Ireland in the Global Information Economy: Innovation and Multimedia 'Content' Industries.

Submitted

by

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Scene from the *Virtual Museum of Colm Cille* CD-ROM.

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Doctor of Philosophy is entirely my own work and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

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The primary objective of this thesis is to examine the process of content innovation in the multimedia industries in Ireland. It is also concerned with the tension between cultural ideals and economic imperatives faced by both producers and policy makers in the field of new media.

This thesis critiques technological determinist approaches to technological and social change and applies instead a social shaping perspective enriched by insights from industrial innovation and communication studies. Multimedia, in this thesis, is defined as both technology and cultural form. While it can be said that multimedia has emerged from the technological convergence of computing, telecommunication and traditional media this thesis adopts a broader perspective. It proposes that the origins of multimedia can be found in economic, political and cultural developments throughout this century and more particularly the social appropriation of a range of communications systems: telephony, photography, radio and television.

Following a theoretical analysis of broad theories of social change this thesis presents a macro analysis of the national and institutional context for innovation in Ireland. This is followed by in-depth case studies conducted in organisations that are producing multimedia content aimed at final users in particular cultural markets. In analysing this sub-section of the information economy in Ireland the thesis is particularly concerned with economic, political and social factors, at a local and global level, which advance or inhibit the process of content innovation. This concern with content and the innovative process in historically and spatially situated firms aims to contribute to both our understanding of the process of innovation as well as our understanding of how new media forms develop. It furthermore aims to elucidate information economy and information society theories by providing a more empirically grounded account of patterns of social and economic change in Ireland, in the global context.

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List of Abbreviations and Acronymns

AOL	America Online
BBC	British Broadcasting Company
BSkyB	British Sky Broadcasting
CEC	Commission of the European Communities
CD-ROM	Compact Disc, Read Only Memory
CNN	Central Network News
CFN	Compuflex Network
CSO	Central Statistics Office, Ireland
CSF	Community Support Framework
DCU	Dublin City University
DIT	Dublin Institute of Technology
DoE	Department of Education
DEE	Department of Enterprise and Employment
DETE	Department of Enterprise, Trade and Employment
EC	European Commission
ECU	European Currency Unit
EireStat	Electronic Database provided by CSO.
EMF	European Monetary Fund
EMS	European Monetary System
EMTEL	European Media and Television in Everyday Life
ERDF	European Regional Development Fund
ERSI	Economic and Social Research Institute
EU	European Union
FDI	Foreign Direct Investment
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product

GII	Global Information Infrastructure
GNP	Gross National Product
GNDI	Gross National Disposable Income
GFCF	Gross Fixed Capital Formation
HE	Higher Education
HEA	Higher Education Authority
HERD	Higher Education Research and Development
ICSTI	Irish Council for Science, Technology and Innovation
ICT	Information and Communications Technologies
IDA	Industrial Development Authority
IIA	Irish Internet Association
IIMA	Irish Interactive Multimedia Association
ILO	International Labour Office
INTO	Irish National Teacher's Organisation
IRTC	Independent Radio and Television Commission
ISDN	Integrated Service Digital Network
ISSC	Information Society Steering Committee
IT	Information Technology
ITU	International Telecommunications Union
MAC	Microelectronic Application Centre
MNC	Multinational Corporation
MUD	Multi-User Domain
NCTE	National Centre for Technology in Education
NESC	National Economic and Social Council
NI	Northern Ireland
NII	National Information Infrastructure
NMRC	National Microelectronic Research Centre
NSI	National System of Innovation

NTIA	National Telecommunications and Information Administration
NIEO	New International Economic Order
NWICO	New World Information and Communication Order
OECD	Organisation for Economic Co-Operation and Development
OST	Office of Science and Technology
PAT	Programme in Advanced Technology
PIS	Primary Information Sector
PC	Personal Computer
R&D	Research and Development
RI	Republic of Ireland
RTC	Regional Technical College
RTÉ	Radio Telifís Éireann
SCOT	Social Construction of Technology
SLIM	Social Learning in Multimedia project
SME	Small to Medium Sized Company
STI	Science, Technology, Innovation
STIAC	Science, Technology and Innovation Advisory Council
STS	Science, Technology, Society
S&T	Science and Technology
TE	Telecom Éireann
TiNet	Telecom Internet
TNC	Transnational Corporation
UN	United Nations
UNESCO	United Nations Education, Science and Cultural Organisation
UNU/INTECH	United Nations University, International Institute for New Technologies
US	United States
USSR	United Socialist Soviet Republics

Irish Nomenclatures

AnCO An Chomhairle Oiliúna	Industrial Training Authority
Bord Fáilte	Irish Tourist Board
Bord na Móna	Peat Development Authority
Bunreacht na hÉireann	The Constitution of Ireland
Córas Tráchtála Teo	A State body concerned with export promotion
Dáil Eireann	The lower house of Parliament with legislative power. Popularly elected.
Éire	The name of the State in the constitution
Forbairt	A State body concerned with the development of indigenous industry
Forfás	Industrial advisory body
Gaeltacht	Irish speaking regions of Ireland
An Foras Forbatha Research (AFF)	The Institute of Physical Planning and Construction
Oireachtais	The legislature which consists of the President and two houses, Dáil Éireann and Seanad Éireann.
Seanad	The Senate or upper house of parliament
Taoiseach	Prime Minister.
Teachtala Dála	A member of the Dáil, abbreviated to TD.

Chapter One - Introduction

1.0 Synopsis

This thesis critiques both theoretically and empirically the widespread claim that new information and communications technologies (ICTs) are driving processes of social change and leading to the creation of 'information societies'. The approach adopted in this thesis proposes that one can only understand technological and social change by adopting a social shaping approach and examining processes of change at macro, meso and micro levels of society. This research project examines socio-technical innovation in multimedia content organisations and in the context of institutional structures and processes of economic, political and socio-cultural change in Ireland during the 1990s.

The multimedia industries, broadly defined, produce hardware, software, producer and consumer information services. This thesis focuses on multimedia organisations which produce content for information goods and services aimed at final users, consumers and citizens. This sub-sector is fundamentally implicated in the 'information society' discourse in that they utilise new scientific and technological inventions, service other sectors of the economy and provide information services to final consumers. A number of international and national reports have also suggested that the 'content' industries are a major source of future job and wealth creation and a factor driving the development of information societies (CEC, 1994a); (CEC, 1994b); (Lybrand, 1994); (ISSC, 1996).

This thesis challenges the dominant technology and transmission based definitions of multimedia. The author conceptualises new multimedia content producers as 'culture industries' and new multimedia artefacts as both technology and cultural form[1]. Historically the culture industries have played both an economic and social role in societies and crucially contributed to the generation, renewal and extension of cultures. This dual role however has also created tensions between economic imperatives and the social ideal of content diversity. This thesis seeks to explore the influence of social structures and political-economic imperatives on the form, content and diversity of new media innovations produced in Ireland. This concern with content and culture is sharply in contrast with information society and industrial development discourses, which tend to empty information of its semantic component and evaluate information only in economic terms.

In this chapter the reader will be introduced to the key concerns and focus of this thesis followed by a review of the research framework and methodology used.

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[1] 'Technology' is defined by the Oxford English Dictionary as the 'study, or use, of the mechanical arts or the applied sciences.' This thesis will use the broader term 'artefact' in order to encompass the hardware, software and content levels of a multimedia good or service.

1.1 Key Concerns & Aims

The central concern of this thesis is to understand the historical factors which have shaped the emergence of consumer information industries and within this to understand the development of content innovations, including 'cultural content' which is aimed at particular ethnic or national cultures, for multimedia artefacts. These concerns are examined on three interrelated levels.

The first level of analysis is broad taking account of macro theories of development and social change and critically exploring information society theories and their assertion that ICTs may revolutionise the economy, society and everyday life. This level of analysis includes historical research on the changing socio-economic structure of the Irish setting and aims to provide a more socially informed and non-technological account of the increase in industries defined as informational and the emergence of consumer information services.

The second level of analysis focuses on the meso level. This draws upon the national systems of innovation (NSI) and social shaping approaches to analyse the Irish institutional set-up and attempts by various actors to shape industrial innovation in the IT and culture industries and influence macro socio-economic change. The NSI approach claims that the national institutional set-up and context can influence the process of innovation at firm level. Government support programmes, for example, may play an important role by assisting or creating the means, incentives and capability to learn for both producers and consumers. This support may be particularly important for an infant industry like multimedia.

The third level of analysis is conducted within multimedia content industries. This thesis rejects traditional linear models of technological development and views innovation as a complex, risky and uncertain process, which is crucially influenced by its institutional setting and upstream, downstream and horizontal learning economies. This level of analysis seeks to explore the influence of the institutional setting, national context and organisational culture on the process of content innovation. The study is also concerned with the influence of these factors on the form and content of the innovation. As symbolic goods multimedia artefacts can act as channels for the distribution and maintenance of information related to national and other collective identities.

A cross-cutting theme throughout this thesis is the issue of convergence. Digitisation is seen as the primary cause of the convergence of previously separate industries, media platforms and information. As an emergent field multimedia content organisations are characterised by their varying industrial backgrounds and their use of multiple-media. However convergence between these different organisations may be problematic given the different histories, industrial frames and regulatory regimes of different fields. This thesis explores the problems which arise at the micro level when organisations attempt to move beyond their core competencies and the tensions which arise when globalising economic

imperatives and cultural or social ideals clash. In turn these trends and tensions have implications for policy makers and state support programmes at a meso level in the traditionally separate realms of telecommunications, computing and the media. The multi-level approach adopted by this thesis allows connections to be made between the micro level of the firm and more meso and macro levels.

In summary, this thesis suggests that:

1. Existing information society theories are based on an inadequate theory of social change and an inaccurate belief in the revolutionary potential of new ICTs.
2. Existing models of industrial innovation and technological diffusion are inadequate to describe the media content innovation process.
3. Multimedia artefacts should be conceptualised as both material and symbolic goods.
4. A 'social shaping' approach which draws upon insights from the national systems of innovation approach, communications and media studies of analysis provides a more adequate framework for analysing multimedia content innovation and the wider implications for institutional, social and cultural change.

The overall aims of this thesis are:

1. To enhance our theoretical understanding of the innovation process by adopting a multi-level and interdisciplinary approach.
2. To enhance our understanding of the development of new media by applying this approach to an examination of multimedia content innovations in Ireland.
3. To contribute to industrial, social and cultural policy by elucidating aspects of the 'information society', the innovation process and the economics of local cultural content production in a global information economy.

The underlying hypotheses of this thesis are:

1. That Ireland has established capabilities in software programming and content design, which could provide the basis for a strong multimedia content production industry.
2. That without institutional and conceptual reform existing socio-economic structures and cultures will not support the production of multimedia content for the domestic market.
3. That the extent to which a message employs culturally specific signifying systems influences both the diffusion pattern and transportability of the final artefact.

1.2 Focus

The main focus of this thesis is on the development of consumer information services in general and multimedia content organisations in particular in Ireland. By focusing on the multimedia content industries this thesis selected a sector of the economy which has been centrally implicated in information economy and information society texts over the past

thirty years (Machlup, 1962); (Porat, 1977); (Bell, 1974); (Masuda, 1981; Masuda, 1985). Despite a library of academic criticism the information society concept has re-emerged as a conceptual framework for both economic and social policy in the 1990s; most notably in the United States and by 1996 also in Ireland (NTIA, 1993); (ISSC, 1996).

It is apparent from an analysis of these policy documents that the social sphere of an 'information society' has become synonymous with the 'market' and that final users are defined as customers rather than citizens (Trench and O'Donnell, 1997). These policy documents tend to focus almost exclusively on developing infrastructures, jobs and economic wealth, while the social and cultural dimensions of new ICTs and the sphere beyond paid employment receives scant attention. While new media technologies may have the potential to restructure both economic and social structures most attention is paid to the former. When information society documents highlight the economic importance of the information industries they tend to focus on developing the potential of the hardware, software and specialist information services, e.g. financial, medical. This thesis aims to investigate another section of the information economy. It will explore the unique characteristics of those industries which produce symbolic content for final users. It is also concerned with the economic, political and social barriers which might prevent multimedia organisations from engaging in the production of particular types of cultural content production.

Multimedia content organisations, as users and suppliers of ICT artefacts, are fundamentally linked into academic and policy concerns about future employment growth, the convergence of industries, the creation of wealth and the changing nature of society. They are inextricably linked to questions of information quality, information inequalities and the potential for a minority culture to produce content for a global market. The Republic of Ireland, with a population of only 3.6 million, is unquestionably a very small economy and market from an international perspective. However, as a country with a strong computer and software export sector, a reputation for producing high quality content for traditional media, and a potential diasporic market of approximately 70 million people it provides an interesting laboratory from which to study the social shaping of a multimedia content industry and its artefacts.

Any study of multimedia is faced with a number of sectorally specific challenges. Multimedia content and technologies are still in the early stages of development and new entrants are faced with many uncertainties in terms of creating products and markets. This fact means that outlining the boundaries of the field and defining the key characteristics of the industry is at best tentative. Multimedia, as technology and cultural form, has developed from the 'convergence' of technologies of computing, telecommunications and media which were embodied in CD-ROM technology in the 1980s (Blackman, 1988) and more latterly in

Internet technology and gaming consoles in the 1990s.[2] For this author its origins can be traced to technological, cultural and language innovations in electricity, telephony, photography, radio and television as well as in computing. This convergence of forms and conventions was seen by the author as potentially highly significant both in media production and media consumption terms.

Multimedia products employ various technologies, networked and stand-alone, combined with varying 'information types' to convey multiple forms of content. As such multimedia products may be seen as 'composite goods' comprising of a number of complementary components. A characteristic of their development currently is the 'flexibility' and 'configerability' of both the technologies and the content (Williams, 1996). A further characteristic is the co-operative and social nature of multimedia product development. This is a result of the embryonic nature of the industry, the complexity of the products and the externalities associated with them. Very few firms have all the required competencies to produce multimedia products and overcome existing market failures (Colombo and Garrone, 1998). This fact poses important challenges to policy makers who are trying to encourage competition on the one hand and co-operation on the other. It also challenges assumptions about the source and nature of the innovation process.

Innovation is viewed by this thesis as a complex, dynamic, circular and 'spatially and historically diverse' process (Leavy and Jacobson, 1997). It is also viewed as a co-operative and cumulative process which depends upon past, present and future learning processes. In order to address the complexities of the multimedia content innovation 'problem' this thesis applies a multi-level approach whereby particular instances of innovation are examined in a broader national and international context. In order to interpret the patterns which emerged the author drew upon theories from communications and cultural studies, the sociology of science and technology and sub-disciplines of economics.

The starting point of this interdisciplinary approach emphasises that multimedia innovations do not take place in a vacuum. Technological change cannot be examined purely at the level of the artefact and in line with many recent works this thesis will argue that 'technological development cannot satisfactorily be treated in isolation from organisational, political and economic matters' (Mackenzie, 1987:195). As a result this thesis highlights the role of particular social structures, politics and State institutions in shaping the process of technological innovation.

As with previous technologies of communication and utility, the origins of new technologies reside in diverse areas depending on the particular social 'formation' and ruling power interests. Many ICT innovations for instance, including the Internet, are driven by the

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[2] Telecommunications is taken in this thesis to mean 'communication over a distance' [tele- origin Greek] and

ambitions of a particular military-industrial complex rather than a desire for improved public communications and more [altruistic] social needs. To the mix of political-economic and institutional factors this thesis would add socio-cultural factors. Raymond Williams argues that communications technologies have traditionally developed in a manner distinct from other technologies and that the development of radio, for example, was crucially influenced by the emergence of a 'new kind of expanded, mobile and complex society' (1974:20).

The social shaping of technology approach has attempted to redress this social deficit with varying degrees of success (Bijker, Hughes et al., 1987; Bijker and Law, 1992; Bijker, 1995); (Hughes, 1986); (Callon, 1987); (Mackenzie, 1987; MacKenzie, 1992); (Wajcman, 1991). These authors attempt to go beyond traditional linear and technological determinist conceptions of technological change to look at the social factors influencing the origin and evolution of technologies. Society and technology are seen as intertwined, a 'seamless web', and the production of new knowledge is viewed as an inter-subjective and social process. In addition end users are seen as an important constituency in the innovation process.

> 'Society is not determined by technology, nor is technology determined by society. Both emerge as two sides of the sociotechnical coin during the construction processes of artefacts, facts and relevant social groups.' (Bijker, 1995:274)

Edge argues that the early work emerging from these schools was fragmentary and lacked integration (Edge, 1988). With this criticism in mind this thesis adopts a multi-level and sectoral approach. It seeks to locate empirical research on multimedia content innovations at the level of the firm within the particular, and largely, (although not exclusively), national, institutional and socio-cultural context in which it is emerging.

1.3 Research Framework[3]

This thesis examines trends, processes, interactions and negotiations at macro, meso and micro levels. At a macro level the thesis is concerned with longitudinal and historical patterns of socio-economic change and the shifting relationships between nations in a global context. At a meso level it is concerned with established social structures, institutions and politics within nation states. At a micro level this thesis focuses on everyday interactions, negotiations and pressures over a short period of time. These three spheres of analysis are not mutually exclusive. Indeed it is proposed here that they are mutually supportive and crucial to any analysis of processes of social change. A number of different theories and perspectives inform this analysis.

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includes the POTS, or plain old telephone service, cable, telegraph and broadcasting. (OED)

[3] This framework is supportive rather than prescriptive.

1.3.1 Information Society and Information Economy Theories

Multimedia artefacts are a product of innovations in a number of scientific fields and developments in information technology, telecommunications, media and software industries in many industrialised nations over the past fifty years. Microelectronic, network and multimedia developments have also lead to the automation and restructuring of more traditional industries in many countries. Many influential texts in the last thirty years have viewed the widespread application of new ICTs as an indication of fundamental economic re-structuring or indeed the end of the industrial age. Other texts propose that these new technologies will lead to fundamental social changes and the emergence of more democratic and leisurely information societies (Bell, 1974; Masuda, 1990). The quite diffuse concept of an information society has been widely criticised within academia in the past twenty years but, like a phoenix, it continually re-emerges as a theory to describe the present reality or the future goal of most advanced industrialised nations in the world. The very persistence and pervasiveness of the concept, particularly in policy circles, validates another intellectual engagement with its formative tenets.

While acknowledging that there have been fundamental shifts in the organisation and function of both productive and consumption spheres in many countries since the 1960s this thesis critically engages with the information society literature. It argues, in line with Kumar (1978) and Webster (1995) and on the basis of empirical evidence in Ireland, that current macro economic trends mark a continuation of long running capitalist trends and not a radical break (Kumar, 1978); (Webster, 1995).

In the work of Bell (1974) information society theories are based on changes in only one sphere of society, the techo-economic, and are too focused on technological innovation in the producer/supply sector to comprise an adequate theory of social change (Bell, 1974). This techno-economic bias places the source of innovation on the supply side and fails to properly address the intricate relationship between supply and demand (Miles and Gershuny, 1983). It furthermore, fails to take account of the background context of innovation; i.e. the institutional, political and cultural diversity, which may lead to varying degrees of innovation and commercial success for an artefact. As with traditional models of communication we find that information society theories are based on a linear model of technical change and a false belief that objective, rationalist and value free technical innovations are the primary cause of social change. They are also driven by a positivistic belief in the notion of technologically driven progress.

A further criticism of the information society discourse is the undifferentiated use of the word 'information'. No meaningful distinctions are made between the broad range of material that it is meant to encompass, from raw data to the bible and CNN news bulletins. Information society theories treat information solely in terms of amounts: bits or pulses. As

Roszak (1986) points out, attempts to quantify the amount of information in society inherently fail to take account of the important qualitative differences between categories of information. 'For the information theorist, it does not matter whether we are transmitting a fact, a judgement, a shallow cliché, or a nasty obscenity' (Webster, 1995:26).

While broadly painting over the semantic and qualitative differences between categories of information, information society theories nevertheless arrive at the conclusion that society is being transformed by the increasing amounts of, and ease with which, information is produced and distributed. To varying degrees the authors highlight the transforming role that new ICTs are playing and their 'impact' and 'effect' on society. Others are less shy about simply promoting the transformative potential of new ICTs. Technological determinism is clearly apparent.

This thesis proposes that we need to disaggregate the term 'information' and identify the differences between different types of specialist/producer type information services and symbolically laden consumer information services. It furthermore asserts that we need to move beyond the presumption that greater revenues and employment in activities defined as informational necessarily imply that society is fundamentally changing. The equation of an increase in the quantity of information with a qualitative transformation of social life is both methodologically and empirically unsound. Such claims ignore the semantic element of the information, political, institutional and socio-cultural biographies as well as the conflictual nature of such developments.

In contrast to information society theories and in line with the recommendations of previous researchers this thesis approaches socio-technical change on different levels and focuses on the interrelationships between them. The first level of analysis focuses on trends in the macro socio-economic structures in Ireland and other European countries over the past thirty years. By adopting the model of social innovation developed by Miles and Gershuny (1983) this analysis aims to compare the macro socio-economic transformation of Ireland with other nation states and begin to account for the patterns which emerge.

1.3.2 National Systems of Innovation and Learning Theories.

In order to further explain the socio-economic patterns which emerge in the Irish case this thesis seeks to identify the unique structural and institutional characteristics of the national setting. The national system of innovation approach argues that the institutional diversity between countries can to some extent explain different types and rates of innovation between countries. 'The ability to absorb technologies relies on national institutional frameworks' (Mjøset, 1992:29). It also emphasises the importance of interrelationships between different actors and the role this can play in the process of

technological change (Freeman, 1994); (Freeman and Lundvall, 1988); (Lundvall, 1992); (Nelson, 1993).

The concepts of 'nation' and 'system' are key to an understanding of the national system of innovation approach. Adherents to this approach define 'systems' to mean the inter-relationships between a variety of institutions which, whether planned or not, contribute to the innovative performance of national firms. These institutions include government agencies, universities, training programmes, incentives, labour relations and the attitudes of people to technical innovations. Importantly for this study the crucial factors seem to differ between industries and between innovations. This approach seeks to identify why countries tend to diverge in their development paths.

> 'the reasons for these differences reside... in national histories and cultures including the timing of a country's entry into the industrialisation process. These have profoundly shaped national institutions, laws, (and) policies.' (Lundvall, 1994:18)

The NSI approach proposes that three trends characterise recent techno-economic developments: flexible specialisation, the adoption of ICTs and a more interactive process of innovation. Central to the NSI approach to innovation is the notion of *learning*.[4] The processes by which knowledge and information are produced and exchanged in 'learning economies' are seen as crucial determinants of innovation and in turn economic development. Shorter product lifecycles, a steep increase in the costs of developing new products and increasingly diverse knowledge sources all add to the complexity and risk involved in innovation at the firm level. Institutions and government may play a role in reducing these risks by assisting in creating the means, incentives and capability to learn and enabling access to relevant knowledge. Despite neo-liberal arguments for less state control it is clear that the state is still an important actor with regard to the production and consumption of new ICTs.

> 'The learning economy is a dynamic concept; it involves the capability to learn and to expand the knowledge base. It refers not only to the importance of the science and technology systems – universities, research organisations, in-house R&D departments and so on – but also to the learning implications of the economic structure, the organisational forms and the institutional set-up.' (Lundvall and Johnson, 1994)

Both the NSI and Learning Economy approaches, while useful, have to date failed to take sufficient account of socio-cultural factors in national settings. A further criticism of both these approaches comes from those who take a more global approach to technological and social change. The nation state may become irrelevant in the context of global flows,

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[4] Indeed learning theories formed an important aspect of the theoretical framework which informed the 'Social Learning in Multimedia' (SLIM) research network.

transnational organisations and transnational programmes of research. In a country like Ireland where foreign direct investment is so important to the economy and where, because the dominant language is English, the media landscape is directly linked into global flows of cultural products, this aspect is increasingly important. In addition, the movement of Irish people throughout the world in the last century means that the flows of both objects and subjects are an important aspect of Irish cultural identity and by extension any examination of cultural content production.

In response the NSI school argue that a national unit of analysis still provides a useful approach and 'valuable insights' into differences between nations and industrial fields. They also point out that in political and policy terms national governments still act in a national context. This thesis takes the view that despite its weaknesses the NSI approach, when defined broadly, is useful and relevant to the concerns of this thesis. It allows us to analyse the institutional, economic and cultural factors which affect the rate and direction of content innovations. It highlights the importance of interrelationships and it also allows for experience, reflection and feedback between elements of the system. The NSI approach goes beyond the broad information society theories and crude quantitative information economy studies allowing us to delve deeper into the qualitative differences between sectors and countries over time.

1.3.3 Innovation Theories & Domestication.

While it may be possible to create a favourable environment for the production of ICT product and process innovations, it is another thing to control or predict the success of new artefacts in the marketplace, particularly in the domestic 'black box'.

The innovation process is more than just a techno-economic process, (although in the early stages, and in retrospect, it may appear to be so); it is also a socio-cultural process. As such, linear models of technological design and diffusion are limited because they do not take into account the social construction, micro-politics and negotiations that shape an artefact after it is diffused. The linear model does little to illuminate the processes by which an artefact becomes part of everyday life and in turn shapes subsequent innovations.

> '...(technological determinism) is an immensely powerful and now largely orthodox view of the nature of social change. New technologies are discovered by an essentially internal process of research and development, which then sets the conditions for social change and progress. Progress, in particular, is the history of these inventions, which created the 'modern world.' (Williams, 1974:13)

In response to the weaknesses of linear models a new interdisciplinary approach emerged during the 1980s. Writers from the Empirical Programme of Relativism (EPOR) and the Social Construction of Technology (SCOT) programme found common ground in their

approaches to the study of science and technology. What emerged was a loosely defined STS (Science, Technology, Society) school which drew upon the language of sociology, history and semiotics to describe how a technology develops and acquires meaning through use and negotiation (Bijker, 1987:26). This approach views a technology as 'flexible' but argues that it acquires stability over time as certain interpretations and solutions become entrenched.

This thesis will argue that these STS theories, while hithertofore have been mainly applied to large technological systems and industrial technologies, may be usefully applied to consumer orientated ICTs. This argument is based on the fact that they highlight the continuous nature of innovation, they remove the emphasis from pre-production research and development (R&D) and they make allowances for the role of the end user. Furthermore, they allow for the role of the technology as 'actant' and they pinpoint how 'relevant social groups' or 'interest groups' may influence how certain users or values are 'inscribed' in an artefact (Bijker, Hughes et al., 1987:40&44).

In industrial organisations social shaping researchers coined the term 'innofusion' to capture how technologies are shaped by their contexts of use and users (Fleck, 1988). Researchers from this school highlight how end users acquire new knowledge and learn to use new artefacts. Learning by doing and by interacting are both strategies which illustrate the limitations of education and training programmes premised on the transfer of codified knowledge. They also highlight how the site of use should be viewed as an important site of innovation to which producers should have continual access in order to improve their innovations.

In other settings STS borrows concepts from ethnographic studies which highlight how, in both industrial and domestic contexts, end users struggle to 'learn' how to use new artefacts and how to 'domesticate' them into their everyday life (Silverstone and Hirsch, 1992). The introduction of new artefacts into 'learning economies', such as the home, involves more than the mere application of codified knowledge but may in fact involve the negotiation of already existing social relations and competencies. Producer awareness of such local transformations may prove vitally important to initial and incremental innovation.

These theories propose that we are seeing the softening of boundaries between: macro/micro, internal/external, global/local and public/private. An important issue for the empirical part of this thesis is to explore how the context of use influences the design, appropriation and re-invention of radical and incremental innovations. Within these processes the symbolic level of the artefact plays an important, but neglected role. ICTs have an important 'double articulation' and they should be understood not just as material objects but also as communications media which mediate public and private cultures through the

dissemination of symbolic texts. This dimension is crucial to an understanding of multimedia content innovations in the culture industries.

1.3.4 Content & Representation.

Most information society and innovation studies fail to deal adequately with the content dimension of ICTs and issues surrounding representation and 'meaning'. In STS there have been theoretical developments with regard to how material objects may acquire symbolic meaning but to date most have failed to explicitly consider symbolically laden artefacts, such as multimedia cultural content products, or their representational strategies. They have also failed to make connections between this level of the artefact and diffusion/appropriation/re-innovation processes. Where 'content' is discussed it is unhelpfully used to describe the essence of a technology and how a social group attributes meaning to it, i.e. gives it content (Bijker, Hughes et al., 1987:159-187).

When one analyses the information/content of multimedia artefacts one cannot ignore the fact that in order for one to value, or determine the quality of the content, one must look at how meaningful the content is to those who may use it. Two important actors in the multimedia innovation process are firstly the producer who must 'inscribe' his audience in the artefact at different levels and secondly the final audience, or end user, who appropriates this artefact and translates it into everyday life. User-producer linkages, feedback loops and distance, defined in cultural rather than geographic terms, are vitally important parts of the innovation process for this thesis. Furthermore, the use of the term process is intentional; it highlights the continuous and complex movement of objects and meanings in the context of one's everyday environment. New online technologies theoretically allow for even greater user discrimination, feedback loops, learning economies and incremental innovation. Indeed design 'fashions' and 'seasonal fatigue' can be conceptualised as drivers of innovation in both traditional and new media fields.

An understanding of innovation in general and the content innovation processes in particular is crucial to an understanding of the development of multimedia industries and the various dimensions of the socio-political project which is known as an 'information society'. The traditional media and cultural industries produce cultural content that piggybacks on technological innovations from other industrial sectors. The content of these artefacts produce, within a set of constraints, pleasures and meanings which must 'satisfy' more than basic 'needs'. While an everyday household utensil may fulfil symbolic as well as functional uses it is highlighted by this thesis that cultural artefacts are 'doubly symbolic', i.e. they have meaning both as objects and as mediators of public and private culture (Preston, 1998);(Kerr, 1997a); (EMTEL, 1995).

As objects, artefacts acquire meaning through user experience and external mediating processes like advertising, marketing and regulation (du Gay, Hall et al., 1997). As media they employ signification processes and distinct 'rhetorical systems' which, while they cannot determine what and how audiences consume them, do restrict the repertoire of meanings available. This thesis will argue that the extent to which a message employs certain signifying systems influences how culturally specific or non-specific the final artefact will be. This in turn may act to simultaneously limit the transportability of the content across markets but enhance its acceptance within certain markets.

Despite the technological convergence caused by digitisation it is hypothesised here that industrial convergence may be a problematic process. Multimedia producers from a non-production background may have problems moving beyond their established 'technological frame' to produce content aimed at final users. Indeed empirical evidence would suggest that certain types of technologically innovative but 'textually' mundane ICTs have failed to achieve expected market penetration because their producers failed to appreciate the role of content in the appropriation process. While much research and development has been focussed on improving visual or aural quality insufficient emphasis is paid to the overall narrative and processes of signification. This supply-push was evident in the case of television where the technology existed before there was any real need, or understanding, of what content might be distributed via it.

> '...important parts of the content were and have remained by-products of the technology rather than independent enterprises. As late as the introduction of colour, 'colourful' programmes were being devised to persuade people to buy colour sets. In the earliest stages there was the familiar parasitism on existing events: a coronation, a major sporting event, theatres.' (Williams, 1974:29-30)

This thesis is concerned with how content producers construct particular types of meaningful content for already existing, but still evolving online and offline multimedia technologies. In investigating this process the work draws upon work from the structural and post-structural semiotics of Saussure and Barthes, the audience research of Morley, Silverstone and Hirsch and the cultural studies of Williams, Du Gay and Bourdieu. This framework allows one to be sensitive to both structure and agency while exploring how communication practices interact with both culture and identity. It acknowledges at the same time the increasing speed and quantity of cultural flows across geography and time at a global level and the active construction and negotiation of cultural identities at a local and individual level.

In linking micro production and consumption processes to macro structural and institutional contexts this thesis is situating the particular firmly within the general to help illuminate macro processes of socio-economic change. In illuminating the problems

encountered when organisations produce meaningful texts for new platforms and exploring the role that cultural texts can play in constituting cultural identities this thesis is tracing the role that culture plays in the content innovation process. This is not to ignore the tensions within culture industries between the economic goals of profit and the socio-cultural ideals of diversity and creativity.

1.3.5 Political Economy of the Media.

The political economy perspective within the field of communications theory provides some highly pertinent concepts and analytical tools related to the specificities of the culture industries. Evolving from structural Marxism the perspective emphasises the role that structural features play in shaping information/media messages within the context of existing socio-economic systems. This body of work suggests that regardless of the emergence of new technological processes and products, capitalist priorities remain as salient as they were in modern, industrialist societies. It stresses the continuities inherent in the present age, in contrast to the information society theories. It also addresses the key issues involved in the establishment and institutionalisation of media/cultural industries, including the process of commodification and the tensions which exist between cultural and industrial policy concerns.

Political economists argue that despite the increasing quantities of information in society large transnational corporations increasingly control information production. They specify that market criteria and economic characteristics like ownership, advertising revenue and the spending capacity of an audience determine what type of content/information a media organisation produces and at what price (Webster, 1995:75). In contrast to the information society accounts, critical theorists argue that the increased volume of information is largely being created by and for the industrial-military complex and that this complex is driven by purely economic and profit motives.

> 'What is called the 'information society' is, in fact, the production, processing, and transmission of a very large amount of data about all sorts of matters-individual and national, social and commercial, economic and military. Most of the data are produced to meet very specific needs of super-corporations, national government bureaucracies, and the military establishments of the advanced industrial state.'
> (Schiller, 1981:25) Cited in (Webster, 1995:85)

Critical political economy theorists point out that 'corporate capitalism' has been the main beneficiary of the development of new ICTs and that this has been accentuated by the adherence of politicians to a regime of deregulation. Global networks underpin global production whereby certain parts of the production process will be located in areas/nations where the cheapest labour and best incentives are available. This may not be to the economic or social advantage of the host nation given the expatriation of profits, transfer pricing and

the sourcing of component materials abroad. Increasingly, it is argued that global corporations influence national policy and encourage nation states to liberalise their trade and communications systems to allow for the free movement of goods while small nations are powerless to counter-influence the global companies.

A corollary of the political economics of media production in a globalised context is that larger and fewer corporations will come to dominate the production of increasingly homogenised products. As more and more information is 'commodified', 'ability to pay' becomes a crucial determinant of production and access and this may lead to the generation of, what has been rather crudely termed, information 'rich' and information 'poor' people. This has serious consequences for public access to, and control of, information. The dominance of economic over social ideals has already been identified by authors in their examination of the production of films, news and literature and the global dominance of a restricted number of forms and sources of information. This restriction has important implications for the diversity of messages available and as a consequence, cultural and citizenship rights. Increasing global consolidation and the de-territorialisation of global media companies may lead to decreasing diversity of content and this may have serious implications for minority cultural and political identities.

The prevalence of market criteria implies increasing standardisation of information at the level of form, as well as narrative, and pseudo-individualisation. The prevailing aim is to create transportable 'global' entertainment programming and not programming which educates, contributes to one's sense of citizenship or one's membership of distinctive political, social or cultural communities. The critical approach suggests that the media act as a channel to simply develop 'false' needs and that with new distribution platforms the speed and reach of these images has reached such a state of saturation that the images and signs are meaningless in reality. They are merely 'attention-grabbers' which deliver audiences to advertisers and stimulate the development of overseas markets. (See section 3.4.1)

There are many means of domination: economic, political and cultural. Despite the changing world order in the last thirty years and increasing globalisation of economic and communication systems some argue, convincingly, that the old hierarchy of nations survives driven by transnational corporations instead of armies. Whereas in the 1960/70s cultural production chiefly originated in America, today global cultural production is dominated by a few thousand transnational corporations which are still predominantly American but whose interests are spread globally and whose primary motive is profit (Schiller, 1991:15). All these trends point not to a radical change in existing social systems but to a continuation of historical capitalist systems and relations of power on a larger scale.

While this perspective is useful in highlighting the structural influences of organisations and capitalist forms of society, a number of weaknesses should be noted. In particular this

perspective focuses entirely on the sphere of production and therefore ignores the 'active' role of end users, viewers and audiences in deconstructing, negotiating and appropriating material and symbolic goods. While recognising that in some instances the role of the end user may be limited and that people are increasingly subject to ideological saturation across a diversity of media, ethnographic audience studies point to social and cultural possibilities which may offer room for countervailing tendencies. This raises the issue of end user agency and appropriation into local contexts. A key concern of this thesis is to explore empirically whether new digital media will create new opportunities for local and regional cultural production and consumption which could counter, to some extent, the de-territorialisation and homogeneity of global media systems.

1.3.6 Summary

Communication theory deals less with content and meaning construction than one might expect. Dominated in the early days by transmission, institutional and structuralist research it was only with the advent of ethnographic audience research that the role of the end user/audience in meaning construction and content innovation was highlighted. With new media and new forms of interactivity even more attention must now be paid to how producers represent their audiences in artefacts and how personal and social biographies influence the way that people domesticate, use and play with these artefacts (Jankowski, 1996:8). Similarly the increasing mobility of people and the decrease in structured 'work time' means that new opportunities and challenges have been opened for multimedia content producers.

To date many communications producers and researchers have failed to take account of the shift from mass, transmission and effects theories to more interactional, contextual and cultural perspectives. If one adopts the former models, along with evidence from information economy research, one might conclude that society is suffering from 'information overload' and that the pervasive use of symbolism and signification, often out of context, must be leading to an emptying out of meaning. One might also arrive at the post-structuralist perspective that the streams of endless simulations have no influence beyond the moment of interaction. If modernity was characterised by representation and authenticity then, for some theorists, postmodernity must be characterised by the trivial and simulation (Baudrillard, 1993) Cited in (Webster, 1995:178).

> '...culture is quintessentially about meanings, about how and why people live as they do, it is striking that with the celebration of the non-referential character of symbols by enthusiasts of postmodernism we have a congruence with communications theory and the economic approach to information...Symbols are now everywhere and generated all of the time, so much so that their meanings have 'imploded', hence ceasing to signify.'
>
> (Webster, 1995:28)

While there are undoubtedly increasing flows of information on a global scale this thesis explores how in particular settings small to medium sized companies (SMEs) produce certain types of cultural content which are not aimed at a global audience of 'average viewers' but rather at more specific ethnic and national audiences. It also examines how these companies 'represent' their end user and use social conventions and codes to construct meaning and identities for them. These works have 'significance' for certain groups and individuals based on their cultural needs and capacities for analysis or symbolic appropriation. A discussion of the design and reception of cultural works implies a consideration of the values brought to bear on them at different moments' (Bourdieu, 1993:21). These values depend on 'habitus' and 'cultural capital' (Bourdieu, 1994).

A person's 'cultural capital', i.e. store of cultural knowledge and internal codes gained over time and through families, schools and social groups, influences how cultural artefacts are designed and consumed. Cultural capital cannot be reduced therefore to codified forms of knowledge that are transferred solely through formal institutions. While in theory 'cultural capital' or 'taste' is accessible to all, empirical work has found that its accumulation is closely related to existing and unequal economic, academic and cultural relations. Within these structures however individuals are increasingly reflecting upon themselves and others; to the extent that they are questioning once authoritative sources of knowledge. This increasing 'reflexivity' can be analysed on different levels. In this thesis it is proposed that in the process of producing and consuming artefacts one can identify not just cognitive reflexivity, but also an aesthetic reflexivity. This is an important component of not just the appropriation of the material object but also of meaning construction at the level of symbolic texts and the creation and negotiation of different identities in increasingly dis-embedded lifestyles (Lash & Urry, 1994:7&47).

Multimedia is conceptualised in this thesis as a 'cultural industry' and multimedia artefacts as both technology and cultural form. In contrast to Bell, 'culture' or 'cultures' are seen here as an intrinsic part of society as a whole; rather than a distinctive domain separate to the social and economic spheres. It is further viewed as dynamic. The Scottish influences found in the Donegal style of fiddling and the American tap influence found in Irish dancing are just two examples of how 'traditional' cultural activities have been influenced by other cultural styles. New means of reproduction and distribution may speed up the mutation of cultural forms, or, act to reinforce existing identities.

The multimedia content production process, as with that of television, radio and cinema, is about the reproduction of old as well as the creation of new forms and types of content. New artefacts both combine and cross previously established boundaries between different genres: games, entertainment, and education. Indeed it is argued that just as television

distributes different types of programmes with different functions, codes and conventions, so new multimedia companies are exploring different 'programming' possibilities for different online and offline functions.

Far from causing a revolution in working and living conditions new ICTs and new cultural forms are viewed in this thesis as slowly emerging and 'socially constructed' artefacts which emerge through a process of negotiation between many different actors and translations in different spheres. Unfortunately for the final consumer and citizen media content production is increasingly controlled by fewer players whose primary aim is to profitably 'exploit' information resources and distribute these as widely as possible.

When this research was conducted in 1995/6 multimedia was an emergent industry with many heterogeneous actors diversifying into the field to gain experience with the new technologies and to demonstrate their 'innovativeness' to their respective publics. This time is best characterised by uncertainty, interpretative flexibility and experimentation. As with photography, radio and television the technical platforms and infrastructures for multimedia also preceded the development of innovative new content and forms.

> '...radio and television were systems primarily devised for transmission and reception as abstract processes, with little or no definition of preceding content....It is not only that the supply of broadcasting facilities preceded the demand; it is that the means of communication preceded their content.'
>
> (Williams, 1974:25)

1.4 Methodology and Research Techniques.

This section will outline how the multi-level approach and interdisciplinary research framework was implemented and will address the research problems which arose. It will explain how trends which arose at macro and meso level in years one and two were explored in more detail using case studies in years three and four. The research strategy adopted is broadly in line with Webster's suggestion that:

> '...social theory, combined with empirical evidence, is an enormously richer, and hence ultimately more practical and useful, way of understanding and explaining recent trends in the information domain.'
>
> (Webster, 1995:3)

1.4.1 Research Techniques, year 1 & 2.

This thesis began with a number of related questions. Coming from a communications perspective the author was interested in multimedia both as technology and cultural form and exploring the relationship between existing media markets, institutions and artefacts and new emergent multimedia artefacts. At a broader level the author was interested in exploring the socio-economic and political factors which were supporting or suppressing the development of computerised multimedia developments in a number of countries, including Ireland. Finally, the author was interested in exploring how these micro and meso level

developments were implicated in, and related to grand theories of social change and development. From these basic questions a programme of work developed.

The work for this thesis began at the macro level, moved to the meso and the micro levels and then moved between the three in constant iterations. Following Cassell, 'techniques' are defined as particular ways of gathering data (Cassell and Symon, 1994:10) and in this thesis different research techniques were employed at different levels of analysis A theoretical framework based on the social shaping approach informed the research questions and techniques used at all levels. At a macro level the research adopted a quantitative, data-analysis approach, at a meso level desk-research, interviews and documentation analysis were conducted while at a micro level this thesis conducted case studies which involved participant observation, observation and interviews. The variety of techniques and the multi-level approach aimed to improve the validity of the findings and make connections between long-term historical trends and particular instances of socio-technical change. The research approach therefore addressed the research questions by drawing upon both quantitative and qualitative techniques and adopting both a deductive and inductive approach to theory.

The work programme for this research project began in early 1995 as relevant literature on macro and meso level theories of development and social change were sought. This stage of the research process aimed to develop a historical and theoretical understanding of the factors influencing socio-technical change. Two competing theoretical approaches emerged: one which viewed technological change as the driver of social change and another which viewed technological change as socially shaped. The 'information society' concept best epitomises the former approach and Daniel Bell's work (1973) on this concept provided a sociological and historical account of the concept, a concept which has re-emerged in national and international policy documents in the 1990s. The latter approach known as 'social shaping' is a relatively new, and inter-disciplinary approach which emerged in the 1980s.This thesis adopted the social shaping approach and extended it to take account of relevant insights from evolutionary economics and media studies.

Information society theories were based initially on a number of influential quantitative studies of the US and OECD countries which highlighted the growth in information goods, service industries and information type work. Following the literature review stage the researcher proceeded to a quantitative survey of macro socio-economic trends in Ireland and a number of other European countries in order to establish how Ireland fitted into, and compared with international socio-economic trends. The data was compiled from national Central Statistics Office (CSO), EuroStat and OECD sources.

In analysing this data a useful theoretical and empirical reference point was an earlier study on the development of service economies by Miles and Gershuny (1983). Their work

rejected the information society and information economy work and developed instead a model of social innovation which attempted to account for socio-economic changes by examining intra and inter-industrial changes and relating them to changes in consumption patterns and wider social processes. This model was adopted by this thesis in order to begin to map international and national trends which emerged in a number of countries since the initial information economy studies in the 1960s.

This period of quantitative analysis coincided with a six-month research fellowship at the United Nations University, International Institute for New Technologies (UNU/INTECH). While in Holland the author was exposed to a number of theoretical approaches from outside her discipline including the national systems of innovation approach, learning theories and STS. The position at UNU/INTECH also provided a level of status which enabled the researcher to interview policy makers in government departments and agencies involved in science and technology in Ireland. This period of research culminated in a report called *'The Evolution of Science and Technology Policy in Ireland, 1963-1995. Issues and Responses'. A* year later a paper based on this work and entitled *'Innovation and Learning to Adapt: Key Factors contributing to the social shaping of multimedia in Ireland'* was presented at an international conference in Seville on 'Technology Policy and Less Developed Research and Development Systems in Europe. Part Two of this thesis draws upon this work.

The findings of the report prepared in Holland provided a platform from which an analysis of the national structural specificities, the public institutional context of innovation and the establishment and negotiation of boundaries relevant to the multimedia field could proceed. The national system of innovation approach provided some useful guidelines as to the pertinent structures at this meso level. Given the emergent nature of this field and disagreement over what in fact constituted 'multimedia', a number of qualitative techniques such as informal interviews, site visits to firms and analysis of 'artefacts' helped to establish the discourses and meanings attached to multimedia. This openness to diverse definitions of the field is an important feature of qualitative research.

During 1996 the researcher became involved in a two-year Targeted Socio-Economic Research (TSER) funded network investigating 'Social Learning in Multimedia' (SLIM). This network included researchers from eight different countries; Scotland, Belgium, Netherlands, Germany, Switzerland, Norway, Denmark and Ireland and from a variety of disciplines: STS, SCOT, Sociology, Economics and Communications/Media Studies. Much of the ensuing theoretical and empirical work was done in conjunction with, although not

always in agreement with, this network.[5] This work also provided important comparative insights into the process and meanings attached to the creation of cultural content in different countries.

1.4.2 Research Techniques, year 3 & 4.

At a micro level of analysis this project proposed to conduct case studies in a number of multimedia content organisations. Case studies are a research strategy used within a variety of disciplines in order to provide a 'detailed investigation, often with data collected over a period of time, of one or more organisations ... with a view to providing an analysis of the context and processes involved in the phenomenon under study' (Hartley, 1994:208). Case studies are a useful research strategy in that a number of different qualitative techniques can be used in order to examine a complex social phenomenon. Case studies also allowed this particular project to investigate the importance of context, including the national and institutional context of innovation, in relation to particular instances of socio-technical innovation. The approach adopted in this project was not to generalise from the particular to the entire economy but rather to investigate how change in one sector of the economy, within a particular set of contingencies, might illuminate and provide insights into macro and meso socio-economic trends and survey data.

Databases and multimedia surveys were only partially effective in comprehensively capturing the extent of the multimedia field and in order to choose the care studies a certain amount of snowballing and informal discussions with important figures in the field were useful. Government agencies and industry bodies provided initial gateways and sources of documentation. Telephone contact was also made with a number of firms in order to discuss the type of product or service they were producing and assess their suitability. During this period and following iterations with colleagues in the SLIM network a number of selection criteria were drawn up. These were:

1. The case must be located on the island of Ireland with a fully independent management [or more than 50% Irish].
2. The creative ideas must originate in Ireland or from an Irish national (modified).
3. The product idea may originate with a client or with the multimedia producer.
4. The multimedia product must be aimed at final users.
5. They must presently be in production of a multimedia service or title.
6. The cases must cover a range of on-line and off-line multimedia products: CD-ROMs, information kiosks, Internet, CD-i, interactive television, dedicated games platforms.

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[5] The full case studies are available on the SLIM website at www.ed.ac.uk/~rcss/SLIM/SLIMhome.html and in paper from the author.

7. The products must incorporate more than two of the following media: animation, graphics, sound, video, still images, interactive user interfaces.

It was also decided that the choice of 'appropriate' case studies should, for comparative purposes, include at least one company from each of the following categories;[6]

1. Traditional cultural industries (print, audio-visual, music).
2. Diversified computer software companies.
3. New multimedia content developers.
4. Other (Educational/Voluntary group projects).

A short list of ten potential cases representing all four of the categories identified above was made from the potential population. Each of these companies were then telephoned to establish the timing and stage of product development and how this might coincide with the timeframe of the research project. These telephone calls eliminated a number of potential cases whose projects were delayed for financial, logistical or other reasons. Finally, letters were sent to four firms inviting them to participate in the research project.

These letters explained that the research project aimed to 'examine the factors which influence, and are influenced by, the continually evolving cluster of technologies and forms of communication which constitute what is widely understood as multimedia.' It also emphasised that the project was primarily interested in the production of content and the representation and involvement of the end user in the production process. At this stage it was envisaged that the researcher would spend up to two weeks in each firm as a participant observer followed by telephone contact and further meetings if required. The four organisations, which were chosen, included one foreign owned firm and one firm based outside Dublin. In the case of the foreign owned multinational computer software company two meetings and a confidentiality document were required to persuade them to participate. The researcher found that in order to enrol this case it was necessary to explain in more detail the broad research objectives and indicate what use would be made of the research findings. These negotiations took place over a period of six months.

Timing was important in order to efficiently use the time spent in the company while remaining within the timeframe of the research project. In most cases the companies were visited as production deadlines loomed. In this hectic period the researcher's presence faded into the background and one became part of the team. For the researcher this period involved acclimatisation, documentation gathering, observation and participant observation. A notebook was kept to hand at all times. Anecdotal information on the spatial and temporal

[6] Appropriate relates to the selection criteria on pg 20-21.

organisation of the firm was noted. Verbatim accounts of what was said, the terminology used and the negotiations involved were also recorded. This written data was supplemented where possible by photographic data, copies of production scripts and transcripts showing the evolution of the content and publicity documents including press releases and newspaper articles.

Once the production deadline had passed key figures were interviewed in relation to the origin of the project, the production period and the expected aftermath. Given the period of time spent in the firm the researcher was able to target interviewees and interviews more carefully and cross-reference or clarify material from other sources. The number of interviews conducted in each firm depended on the size of the organisation and the division of labour within it. In each case a manager, a programmer and a designer were interviewed, supplemented by significant others. Each interview lasted approximately one hour and was guided by a list of open-ended questions (see Appendix A).

These interviews were transcribed and analysed in accordance with the initial aims of this thesis and the SLIM network. The interviews also gave rise to new issues. The findings from these interviews were compared with other sources of information in a triangulation of methods. Various problems arose during these interviews which included background noise, difficult accents, uncommunicative and too communicative interviewees. However the triangulation of research techniques helped to overcome these problems. Relationships were maintained with all the cases via telephone calls, e-mails and post in the period following the in-firm research. This proved useful as new designs, content and organisational forms evolved. In some cases the new information only confirmed previous findings. During this period the research findings were discussed at SLIM meetings and results from studies in other countries were used as a foil to analyse developments in Ireland. This was particularly useful given the lack of research on new media in Ireland.

1.4.3 Research Issues

The first research issue which emerges from this project is the influence of the researcher on the object/subject of study. It emerged in one firm, for example, that a team meeting was scheduled to coincide with the researcher's visit. Discussions with individuals after the meeting revealed that such meetings were a rarity and that the items discussed, such as off-site training, would probably never materialise. This incident caused the researcher to become more cautious and alert to possible alterations in firm behaviour. It also underlines the value of case study research which allows the researcher to develop a deeper understanding of a research case than survey methods.

In some cases the researcher's influence extended to the content being produced. Given the researcher's background in communications studies and the need for a participant

observer to assimilate into an organisational culture in one case the researcher became involved in recording voice-overs, conducting demos and interface design. Other factors may also have influenced or in some way biased the research process and findings (Boucher, 1994). These included being Irish, female and middle-class.[7] It is proposed that these factors did not however become significant biases due to the constant iterations with the thesis supervisor, with researchers in the SLIM network and with members of the production teams themselves. Nevertheless they are presented here in order to allow the reader to judge whether or not these factors have influenced the work presented.

The second issue which emerges from an analysis of the research techniques relates to the completeness of data and this had obvious implications for Part Two of this thesis. In particular differences between national and European classification systems and changing classification systems over time made longitudinal analysis precarious. A balance had to be found therefore between aggregation and comparativeness when analysing structural changes in production in Ireland. In relation to consumption data (Chapter Four) problems arose because of the lack of internationally comparative data on Ireland.

A third issue involved access and the period of time spent in each organisation. This was of necessity limited and could only give a partial view of internal behavioural patterns and processes. In other instances the work of employees, particularly project managers, was not obvious, or had been written in confidential e-mails or confidential reports. This was a particular problem in the foreign owned multinational where marketing and strategic decisions were made outside the Dublin firm. Despite repeated requests for interviews with personnel from these other centres the manager of this project team felt it was 'inappropriate' to 'bother' these other centres. In order to maintain good working relations with this team it was felt that contacting these other firms should be left until after the initial fieldwork was completed. By this time however the product had changed so much that it was felt it would be difficult to engage people in such 'historical' discussions.

A final issue, which emerged during this research project, involved project control and the influence of what might be termed 'stakeholders' in the research (Cassell et al., (eds.) 1994). Stakeholders have been defined as 'actors, agents, interested parties, interests, interest groups...a stakeholder is any interested party affected by or affecting the phenomenon' (Ibid., 1994:190-191). In this research project the work programme was influenced by the research framework of the SLIM network and the funding priorities of the EC which supported the researcher over a period of two years. These influences meant that much energy was spent trying to formulate usable policy recommendations in addition to the other

[7]Interviewees in one case remarked how they had expected a 'middle-aged school teacher type' and were relieved to find that I was more like a member of their own production team.

objectives of the thesis. It was also found that the cases themselves became stakeholders in the research, not only commenting on and clarifying issues which emerged from their interviews but wanting to change the 'meaning' of what they had said. In one case lengthy negotiations were entered into in order to produce a case study which the researcher felt was 'independent' but which the organisation felt was 'fair'. Interviewees were similarly concerned with erasing conflict and maintaining an impression of effortless co-operation. While some compromises were made in the case studies for the SLIM project the researcher has more freedom to re-analyse the conflicts in this text.

1.5 Thesis Outline

The layout of this thesis is closely related to the multi-level approach previously outlined. Part One is theoretical and introduces the reader to a selection of macro and micro theories of technological and social change. Part Two examines the macro and meso context of innovation in Ireland while Part Three explores the micro level process of socio-technical innovation in its institutional and local context.

Part One examines in detail the theoretical framework which informs the research approach of the thesis. In Chapter Two the reader is introduced to some broad theories of social change including a critique of those theories which suggest that information industries and ICTs are leading to the creation of a fundamentally different economy and society. This is followed in Chapter Three by a review of more meso and micro level theories of technological and cultural innovation, and the development of an interdisciplinary 'social shaping' framework for the analysis of the development of multimedia content in Ireland.

Parts Two and Three provide a meso and micro level examination of the context and process of socio-technical change in Ireland. Part Two consists of Chapters Four and Five which describe the broad social, institutional and historical context of the development of service industries, in general, and multimedia content industries, in particular, in Ireland. Part Three draws upon detailed case studies in four production companies to address the micro process of innovation. (Again this part consists of two chapters, Chapters Six and Seven.) Chapter Eight presents the main conclusions of the thesis in relation to the key concerns and aims outlined in section 1.1.

Part One

Theory

Chapter Two – Theories of Social Change and Technological Innovation

2.0 Introduction

This, and the next chapter, will examine in more detail the theories of social change which informed the research framework. The aim of this chapter is to critically assess claims that we are currently experiencing a socio-economic revolution on a macro level caused by the constant innovation in ICTs and new information products on a micro level. In particular it will examine the highly influential information society concept as espoused by Daniel Bell (1974), the knowledge and information economy perspectives advanced by Machlup (1962) and Porat (1977) and the social innovation model of Miles and Gershuny (1983).

After an initial examination of early industrialisation theories the contemporary social theories presented in this chapter fall into two camps (Webster, 1995). The first emphasises the uniqueness of economic and social structures in some countries and in comparison to industrial societies. The approach also highlights the increasing importance of information and ICTs in shaping these structures. They describe these new social formations as information societies. The second camp emphasises the continuities evident between existing societies and industrial society and suggests that social change is a much more complex process. While the former tend to emphasise the central role of ICTs as a driver of social change the latter argue that ICTs are crucially shaped by existing political, economic and cultural structures.

While there is little theoretical agreement on the exact nature of contemporary social formations most of the theorists examined in this chapter agree that in the last thirty years, in a number of economies, there has been an increase in the number of people engaged in the production, distribution and interpretation of information goods and services. Within this expanding information economy multimedia hardware, software and content industries have been highlighted as important sectors. In particular the development of new content industries have been seen as crucial to the successful diffusion and appropriation of information networks and terminals (Miles and Gershuny 1983). In an attempt to exploit the wider social and economic potential of these sectors a number of US, EU and national publications within the past ten years have resurrected, and in some cases uncritically appropriated, the 'information society' concept as a development goal. It is therefore important that this chapter should critically assess the origin and basic tenets of this concept.

2.1 Industrialisation, Industrial Society and Development

This section presents theories of socio-economic change and development from the early sociology works to the present. It reviews theories of industrialisation from national international and global perspectives in order to situate, and critique, the post-industrial society theories which follow.

2.1.1 Industrialisation and Industrial Societies – National Perspectives.

Post-industrial society theories are premised upon quantitative evidence from western industrialised nations, which shows that important structural changes took place this century. Most information society theorists conclude from this evidence that we have entered, or are entering, a radically new and different era, and that our present state is transitional and characterised by immense and rapid change. In trying to develop a grand theory of society at a time of 'crisis' these writers are following in the vein of 18th and 19th century social theorists who believed that a crisis was a sign that society was going through fundamental changes. A second similarity is their explicit, or implicit, belief that society evolves according to a grand plan, or, on a given trajectory. A correlate of this epistemological position is the belief that technical or social change is progressive and leads to a qualitative improvement in everyday life.

Since the late 17th century 'change' has been viewed as progressive while rational thinking and science have been perceived as the keys to this progress (Kumar, 1986:14). The 18th century work of Turgot and Condorcet initially formulated these views and their work informed the work of later sociologists like Saint-Simon and Durkheim. These philosophers/sociologists were primarily concerned with change, the temporary nature of the present, evolution and revolution. They presented largely secular, rationalist theories of social change which promoted the work of scientists and positivism.

> 'The aim of every science is foresight. For the laws established by observation of phenomena are generally employed to foresee their succession.... '
>
> (Kumar, 1978:23)

When viewed in relation to post-industrialisation theories these early theories of social change are illuminating. For Henri Comte de Saint-Simon progress was inevitable and had been achieved through alternating periods of stability (organic epochs) and conflict (critical epochs). He periodised historical societies into three grand eras: polytheism/classical antiquity, theological/feudal society and science/industrialism. These three periods were organised around a single ideal and elites who championed it. They were relatively stable and only overthrown through both political and philosophical revolution and critical periods of transition, e.g. the French Revolution and the Enlightenment. Each period of conflict was

'inevitably' succeeded by a new organic epoch based on new philosophical and political principles. For Saint-Simon industrial society would be transnational, bureaucratic and recognise the role of scientists, industrialists and artists.

> 'The men who brought about the Revolution, the men who directed it, and the men who, since 1798 and up to the present day, have guided the nation, have committed a great political mistake...They should have been forced to recognise the fact that the scientists, artists and industrialists, and the heads of industrial concerns, are the men who possess the...positively useful ability, for the guidance of men's minds at the present time.'
>
> (Saint-Simon, cited in Kumar, 1986:35-36)

Henri Comte de Saint-Simon, an early purveyor of the 'science of man', also provides us with important insights into the nature of industrial society. For him an industrial society was one whose origins stretched over six centuries and which had resulted in multifarious and fundamental changes in the structures of both the economy and society. In industrial societies industrial organisation, values and structures had succeeded in overthrowing the feudalist system, emancipating people from the communes and displacing both religion and priests as a source of value and morals. Following the French Revolution he proposed that society should be organised not by politicians, or the military, but according to an industrial order.[8] Industrial production and society, for him, should be managed by an elite of intellectuals of theory, scholars of application and artists, those with knowledge rather than power.

Industrialisation is crucially linked to, but distinct from, theories of industrial society. The former is understood in this thesis as the 'emergence of machine production, based on the use of inanimate power resources' (Giddens, 1993:52). A society can achieve industrialisation through implementing new technologies and work practices in any sector of the economy, not just in the manufacturing sector. Kumar points out, for example, that Denmark and New Zealand 'industrialised' by mechanising their agricultural sectors (1978:65). Industrialisation can also occur in non-capitalist societies; e.g. USSR (Wallerstein, 1982:37). Finally, industrialisation, or indeed post-industrialisation, does not necessarily result in progressive and positive 'development' as any analysis of conditions in Third World or peripheral/semi-peripheral nations today illustrates (Kirby, 1997) (Amin, 1990) (Alavi and Shanin, 1982).

For the sociologists of the 19th century industrialisation and modernisation were interchangeable terms and used to describe economic trends but also, and importantly in the context of a critique of post-industrial/information society theories, a varied and extensive set of political, social and cultural changes. To most, industrialisation implied the apotheosis

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[8] For Saint-Simon industrialism emerged in the 12th century (Kumar 1986:33).

of a trajectory of development (Wallerstein, 1982:29). To varying degrees 'industrialised societies' were those which experienced an increasing degree of urbanisation, an explosive growth in population, a decline in community spirit and relations, an increasing specialisation and division of labour throughout society, the democratisation and centralisation of society around the nation state and the secularisation and rationalisation of society. These changes were important issues for Durkheim, Weber and Marx.

In relation to post-industrial society theories, and the later examination of the work of Daniel Bell, the identification by these 19th century theorists of the increasing division of labour and rationalisation as defining characteristics of industrial society is of particular interest. For Durkheim the social division of labour; i.e. the development of new roles and tasks throughout industrialising societies, was a central point of interest and underpinned his notion of the 'organic solidarity' of more developed societies. Within this social division of labour an increasing economic division of labour was just one aspect (Kumar, 1978:85). Adam Smith also described the increasing division of labour as characteristic of industrialising societies while for Marx it was a crucial aspect of industrial capitalism.

For many of these theorists the secularisation of society, in the widest possible meaning of the term, seemed to be a corollary of industrialisation. For them a new philosophy, a rational and scientific worldview seemed to replace the old. Belief systems were 'disenchanted' and the search for control over nature and self was rigorously sought through ever more positivistic tools of measurement, observation and calculation. The philosophic ideals of the Enlightenment and the economic and social trends evidenced during the English Industrial Revolution fused into a prescriptive model of industrialisation and modernisation.

For Weber the related processes of secularisation and rationalisation predated industrialism, but as both 'an attitude' and 'a practice' they achieved their epitome within western industrialising societies and were heartily embraced by the latter. The origin of this rationalising tendency was for Weber to be found in the Protestant ethic, which justified the creation of surplus and its reinvestment for economic rather than social ideals. Its outcome, when combined with industrialisation trends was a modern capitalist system.

Weber's concept of rationalisation is broad and may be observed at both the macro and more micro levels of society. Anthony Giddens delineates three interrelated phenomena within Weber's concept; broad social processes of intellectualisation and 'disenchantment', the calculation of methods and means towards specified ends, and the formation of ethics that are oriented to goals (Giddens, 1972:44). In another text Giddens points out that Weber's rationalisation thesis was based on the increasing prevalence of bureaucracy, science and modern technology in certain societies. 'Rationalisation means the organisation of social and economic life according to principles of efficiency, on the basis of technical knowledge' (Giddens, 1993:723). For Weber rationality of technique was a defining

characteristic of industrial society, although he tended to emphasise the negative aspects of the process (Kumar, 1978:105).

Weber pointed out that an increasingly rationalist society was not necessarily a more knowledgeable society. He observed that the increasing rationality of technique seemed to lead, in reality, to increasing irrationality and complexity in terms of attaining rational goals. Indeed in some cases the rational means/bureaucracy subverted and invaded the achievement of the rational goals. Weber distinguished between two different forms of rationality: 'formal rationality' and 'substantive rationality'. Frank Webster (1995) notes that Weber's concept of formal rationality may in fact relate closely to Bell's concept of 'theoretical knowledge' and in the absence of a clear definition within the latter's text this assertion seems justified. For both Durkheim and Weber changing value systems and the increasing differentiation in social roles and institutions in England, France and Germany were fundamental characteristics of the emergent industrial society.

These early sociologists developed taxonomies which allowed them to classify all societies according to their stage of development in relation to the most advanced economies. These classification systems were based on a belief that at each stage of development societies became more complex and sophisticated. A correlate was that progress was an inevitable outcome of social change.

2.1.2 Industrialisation and Dependency – International Perspectives

In line with these theories of development which emerged in the 18th and 19th centuries sociologists in the 1950s/60s classified third world countries as pre-modern, pre-industrial and underdeveloped. The classification systems used to describe these societies, while more sophisticated than their predecessors, were underpinned by similar conceptions including a belief that the introduction of technology to an underdeveloped economy would lead to its modernisation. Peadar Kirby details how various sociologists including Talcott Parsons advanced the theories of Weber and Durkheim and developed sets of dimensions against which developing societies might be evaluated (Kirby, 1997:47).

The normative and prescriptive implications of such 'development' theories justified vast policy and investment programmes this century in many Third World countries. While the theoretical premises of this 'modernisation' work have been largely discredited (Kirby, 1997), the theories remain important in relation to a historical understanding of development programmes in developing countries and to an extent in Ireland. These theories were used to rank nations according to their level of economic 'development' and to justify policies aimed at recreating the conditions for industrialisation/modernisation present in advanced nations. There are strong links between modernisation theories and government policies

which focussed on technology transfer and supply push rather than local capability development.

Key principles underlying these modernisation and technology policies were a belief in the unproblematic transfer of technology and knowledge between nations and the irrelevancy of political and cultural factors within the recipient nations. The diffusion of technologies and the removal of barriers to this process were the principle goals more than the stimulation of local innovation and reverse engineering. These policies drew heavily upon neo-classical economic theory which proposes that technology is exogenous to the production function and may be unproblematically introduced into macro and micro situations. Furthermore, development and economic growth were determined solely by measuring increasing output and employment. For this school of economics, economic growth is synonymous with development and progress. Given the increasing 'rationality' of production in industrialised societies, this school proposes that firms are rational decision makers and that innovation results from decisions made with full knowledge of 'known innovation possibility frontiers' (Mjøset, 1992:36) (Dosi, 1982:147).

Since the 1960s the modernisation and neo-classical economic schools, as well as early communications and development theorists, have come under theoretical and empirical attack; first, from 'dependency' and globalisation theorists and second, from evolutionary and institutional economic theory.[9] While it is impossible to do these theoretical developments justice in this space they will be briefly discussed given their relevance to cultural and social debates. Institutional and evolutionary economic theories will be dealt with in the next chapter.

In the 1960s and 1970s dependency theorists and critics working within the United Nations (UN) proposed that social scientists needed to take a more international and historical approach to the development of societies taking into account colonialism, external-internal linkages and the unequal distribution of power both between and within nations. Development, therefore, should be understood not only as an economic and technological process within a bounded nation state but also as a historical, political, institutional and cultural process involving determining external influences.

> 'Dependence,... is based upon an international division of labour which allows industrial development to take place in some countries while restricting it in others, whose growth is conditioned by and subjected to the power centres of the world.'
>
> (Jacobsen, 1994:9)

[9] It is unfortunate given the previous discussion of evolutionary societal development theories that this school within economics should also be known by the same term. This thesis will refer to this work as the 'alternative' school to avoid confusion.

The co-existence of modernisation/industrialisation and underdevelopment, (an important contradiction for neo-classicalists), in some peripheral and semi-peripheral nations prompted the development of a dependency perspective. This school argued that technical progress and economic growth did not necessarily mean a qualitative improvement in the lifestyle of people. Indeed in many cases they highlighted how, both between and within nations, there was a growing disparity in wealth distribution (Alavi and Shanin, 1982) (Traber, 1986) (Kirby, 1997).

A crucial feature of this approach to development was that it situated societies and nation states firmly within the existing capitalist world-economy. Within the world capitalist system authors pointed out that patterns of domination from the ages of imperialism and colonialism meant that certain 'peripheral' nations had their 'surplus' production appropriated by 'core' nations. Theorists like Samir Amin argue that development is not a stage prior to industrial capitalism but rather a 'situation' produced by the contradictions within capitalism itself and a coalition of interests between actors both external and internal to these dependent states. For them capitalism involves cyclical waves of employment and unemployment, wealth and poverty, accumulation and shortage. For them capitalism is a zero sum game where some people, and some nations, are always destined to lose out.

> '...the semi-periphery is needed to make a capitalist world-economy run smoothly. Both kinds of world-system, the world-empire with a redistributive economy and the world economy with a capitalist market economy, involve markedly unequal distribution of rewards.'
>
> (Wallerstein, 1982:41)

Within this perspective development in peripheral and semi-peripheral nations is fundamentally different from development in core nations. In the latter surplus is reinvested in production whereas in the former, if the surplus is not exported, it remains in the hands of a few wealthy individuals and is not made available for re-investment. Of crucial importance here is the concentration of capital in the hands of a few, either within the developed country or abroad, and the collusion of these elements to the detriment of social equality and socio-economic development (Kirby, 1997:63). For dependency theorists the concept of development within capitalism is associated with inequality and the ultimate aim, at least in the first formulations of this approach, was to replace this system with a socialist alternative.

The dependency school stimulated a lot of debate and resulted in an alignment of nations, which called for a movement towards a New International Economic Order (NIEO) in the 1970s. A related move was towards a New World Information and Communication Order (NWICO) culminating in the production of the 'Many Voices, One World' MacBride report in 1980 for UNESCO (UNESCO, 1980). This report focussed on the unequal control of information and communications technologies and the right of less privileged nations to

preserve their own culture. Both these movements helped to raise awareness about unequal patterns of world development but the momentum for action was stymied by the United States and other advanced western nations who withdrew their support from UNESCO in 1985. International co-operation then shifted to international fora, which were focussed on removing barriers to trade than assessing the social implications of their actions. Philosophically the movement was stymied by the demise of existing socialist systems, which seemed to undermine their critical power by denuding them of a valid alternative social formation.

Dependency theorists continue to highlight the unequal distribution of wealth and communications which exists both between and within capitalist nations. These writers are highly critical of neo-classical and modernisation theories which are based on converging trajectories of development and solely focused on economic and technological development as measured by crude macro economic indices within individual nation states. In these two regards the work provides a useful critical perspective on modernisation, neo-classical and liberal theories. Nevertheless, the latter theories continue to influence both theoretical and political texts on economic growth and the development of information societies.

2.1.3 Globalisation – Global Perspectives

While modernisation theories have been criticised for ignoring national and international historical, political and social factors in the development process a related perspective on development has become prevalent both in academic and popular works. 'Globalisation' is used to describe the process of 'becoming', and how the world politically, economically and importantly for this work, culturally, 'is being made into a single place with systemic properties' (Robertson and Lechner, 1985). While the origin of this process may have a long history globalisation theorists propose that the pace of globalisation is increasing and that both transnational corporations and new communications networks are centrally implicated in this process. The outcomes of this process are seen as borderless communities and the unproblematic movement of information, people, goods and services across space and time.

As Ferguson and Robertson point out the meanings of the globalisation concept vary considerably and in many cases ignore important historical and local differences between regions and societies (Ferguson, 1992); (Robertson, 1990:19). Ferguson argues that 'globalisation' is an ideology for advancing market liberalism. The concept has been used to support a market-based approach to policy initiatives at the national and international level resulting in the proliferation of deregulation and free-trade policies in the 1980s, the dismantling of public service institutions and the marginalisation of cultural and citizenship rights in favour of corporate expansionism. For critics the outcome of these political developments has been increasing economies of scale for global corporations, increasing

cultural and regional homogenisation and the elimination of alternative forms and voices (Garnham, 1981); (Schiller, 1981).

Robertson argues that the emergence and take-off of globalisation can be traced to between 1880-1925 (1990:19). This thesis proposes that while one can find a long history of cultural contact this has not led to cultural homogeneity. Indeed it has often resulted in simultaneous processes of cultural disintegration and cultural renewal (Morley, 1992); (Morley and Robins, 1995); (Mohammadi, 1990). Globalisation theorists often ignore the local and contingent nature of cultural formations and the actions of individual nations and regional blocks to 'safe-guard' their cultural space. They further display a first-world bias, which ignores the concentration of flows in Western advanced nations, and the extent to which they bypass much of the rest of the world (Traber, 1986); (Golding, 1997); (Hamelink, 1990).

The globalisation thesis collapses 'difference' in much the same way that the concept of 'information' used by some information economists ignores the qualitative and semantic differences between different types of information. The available evidence suggests that political and cultural integration is far from a reality given the political and ethnic problems at international level within the United Nations, at regional European level and at national level, from Ireland to the former Yugoslavia. Finally, while international barriers to trade and technology are increasingly dissolved, there little evidence to support the existence of a global market or a global product. Elsewhere this author has argued for the continuing, if evolving, salience of the nation state and the role of local factors in shaping/negotiating products and services from both national and transnational information corporations (Preston and Kerr, 1998); (Kerr, 1997b); (Kerr, 1998).

This is not to deny that at one level a transnational market has emerged for some goods and due to increased travel and connectivity a new sense of cosmopolitanism and interconnectedness. Mass media, telecommunications and new media are important facilitators in these trends. The increasing transnational reach of these technologies and the liberalisation of regulatory structures means that we have moved beyond an era of purely nationally focused communications and media systems. Featherstone refers to this new level of interaction as the development of a set of 'third cultures', 'diverse cultural flows', which are independent from nation states but co-exist alongside them (Featherstone, 1990). Appadurai identifies five different types of flows: ethnoscapes, technoscapes, finanscapes, mediascapes and ideoscapes.

The evidence used to support globalisation theories draws upon transnational economic developments and associated international policies, the development of global telecommunications and media networks, new transport possibilities, new environmental organisations and new international non-governmental organisations which appear to

radically alter our conception of space and time. Yet the term does little to aid our understanding of the persistence of local political and cultural structures and historically contingent relations which act as barriers, or actively shape, these global flows. While this thesis would agree with Robertson's historical and cultural approach to globalisation, it questions his assertion as to the 'general autonomy and 'logic' of the process. Indeed it questions the appropriateness of the term 'globalisation'. A more appropriate term might be 'trans-nationalisation' which would suggest both global flows and the persistence of nations.

2.2 Post-Industrial Society Theories

> '...futurology, in casting around for a suitable conceptualisation of large-scale societal change, found only the evolutionary schemes of the past to hand and adopted these for its own purposes. In doing so the futurologists...accept that the 'Industrial Society' as it has been understood hitherto cannot be taken as the fulfilment and final end of social evolution. But all that has to be done is to add another stage to the sequence...The present is once more seen as transitional, as metamorphosis: not now from feudal agrarianism to industrialism, but from the industrial society to post-industrial society.'
>
> (Kumar, 1978:191)

This section will examine one particular subset of macro social theory which is used to explain the stage of development achieved by different countries. The prefix 'post' can mean either a new departure or a development in an existing system. Predominantly in the case of post-industrialisation theories it is used in the former sense. Arthur Penty in 1922 defined post-industrialism as a new departure, 'the state of society that will follow the break-up of Industrialism' (Kumar, 1978:314); (Bell, 1974:37). From the 1960s writers were prompted by a series of economic, political and social 'crises' to conjecture that various societies were undergoing a period of 'crisis' not unlike that which characterised the emergence of industrial society in the late eighteenth century. They forecast that a new post-industrial society was emerging and set about defining the core characteristics of this new stage of development.

Social theorists proposed that ICTs and telecommunications infrastructures were leading to radical changes in economic, political and cultural systems. The most utopian of these accounts proposed that certain societies were entering a post-capitalist stage of development where workers would no longer be exploited and where, because of automation, there would be more time for meaningful leisure activities (better realisation of time-value). New networked technologies would also lead to a more participatory and democratic political system. 'Computopia' would be a more synergetic, co-operative and opulent society but also a more democratic and peaceful one (Masuda, 1990). Writers who subscribed to this thesis also subscribed to a convergence theory of development, not unlike the earlier modernisation thesis, whereby all nations would eventually achieve this final stage of development.

In the academic and popular literature the term 'post-industrial society' is used interchangeably with terms like the technocratic society, the knowledge society and the information society: all societies based upon, and defined by, their relationship with information and communication technologies (Toffler, 1980). Underlying these accounts is a belief in the role of technological innovation in stimulating economic growth and by unspecified 'trickle-down mechanisms' inducing positive social change (Dosi, 1982). These theories provide one perspective on the wider impact of ICTs.

2.2.1 Daniel Bell's Post-Industrial Society Theory

Daniel Bell, journalist and sociologist from Harvard University, has been popularly credited with coining the phrase 'post-industrial society'. This term emerged, he writes, from his reading of Marxist and sociological works on socio-economic change combined with his analysis of social trends in advanced western industrialised nations in the first half of this century. The term for him describes the society that will emerge in the thirty to fifty years following the publication of his key text '*The Coming of Post-Industrial Society*' in 1973. In later works in the 1980s he used the term *information society* to describe the same phenomenon[10] (Bell, 1974; Bell, 1980).

For Bell society is constituted by three independent social spheres: the social structure (which includes the economy, technology and the occupational structure), the polity (which regulates the distribution of wealth and power) and culture (which generates meaning through symbolic exchange). He proposes that the axial principle of the social structure is economising – a way of allocating resources according to principles of least cost. The axial principle of the polity is participation – which is sometimes controlled by political parties but sometimes subject to demands from below - and of culture is the fulfilment and enhancement of self (1974:12). In his 1973 and 1980 texts Bell deals primarily with changes in the first part, the social structure, which he believes poses fundamental questions for the political and cultural spheres but in no way determines their evolution.

Bell proposes in his text the *Cultural Contradictions of Capitalism* (1976) that, while once all three spheres in society shared a common value system, advanced societies had become radically disjunctive and each sphere now evolved independently of the others. While once Protestant ethics and values united the economic and cultural systems, today this is no longer the case. Advanced economic systems for Bell, are characterised by functional rationality, economising, progress and innovation while advanced cultural systems are driven by a 'ricorso' or a continual return to the same existential questions and a

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[10] Bell notes that he first used the term in a presentation he gave in Salzburg, Austria in 1959 [1973:35]. He attributes the first use of the term to Penty, A. (1922).

'syncretism' of styles from all ages. One cultural style, he argues, does not replace another, it builds upon it (1976:13). These are fundamentally different principles in Bell's mind: the one rational and progressive in a linear sense, the other imaginative and circular. They produce, for Bell, fundamental tensions and different dynamics of change.

For Bell science and technology drive development. He states that 'along the axis of technology, we can stipulate a scheme of pre-industrial, industrial and post-industrial' and despite the differing historical biographies of individual nations one can trace the 'progress' of economies over time from the former to the latter (Bell, 1974:23&117). Post-industrial society is chiefly concerned with the organisation of science and public and private institutions which might foster it. Politics is concerned with science, education and reallocation policies. For him the future expansion of the information economy depends on the expansion of automation, information processing and international communication networks (1980:524).

2.2.2 Characteristics of a Post-Industrial Social Structure

For Bell industrial society was characterised by secondary manufacturing industries, resources like electricity and coal, and new infrastructures: the railways and electricity. Machines like the steam engine symbolised industrial society. Innovations were ad hoc, lucky experiments developed by 'talented tinkerers', people who were ignorant of 'science'. Economic growth was the axial principle and financial capital the main resource (Bell, 1980). Significant shifts along four main economic dimensions are sufficient criteria for Bell to propose that today's social structure is qualitatively different from industrial societies. These shifts are:

1. Industrial - a shift from a primarily goods producing economy to a primarily service economy.
2. Occupational - the growth and pre-eminence of knowledge workers, particularly the professional and technical classes.
3. A new axial principle - theoretical knowledge, as a director of innovation.
4. A new form of management - using new 'intellectual technology' (abstract rules and formulas combined with computerisation) to manage complexity and develop future development plans.

Colin Clarke wrote *Conditions of Economic Progress* in 1940 and in this text argued that the economy could be divided into three sectors. He proposed that the movement of labour from primary to secondary (manufacturing) and finally to tertiary (service industries) was evidence of the increasingly advanced development of a society. The rate of movement from manufacturing to services was driven by differential productivity between the sectors and

the application of labour saving technologies in the secondary sector (more goods produced at less cost). It was also driven by rising wages and living standards and as a result a greater demand for services (Bell,1980:515), (Bell, 1974:188). This pattern of development, he proposed, was one all industrialising nations-would eventually follow, regardless of their political or cultural 'configurations'.

Bell, in an attempt to keep the 'thrust' of Clarke's 'emphasis on differential productivity as a mechanism for the transition from one society to another', divides economies into a primary extraction sector, a secondary fabrication sector and a tertiary information sector (Bell, 1980:516). As the third information sector grows and more people are engaged in work which deals with information and knowledge rather than goods, Bell proposes that a post-industrial/ information economy emerges (1980:516).

Bell's **first dimension**, that some societies had become service and information economies, is based on quantitative analyses of US national economic accounts conducted firstly by Fritz Machlup and later by Marc Porat (Machlup, 1962) (Porat, 1977). Machlup estimated that in 1958 in the US 29 percent of GNP was spent on producing and distributing new knowledge and that 31 percent of the labour force were employed in this sector (Bell, 1974:212). Bell narrowed Machlup's sectors to focus on research, higher education and the production of knowledge (as intellectual property) and argues that the growth in expenditure was still exponential between 1949 and 1969 (1974:213). Bell also draws upon Porat's six sector economy and his calculation that both market and non-market information transactions constituted together almost 50 percent of GNP.

> 'The United States today is the only nation in the world in which the service sector accounts for more than half the total employment and more than half the Gross National Product. It is the first service economy.'
>
> (Bell,1974:15)

The **second dimension** of Bell's post-industrial society highlights the changing distribution of occupations across all three industrial sectors. While industrial society saw an increase in semi-skilled workers, post-industrial society is associated with a shift to white collar work. For Bell it is human and professional services that are the crucial distinguishing feature of post-industrial society. Human services include health, teaching and social services, while professional services include programmers and processors of information. Within this sector the biggest increase, twice the growth rate of the average labour force in terms of numbers employed, has been in the professional and technical classes, all of which require some degree of college education (1974:17). Within this class it is scientists and engineers which have been in most demand and which form 'the heart of the post-industrial society' (1974:18). The quantitative growth in terms of employment in this class of service industries (doubling from 3.8 million to 8.5 million between 1947 and 1964) demonstrates

for Bell how information and knowledge have become both the defining, and transforming, characteristic of post-industrial society.

Workers in the post-industrial society are primarily working with information and knowledge. For Bell, his **third dimension** proposes that a particular type of knowledge, 'theoretical knowledge' or codified knowledge, is playing a crucial role in innovation processes and the development of society. Bell defines information as data processing in the broadest sense and as a 'pattern or design that rearranges data for instrumental purposes' (1980:509). Knowledge is defined as an 'organised set of statements of fact or ideas presenting a reasoned judgement or an experimental result, which is transmitted to others through some communication medium in some systematic form.' He focuses therefore on codified and theoretical knowledge distinguishing it from more ephemeral knowledge as contained in entertainment and news programming and other forms of knowledge such as tacit knowledge[11] (1974:175) (1980:506). He concentrates in his texts on only one form of knowledge; i.e. that which can be 'measured, stored and readily retrieved'. Knowledge which is 'objectively known, an intellectual property, attached to a name or a group of names and certified by copyright or some other form of social recognition' (1974:176) (1980:572). By adopting this approach he 'ignores' important semantic and qualitative differences between different types of information and the existence of different types of knowledge.

A post-industrial society, for Bell, is driven by theoretical scientific knowledge and institutionalised/goal-orientated research which together provide more powerful frameworks for explaining reality and directing innovation. Bell notes that while 19th century inventors proceeded by trial and error, in this century there is a much greater integration of different fields and theories in research. For Bell scientific capacity, as measured by R&D expenditure, is the new indicator of power in the post-industrial society (1980:117). Theoretical knowledge in also important in relation to reducing uncertainty and projecting possible future scenarios. Bell proposes that theoretical knowledge is now the primary source of innovation in society and is more important than empirical knowledge. While he acknowledges that every society has/had some form of knowledge he argues that in contemporary society theoretical knowledge has a new role as director of social change.

Bell proposes that in order to adequately harness these new techniques and stores of knowledge societies will need to develop a new knowledge theory of value and recognise its importance in management, innovation and economic growth. As a society the US had an inadequate understanding of information in 1973 and 1980. Bell asserted that information is not a commodity in the classical sense. It is a more like a collective/public good which is

expensive to create but once created, is open for use by all without exhaustion. As a consequence there is little incentive for individuals to invest in new knowledge if they cannot recuperate their investment and capture the economic rents afterwards. Bell argues that patents and intellectual property rights 'no longer guarantee exclusiveness' (1980:512) and thus investing in new knowledge is increasing risky for entrepreneurs. He believes that universities and governments will increasingly bear this burden.

Bell claims that the outstanding development of the twentieth century will have been the development of new scientific 'techniques' for managing complexity using rational and scientific methods fused with the power of computers. The techniques used in managing this complexity are theoretical and rational models (algorithms, stochastic processes). Bell called this new development 'intellectual technology' and this forms the **fourth dimension** of his post-industrial society. The relationship between theoretical knowledge and technology, as the 'instrumental mode of action', is fundamental to his theory of intellectual technology which replaces intuitive judgement in the deliberate planning and assessment of technology and policy options before it is introduced to the market in order to avoid undesirable consequences.

Particularly, in relation to this dimension, Bell (1980) highlights the use and importance of IT, especially the computer, as a tool for analysing large amounts of data which can be used to confirm, or deny, abstract theories of economic change. They can also be used to conduct policy experiments and predict outcomes. The primary manifestation of this trend is in the rise of R&D which joins the fields of science, technology and economics together. Many industries now gather together all existing theories and knowledge prior to production and use this as a basis for future developments. Bell argues that what is true for economics and technology can also be shown for other fields of knowledge.

From the four dimensions discussed above one can conclude that what is different about post-industrial societies is the *type* of work most people are doing and *the ordered planning of innovation*, either political or social. This planning is informed by a greater diversity of codified knowledge in interrelated fields, a greater capacity to anticipate outcomes due to the processing power of computers and the annihilation of space and time by telecommunications networks. Bell's work proposes that the computer is the transforming resource of the post-industrial society and knowledge is the strategic resource. Information and codified knowledge constitute the primary source of employment, economic output, innovation and planning in this social structure. 'In that sense, just as capital and labour have been the crucial variables of industrial society, so information and knowledge are the crucial variables of post-industrial society' (1980:506). These claims, coupled with the growth in

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[11] So while some critics have noted the growth in images and news this is not of significance in Bell's typology.

employment and share of GNP of the knowledge industries, are central to understanding how the post-industrial society theory became the basis for subsequent information society theses and policies.

2.2.3 Wider implications of Bell's Post-Industrial Social Structure

> 'Technology has transformed social relationships and our ways of looking at the world.' It has transformed how we produce goods, reduced inequality in society...created new interrelationships and networks and altered our perceptions of time and space.'
>
> (Bell, 1974:189)

Bell's post-industrial society is one in which technologies and knowledge will lead to the development of a more democratic and informed society where the benefits of social and economic changes will be available to all (1973:451). The emergence of more caring societies is something that relates loosely to the vision of Masuda and his belief that a new voluntary and community spirit will emerge from new information frameworks (Masuda, 1981). For Bell the new knowledge elites, driven more by professional ethos than profit, will spearhead this change in society. In turn this will force an increase in services, both public services and 'knowledge/planning services' (research institutes and universities). A new politics of consensus will emerge as new and better informed groups all vie for their own interests.

> '...in contemporary society there is a growing egalitarianism fostered in large measure by sectors of the knowledge elite, especially the younger ones.'
>
> (Bell, 1980:543)

In a detailed summary of philosophical theses on equality Bell outlines different interpretations of equality and how a post-industrial society redefines the concept (1974:408-455). In a post-industrial society equality of opportunity based on academic achievement is a fundamental principle and society is more meritocractic (in that people earn power and security according to their educational achievements) (1980:505). Indeed, in important institutions, Bell argues that technical skills achieved through formal education are the new source of status and power (1974:358&426). Bell recognises that there may still be an unfair distribution of wealth between citizens and that governments have an important role to play in intervening to ensure both fair access and redistribution (1980:363-367& 452-543). In a post-industrial society politics mediates between different interest groups in a new form of consensual policy making. He rejects critics who point out that his new class of powerful elites indicates that he is describing the emergence of 'technocracies'. He believes that the

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See (Webster, 1995:21-29)

knowledge elites will not have the final say in policy and that a defining characteristic of emerging societies is the 'subordination of the economic function to the political order' (1974:373).

For Bell new ICTs pose important policy and cultural questions. Bell considers that telecommunications and microelectronics have contributed to not just new means of economic and social exchange but also to a new tightened social framework where people from geographically dispersed regions interact more frequently. The scale of such developments can, however, be disconcerting and must be managed carefully. The most important implications of telecommunications developments in a post-industrial society are:

1. New telecommunications infrastructures will lead to a reorganisation of communication modes between people, the reduction/elimination of paper in transactions, new modes of information and entertainment distribution and the reorganisation of learning.
2. Changing patterns of communication will cause problems in terms of the distribution and planning of national land use and the decline of more traditional communication hubs.
3. The increasing complexity of society will demand new forms of planning which are made possible by new large scale computer systems.
4. These systems and increasing bureaucracy will create problems of accountability and individual privacy concerns.
5. The scale of these developments moves beyond the national and poses important challenges in terms of legislation and control (Bell 1980:537-544).

For Bell in 1980, there were two main areas where important policy decisions had to be taken. The first was infrastructural concerning what form of techno-economic organisation would best meet the future needs of consumers. Here he favours a market-orientated approach with government 'subsidies' used to redress inequalities. The second problem was intellectual and concerns the national co-ordination of a policy for knowledge production, dissemination and application in the pursuit of national productivity. He forecast that the changing, more goal-orientated character of science and technology would lead to new means for achieving individual and national growth.

For Bell ICTs allow for 'alternative modes of achieving individuality' (1980:545). However, this is achieved only through the formal economy and through the commodification of information and the consumption of goods and services. The technological revolution made possible, for Bell, mass consumption, incorporating new means of production, new means of advertising these goods (creating both needs and life-styles), and new methods of payment. For Bell mass production and mass consumption have destroyed the values and morals of Protestantism on which capitalism was founded and

created a disjunction between the social structure, where efficiency and self-control is valued, and culture/consumption where hedonism and self-gratification are promoted (1974:478-478). Indeed he sees this disjunction as the greatest threat to the sustainability of a post-industrial society. Bell focuses here almost entirely on the individual and says little about the potential or need to support experimentation, preservation and expansion of collective identities using ICTs.

2.3 Critiques of Post-Industrial and Information Society Theories

This section will critique Daniel Bell's post-industrialisation theory and approach to socio-technical change. It will highlight the continuities between post-industrial society and industrial society and the technological determinism upon which the former is based.

2.3.1 Critique of Daniel Bell's Epistemology

Empirical and theoretical developments have emerged since Bell's first treatise on the post-industrial society which undermine many of his core arguments. For example reports on S&T in the West have shown that the private sector now accounts for most R&D expenditure and contradicting Bell's assumption that the generation of new knowledge would increasingly take place in the public sector. His assertion that 'information is not a commodity' can be countered by looking at the trend towards the privatisation of information and intellectual property laws at European and international levels (Bell. 1980:512). In addition, some of the employment trends which underpinned his post-industrial society thesis have slowed, or indeed reversed, in the past twenty years. Finally, these trends have not resulted in more democratic and equal societies as income gaps widen and gender, racial and class tensions remain (Young, 1987); (Webster, 1995).

This thesis rejects some of the basic epistemological presumptions on which Bell's theories reside. Bell's historical periodisation and categorisation of societies into pre-industrial, industrial and post-industrial has been widely criticised as historicist, teleological and partial (in that it focuses entirely on supply side changes and fails to recognise other factors in the process of social change) (Webster, 1995:32) (Miles and Gershuny, 1983). This thesis asserts that this categorisation of societies is prescriptive and neo-evolutionary reflecting the largely discredited modernisation and convergence theories of the 1950s/1960s detailed in section 2.1 above. It also points to a deterministic belief that increasing technological complexity, as expressed in the economic sphere, produces revolutionary changes in all spheres of society and determines the pace and direction of development. Bell's post-industrial society 'emerges' unproblematically from the 'revolutionary' changes wrought by the application of science and technology in the economic sphere.

Empirical evidence from developing countries shows how countries and sectors within these countries follow vastly different development paths (Hamelink, 1986). Furthermore, as mass communications researchers have pointed out, historically created external and internal relations may greatly influence economic and social development. For example a quantitative analysis of sectoral and occupational development in Mexico might conclude that Mexico had become an information economy in absolute terms. However this would ignore the continuing salience of agriculture, the growth of industry and the growth of public sector service employment. In other words such crude indicators do not necessarily reflect the varying trends which created them, the existing social relations of production or the amount of capital available for reinvestment in a country (Arriaga, 1985).

For Bell a post-industrial society displays radical disjunctures with that which characterised industrial society. These changes relate not just to the mode of production but also the relations of production and the source of value in the economy. In this he is asserting that some of the basic tenets of capitalism, including labour and capital, have been supplanted by information/knowledge as the main source of value. However, it is clear from other accounts that for all the technological changes in the mode of production and distribution, the fundamental tenets of capitalism and industrial society remain. The market remains dominant as a means of allocation and distribution and the motives for production remain the accumulation of profit. The means of production remain in private control and increasingly, in deregulated economies, in the hands of fewer people. Labour and capital remain important variables in production and more varied forms of knowledge are increasingly acknowledged. Historically contingent relations and institutions of power remain intransigent. The use of abstract monetary systems continue to mediate exchanges while industries remain crucially interdependent not just in terms of a societal division of labour but also in terms of obtaining additional resources and accessing new markets.

> 'Contrary to the notion that capitalism has been transcended, long prevailing imperatives of a market economy remain as determining as ever in the transformations occurring in the technological and informational spheres'
>
> (Schiller, 1981) cited in (Webster, 1995:76)

Bell proposes that changes in the organisation of economic relations have important implications for the entire social framework. While he decides that the market is the best mechanism for developing new information and communication structures he supposes that it will fall to the polity to redistribute excess surplus and to develop programmes for the development of new knowledge. His conceptualisation of the polity is one which presupposes the neutrality and impartiality of these decision-makers and allocates to it only a partial role in the economic process.

Undoubtedly there have been changes in the socio-economic structures of many societies but it is proposed by this thesis that Bell places too much emphasis on the determining role of information technologies and theoretical knowledge. Crucially for this work he neglects the role of capitalist relations of exchange, institutional and structural factors, the politicking of the polity, the role of different forms of knowledge and learning processes, and changing patterns of demand in shaping social change (Brants, 1989); (Meehan, 1984); (Schiller, 1991). Bell's mapping of the historical evolution of societal development is technocratic as well as culturally and politically naive (Robins and Webster, 1987).

This thesis secondly rejects Bell's division of society into separate spheres. It asserts that culture is an intrinsic part of all aspects of society and that the culture industries, or in the language of Bell – the 'arena of expressive symbolism' - are an important part of the productive/social structure and the 'services' or 'information' sector depending on one's classificatory system (1976:12). Indeed, while it is incontestable that the service sector has grown in terms of output and employment, it is also evident that manufacturing remains important and that they are crucially interdependent. As highlighted by Garnham the culture industries through their symbolic products are crucially linked into, and 'serve', other spheres of material production e.g. advertising (Garnham, 1990:13).

Bell's assertion that innovation in the techno-economic sphere is driven by the principles of utility and efficiency while in the cultural sphere innovations continually return to the same basic concerns and styles demonstrates an inadequate understanding both of innovation in the techno-economic realm, as well as, the demand for novelty which drives innovation in the cultural realm (1976:12-13). The creation and reproduction of symbolic messages simultaneously reflects not just past cultural styles, as Bell writes, but also current discourses, structures of power and a search for novelty. Empirical evidence presented later in this thesis will show how the cultural industries are subject to the same processes of rationalisation and automation of production as other sectors. Further, it will show that innovation does not necessarily imply displacement and substitution but on the contrary there are important inter-textualities between the old and new media which are an important aspect of innovation.

2.3.2 Critique of Bell's Post-Industrial Society Theory

For Bell the axial principle of post-industrial society is 'the codification of theoretical knowledge' (1980:505). For him theoretical knowledge is central to innovation in technology and an intrinsic part of his new 'intellectual technology' which enables the planned and orderly development of society. A third point of criticism that this thesis makes, along with Kumar and others, is focused on Bell's concept of theoretical knowledge (1987:102). It questions his prioritisation of just one form of knowledge over all others and

it questions its implicit premise that rational and goal-oriented planning are uniquely characteristic of post-industrial societies.

Bell argues that codified and theoretical knowledge have become the transforming resource of post-industrial society and have replaced capital and labour as the crucial source of 'added value in the national product' (1980:506). For him innovation and the communications revolution in post-industrial societies have emerged from the coupling of information theory to new computational methods with each new innovation crucially building upon existing scientific knowledge and differing therefore from the scientific trial and error practised in the industrial era. By contrast innovation and social shaping studies highlight how many different types of knowledge, not just theoretical knowledge, inform the innovation process. They highlight the difficulties involved in transferring knowledge and the contextual nature of much research. It shows how many innovations are merely incremental improvements on existing processes and products and derive from market and experiential knowledge rather than scientific knowledge. In addition trial-and-error is very much a part of innovation today in both private and public research institutions.

Bell's conceptualisation of innovation seems to draw upon the notion that firms will innovate according to a computationally tested and fully rational plan of action. This position is in keeping with traditional neo-classical economic theory. Yet innovation studies contest this and highlight the role that uncertainty plays in the innovation process. They demonstrate that contextual, cultural and other forms of knowledge act to counterbalance this uncertainty and that firms implement a number of strategies to lessen the risks involved including co-operating and networking with other companies across sectoral boundaries. This seriously undermines Bell's theorisation of the process of innovation, the role of information technology in this process and the certainty of the development trajectory of his 'new' information society.

While Bell asserts that processes of both innovation and social change are increasingly rationalised in post-industrial societies, this thesis has already shown that rationalisation and rational knowledge were viewed as characteristic of industrial societies in previous centuries. Therefore this characteristic cannot be a defining principle of post-industrial societies. Weber, for example, was concerned with forms of rationality and indeed the increasing rationalisation of society in the 19th century was seen as an important part of the industrialising process by early sociologists. Thus it can be argued that this axial principle is merely a continuation of trends established within industrial capitalism and does not constitute a radical break.

This thesis refutes Bell's contention that new intellectual technologies are making new forms of management possible. Instead it agrees with Kevin Robins when he argued that the shift from manual to mental labour was an outcome of Fordism and other scientific

management systems which emerged in the early part of this century (Robins and Webster, 1987). Again it will be argued in later chapters that such developments are endemic to both capitalist and industrial production.

Bell's theory is premised on the belief that information and knowledge production constitute the defining characteristic of post-industrial societies. This conviction is based on an analysis of (rather short-term) quantitative economic data, problematic classifications of knowledge industries and a degree of speculation. Kumar rightly asserts that, while one can trace important quantitative socio-economic changes in the social structure in the US this century, the qualitative extrapolations made by Bell are unjustified.

> 'That many of the changes alleged by Bell and others are occurring, and are important, need not be denied. What needs scrutiny is the central claim that all these changes add up to a movement to a...new social framework.'
>
> (Kumar, 1996:199)

2.3.3 Critique of Bell's Conception of Information and ICTs.

From a theoretical point of view information goods and services, and by extension multimedia artefacts, display certain characteristics which distinguish them from other commodities and render as a result crude macro-economic measures inadequate as instruments for measuring their significance either in economic or social terms. Machlup, Porat and Bell develop different definitions of information and knowledge which attempt to come to terms with the their complexities as economic goods and the problems involved in measuring its significance. All three admit that such a task is necessarily problematic and utilitarian (Machlup, 1963:35-50), (Bell, 1980b:574), (Porat, 1977:2-3). These definitions end up excluding or conflating various forms of information and information work. As a result the quantitative basis on which the information society thesis is based is reductive and relatively easily contradicted (Marvin, 1987).

This thesis concurs with those who propose that information can only be valued in accordance with the meaning/use ascribed to it by final users. This is in contrast to the traditional economic approach which ascribed value according to the amount of labour and capital expended during production and distribution. Secondly some communications writers and anthropologists argue that information has long been a part of rituals, productive activities and planning in all societies across all sectors of economic activity. For Mary Douglas goods are themselves part of a cultural information system (cited in Marvin, 1987:57). The crucial determinant of value is how useful and meaningful information is to intermediate and final users, something which is not easily indicated by measurements focussed on inputs.

Exploratory work by van Cuilenberg found that while absolute quantities of information being produced and stored in western societies is growing the application and use of the

information has remained constant. Indeed he argues that information production follows the economic law of diminishing returns. While Machlup and the OCED found that information production in the 1960s was growing at 10 percent annually a study of consumption in Japan found growth levels of no more than 3 to 4 percent (cited in van Cuilenburg, 1987:109).

Writers from a political economy and cultural perspective have written comprehensively about the specificities of one sector of the information economy, the culture industries, and the wider 'value' of their 'information' products within society (Williams, 1981); (Bourdieu, 1993); (Garnham, 1990); (Preston, 1996). In contrast to Bell these writers firmly place the culture industries within the capitalist formation and highlight the specific characteristics of information in economic as well as social terms.

> 'The particular economic structure of the culture industries can be explained in terms of the general tendencies of commodity production within the capitalist mode of production as modified by the special characteristics of the cultural commodity'.
> (Garnham 1990:160)

The special economic characteristics of these industries include high first production costs and low costs of reproduction, which necessitate a drive to maximise sales in order to recoup investment. In addition the nature of an information commodity is such that it is not destroyed by use but is available for re-use. This feature means that despite the attempts by companies to impose limitations on how their products are used they are freely and easily redistributed and pirated at no cost to the final user. Companies are therefore prompted to consolidate, vertically integrate and develop new mechanisms for cross-platform distribution. This work allows us to question not just Bell's prioritisation of theoretical and codified knowledge as a source of innovation but also his focus on production to the exclusion of sector specific factors and other elements of the 'value-chain' like distribution and the audience/final users.

From a communications perspective the work of Bell and Porat in particular ignores significant semantic differences between different information and knowledge types. It excludes forms of non-codified knowledge such as know-who, which have been shown to be an important part of learning, productivity growth and innovation. It prioritises and values commodified and privatised information over other forms of news and entertainment (Slack, 1994). It values signals and bits over symbols and meaning. According to this perspective an increase in the number of television channels and programming is presumed to be positive regardless of what type of programming is provided and who has access and can pay for it (Brants, 1989); (Meehan, 1984). The information economy and society perspectives also ignore important questions related to unequal representation and inequalities related to region, class, and gender (Hepworth and Robins, 1988); (Bourdieu, 1994); (Frissen, 1997b).

Finally, they ignore questions of ownership and power, factors which may crucially influence what information is produced and for whom.

This thesis contends that crude quantitative measurements say nothing of information quality, diversity and use. In relation to the study of innovation these studies fail to illuminate how information contributed to new processes and products. In relation to consumption these studies tell us little of how people build upon existing knowledge, struggle with old and new knowledge and meaningfully apply it in their everyday lives. They fail to elucidate the real and imagined barriers to innovation experienced by both intermediate and end users or explain the means by which individuals might become better informed in an information society (Marvin, 1987), (van Cuilenburg, 1987). Measurements of information employment say nothing of how cultural/information products might contribute to identity formation, opinion formation or the democratic process.

Finally this thesis rejects Bell's treatment of information technology as a neutral tool which can be objectively applied to improve society for all. Technology for him is 'the instrumental mode of rational action' and the computer is 'a tool for managing mass society' and understanding 'how societies change' (Bell, 1980:503&509-510). His version of social change would suggest that society unproblematically and without conflict adopts technology and uses it to increase productivity and create a better society for all (1974:188). This needs to be balanced by a realisation of the limitations of abstract and simplified computerised planning (Weizenbaum, 1980); (Mackenzie, 1988), the social construction of both knowledge and technologies (Bijker, Hughes et al., 1987; Bijker and Law, 1992); (Wajcman, 1991; Jasanoff, 1995) and the other factors which influence such socio-economic developments. It will be shown in this thesis that the information society rhetoric can be unveiled as an ideological curtain masking the crude capitalistic motives of large industrial interests and unequal power relationships.

Despite his assertion that he is not a technological determinist Bell asserts that the computer is the new symbol of the post-industrial age and a crucial enabler of new management techniques. Furthermore, new telecommunications structures may be 'decisive' for how economic and social exchanges are conducted and will pose important new policy challenges (1980:500). 'Inevitably, the onset of far-reaching social changes, especially when they proceed, as these do, through the medium of specific technologies, confronts a society with major policy questions' (1980:531). He goes on to speculate that in the following two decades new telecommunications infrastructures will reorganise 'modes of communication between people', reduce if not 'eliminate' paper, and lead to the 'reorganisation' of learning. With the benefit of hindsight we can see how the 'vast social changes' that he anticipates have not occurred and where they have occurred it has been more slowly, through negotiation and without necessarily displacing what went before. Indeed other technologies

such as genetic and nuclear technologies, may be equally, if not more, revolutionary from society's perspective (Marien, 1985:650).

In the final analysis this thesis rejects the fundamental tenets of Bell's post-industrialisation theory. Despite the author's eminence in academic and political circles in the United States the work provides an insufficient basis for contemporary empirical or theoretical work on patterns of social change and the contribution of new communications technologies to these processes. Indeed his work is highly self-contradictory for while Bell posits that the social structure is independent of the other sectors of society, he nevertheless asserts that changes in that sphere will lead to the emergence of 'post-industrial' or 'information' societies. It is the contention of this thesis that the term 'society' refers to something broader than the structures of employment, technology and the economy. Furthermore, the social structure is crucially inter-linked with culture and the polity.

2.4 Knowledge, Information or Service Economies?

The approaches to socio-economic change examined in this section are united in their identification of the growth of information production and distribution industries in a number of countries in the US and Europe. They also situate the traditional and new content services firmly within these developing sectors.

2.4.1 The Economics of Information and Knowledge Industries.

Daniel Bell was chair of the *Commission on the Year 2,000* in the US during the 1960s. This era was characterised by a renewed interest in macro theories, generating national statistics, and formulating future development plans. The four main dimensions of Daniel Bell's post-industrial society are based on empirical evidence provided by quantitative surveys in the United States and OECD countries during the 1960s. On closer examination this quantitative work, mostly arising from the reclassification of existing statistics, is problematic. In some of this work the definitions of information and knowledge on which the classificatory systems are based are questionable, particularly given the concerns of this thesis.

The first major attempt to define economic concepts of information and knowledge, estimate the numbers employed in knowledge production and the contribution of these industries to national wealth was conducted by Fritz Machlup (Machlup, 1962). Machlup in his work takes care to distinguish between the nouns 'knowledge' and 'information', not using them interchangeably. For him knowledge comes from the verb 'to know' and therefore connotes a state of knowing or what is known. Information meanwhile comes from the verb 'to inform' and is a process of becoming, a more transitory state. While knowledge may form a subset of all information, the reverse is not true (Machlup, 1984). There are five

different types of knowledge for Machlup: practical knowledge, intellectual knowledge, small-talk/pass-time knowledge, spiritual knowledge and unwanted knowledge. While not all knowledge is economically productive Machlup attempted to expand upon available economic categories to include 'hidden' labour groups.

Machlup in his examination of the characteristics of knowledge compares it to other public goods. While the production of new knowledge involves costs, the consumption of knowledge is freely available to all. This creates distinctive characteristics for certain classes of knowledge, e.g. intellectual property, and problems like how to recover investment costs and limit access to end users. These characteristics also apply in the context of media and cultural content

> 'To seek knowledge, to create, acquire, transmit, or retrieve knowledge – all these activities are ordinarily associated with effort or sacrifice of some sort: that is they are not without cost. To use existing knowledge, however, may be costless.
> It is in the class of knowledge sometimes called "industrial property", chiefly novel technological inventions resulting from heavy expenditures for research and/or development which- without subsidies–cannot be recovered except if the use of the inventions is restricted for several years...but there are also other kinds that are affected by the public-good dilemma. Recorded reference works, texts in books and journals, music, graphics, and other printed matter may be in this category. If the selling price for the output includes nothing to pay for "fixed" inputs, no pecuniary compensations can be paid to the persons who have provided them. Temporary monopoly rights for the sale of the products are needed to secure prices above marginal costs and hence, to provide incomes to those who have contributed their "knowledge-producing services."
>
> (1984:159)

> 'Broadcasting is another class of knowledge-producing activity that, if the rule "price not to exceed marginal cost" were imposed, would be left without any revenue for services rendered: radio and television stations can serve additional listeners and viewers without additional cost. In this case, where the customers provide their own appliances, the total cost to the broadcaster is independent of the size of the audience within a given area, which implies zero marginal cost per customer.'
>
> (1984:162)

Machlup stated in his work that how economists define information and knowledge says nothing about the semantic value of the input/output. Therefore he cautions that economic theory and data should only be used to predict trends based on observable evidence and that economists should acknowledge the incompleteness and uncertainty of the knowledge they produce. 'Much more knowledge is required' if such data is to be used for evaluative and normative purposes (1984:23).

For Machlup knowledge just exists or may be embodied in things or people (1984:8). Within the economy he differentiated between knowledge as input and knowledge as output. He clarified his work by stating that increased expenditures on knowledge as input did not

necessarily result in increased output or wealth generation. Machlup adapted numerous data sources on employment and output to arrive at his information economy estimates for 1958. He reclassified industries into five knowledge producing classes and found that in 1958 expenditure on knowledge production represented 29 percent of gross national product (GNP).[12] Importantly for the concerns of this thesis he placed radio, television and advertising within one of these knowledge classes: media of communications. He also found that for the years 1947-58 the annual growth rate of knowledge industries, as compared to other goods and service industries, was growing at 2.5 times the average growth rate, although there was evidence that it was slowing.[13] By regrouping census data on occupations into white collar, manual/service and farming classes he established that white collar workers accounted for 42.1 percent of workers in 1958 (1962:382). Within these classes clerical workers, professional and technical workers displayed increasing rates of growth between 1900 and 1959.

Machlup concluded from his study that both the demand and supply of knowledge personnel had been increasing over the period under study. He noted that this trend had been favoured, rather than determined, by technological progress and shifts in final demand. Machlup warned that most national accounts did not adequately measure investment in knowledge, or capture inter-industry payments, work for which no payments were paid (e.g. housework) or industries which produced no physical output. He also pointed out that, within knowledge producing occupations, varying groups contributed to the overall pattern of growth overtime. Machlup's work was one of the first attempts to address the specificities of the information industries.

2.4.2 Primary and Secondary Information Industries

Despite Machlup's warnings about the limitations of national statistics as a measure and indicator of the size of the information economy his approach has been adapted and extended by others in subsequent years. Porat, in the acknowledgements to his 1977 text, writes 'to Fritz Machlup and Daniel Bell I owe a deep intellectual debt for ploughing the field so thoroughly and proficiently before me' (Porat, 1977:viii).

Porat set out to measure the share of US GNP connected with 'information activities' as opposed to other kinds of activities (Porat, 1977:2). This includes the production, processing and distribution of information goods and services. While he acknowledges that the manipulation of matter and energy would not be possible without knowledge he argues that

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[12] The total value of goods and service produced in a country plus the total of net income from abroad.
[13] For Machlup there were five classes of knowledge industries: education, research and development, the media of communication, information machines and information services.

there is now a linked, but clearly separate domain, which transforms information from one pattern into another.

In order to define information and an information activity in a manner which could be measured Porat proposed that 'Information is data that have been organised and communicated. The information activity includes all the resources consumed in producing, processing and distributing information goods and services' (1977:2). These resources include information capital resources (e.g. typewriters), information workers and information buildings. This definition of information and information labour was then applied to existing occupational data available in the US Census and the Bureau of Labour Statistics and output data from the Bureau for Economic Analysis. Unlike Machlup, Porat did not attempt to go beyond the resources available.

While Porat acknowledges that all activity involves some degree of information processing he argues that for this exercise such a definition of information would be 'operationally useless' (1977:3). Indeed he states that 'I am completely indifferent as to the motivation for acquiring knowledge, or even to the quality of the knowledge relative to other kinds of knowledge. It does not have to be "good" information to qualify as an information service, nor does it have to be "true" (1977:23).' Marvin argues that his approach presupposes that all information is uniform, and quantifiable, and disregards meaning as an indicator of value. She also points out that Porat ignored many of Machlup's caveats about treating information as an economic good (Marvin, 1987:51).

Porat divides the economy into six sectors: three information, two non-information and a household sector. What distinguishes Porat's information sector from Machlup's information sector is that he defines both a primary and secondary information sector. The primary information sector (PIS) for him comprises all industries which produce information machines and information goods and services to sell in the public market place.[14] Porat estimated that 25.1 percent of value added GNP in 1967 originated in this sector. The secondary information sector (SIS) estimates the amount of information produced within firms and governments, and not transacted across markets. In 1967, 21 percent of value added GNP originated in these sectors, 18.8 percent in private bureaucracies and 2.4 percent in public bureaucracies. Much of this was spent on employee wages. The non-information sectors are called the public and private productive sectors by Porat and include all industries producing all other types of private and public goods.

In relation to occupations Porat calculated that by 1967, 53 percent of the total compensation (i.e. wages) was being paid to workers who were primarily engaged in information activities. By 1975, information workers had surpassed non-information

[14] For Porat this includes computer manufacturing, printing, the mass media, advertising, accounting

workers in numerical terms as well. He also noted the layoffs of information workers lagged behind depressions by one or two years and that service employment had 'taken off' from 1965.

For Porat this data indicated that by 1977 an information economy was emerging. For him, just as energy and utilities underpinned the industrial economy, the computer and telecommunications underpinned the information economy. He also wrote that the 'rapid diffusion' of these technologies 'carried tremendous force' and therefore policy would have to take care of the inevitable tensions caused by such change. This call for policy across all industrial and non-industrial areas presaged the development much later of national information policies and infrastructures. His brief description of changes in the home notes that for once technology forecasts had overestimated the speed of change and there was now time to consider the impact on both work and leisure. When homes are transformed into communications and information centres then, for Porat, we will have information societies (1977:240).

The OECD since the 1970s has also attempted to measure growth in the information industries and their impact on overall patterns of employment. In the early 1970s Anderlea found that there was a growth rate of 10 to 10.5 percent per annum in scientific and technical information (1973:33). Other OECD studies were carried out in 1978 and 1986 to try to establish if information technology was suppressing or generating employment (OECD, 1981; OECD, 1986). A 1986 report adopted the Porat classification system and found that the rate of growth in the PIS in a selection of European and other countries was slightly less than in earlier reports. The report also found that the value of the primary information sector, while growing in some countries, was retracting in others. This they attributed in part to firms deciding to bring functions in-house rather than buying them in from intermediate providers. This report concluded that final demand did not seem to have generated much of the growth in services and that final expenditure was being spent more on service goods than on services.

Updated work on the share of GNP accounted for by the PIS in 1972 in the United States by Michael Rubin found that the percentage had changed little from 1967 (Machlup, 1984:10). By 1980 the share of adjusted GNP accounted for by the PIS had only risen to 34 percent in the US (Rubin and Huber, 1986:3). Expenditure on generating knowledge rose from 28.6 percent of GNP to 33.9 percent in 1972 and remained fairly static during the 1970s rising only to 34 percent in 1980. Within this, while expenditures on information machines and services grew, expenditure on education declined. With regard to the distribution of occupations this later study found that by 1980, 52 percent of the active labour force was employed in white-collar work, 45 percent in manual work and only 2.8 percent on farms. They accounted for these figures thus: 'here we see the substantial effects

of the rise of technology' (1986:194). This study found that between 1958 and 1980 the percentage of the labour force engaged in producing knowledge doubled to 41.23 percent.

While the US and the OECD studies have provided data which has been used by theorists and politicians to support their post-industrial/information society theories it is apparent from this more detailed analysis of key texts that these studies encountered important classification and empirical problems. These problems range from their basic working definitions of information, to calculating the number of information workers from within existing (out-of-date) broad industrial categories, to their interpretations of the data. Cross-national comparisons of such statistics are even more hazardous in that there was no unified methodology of industrial classification in relation to the information industries. This work is useful therefore only in relation to indicating some interesting trends within which the culture and content industries are implicated.

2.4.3 The Service Economy

What is evident from the data collated by knowledge and information economists is that a number of different categories of industries have contributed to the overall growth in information industries in the past thirty years and that manufacturing industries remain an important source of employment and wealth generation. This evidence seriously undermines assertions that the industrial society is declining in importance. Historical analyses of industrial and occupational development also show that capitalist economies continually experience shifts between industrial sectors and that services have traditionally played an important role in supporting production. Far from signifying a break with past experiences the growth of services has been a historical feature within industrialist capitalist economies (Webster, 1995:40).

The information society concept highlights the shift in employment from goods to service production. In particular it notes the growth of human and professional services. Information economists have proposed that in addition to the primary and secondary, a number of different knowledge or information sectors can usefully be identified. Miles and Gershuny critique this approach.

> 'If the tertiary sector is internally diverse, the 'information sector' is equally so...when we consider that there are a host of industries in which these categories of occupation are found, the notion of information occupations begins to look more like a handy slogan than a concept of any real explanatory power.'
>
> (1986:23)

The 'Miles and Gershuny critique' of the information economy/society thesis proposes that if one closely analyses the information, and the broader service sector, one will find that it includes a multifarious grouping of industries displaying widely disparate growth trends.

The core of their argument is that one needs a more detailed approach to defining services and a broader, more socially informed approach to understanding the factors driving socio-economic developments. They propose that in order to understand the development of new types of services one needs to examine patterns of change in final demand, changes in the composition of intermediate demand and changing patterns of consumption. While technological innovation is implicated in these processes it is clearly not the main driver of social change for these authors.

Miles and Gershuny go beyond the 'catch-all' approach to service definition and define services based on the characteristics of the product at the point of consumption (Miles and Gershuny, 1983). In an adoption of a Browning and Singlemann classification (1978), the authors identify four classes of services: producer, distributive, social and personal. Entertainment and recreational services are placed within the personal services category although they highlight that this category is an 'unsatisfactory mixture' of industries (1983:14). They also distinguish between employment in service industries and services occupations (Miles, 1983:13-14) and they emphasise the linkages between manufacturing, intermediate services, physical infrastructures and informal labour/final consumption in generating service innovations.

> '...the important thing to note about tertiary industry is that though it does not directly produce material goods, a large proportion of it is closely connected with the process of production in the slightly wider sense.'
>
> (Gershuny, 1977:109-110)

Analysing cross-national European data Miles and Gershuny found that by the 1970s tertiary industries in European countries accounted for the greatest share of employment except in Luxembourg and Germany where secondary employment still dominated. Taking a more detailed breakdown of service industries they found that while still small, in terms of total share, producer services were growing as were final non-marketed services (health, education, welfare). By contrast marketed final services witnessed a 'levelling-off' of growth, personal services had declined from WWII and transport and distribution services since 1960. Interestingly for Miles and Gershuny intermediate consumer services like repair services had also grown indicating for them the continuing importance of manufactured goods. The authors concluded that the rate of growth in the tertiary sector was not going to provide sufficient employment for those displaced from other sectors much less the other vaunted economic and social benefits.

Analysing the distribution of occupations across all sectors, Miles and Gershuny found that for a selection of European countries between the 1960s and 1980s similar patterns of development emerged. The Administrative, Professional and Technical group grew in all countries while the manual category declined. Clerical occupations grew in the 1960s and

started to decline in the 1970s (1983:58). Based on these statistics the authors concluded that white-collar workers were replacing blue-collar workers in almost all countries and that the trend was accelerating in the 1970s. Their analysis concluded that the occupational effect on employment was greater than the structural effect and was generated by internal organisational restructuring and new technologies of production (1983:65). Thus industrial restructuring and an increasing division of labour across all sectors of the economy can contribute to the growth of producer service employment if more key functions in the production process like marketing, advertising, market research are outsourced.

In their search for factors influencing the growth of service industries and occupations Miles and Gershuny went beyond the productivity/ rising incomes approach advanced in the 1950s and adopted by Bell. Miles and Gershuny asserted that the influence of lower productivity increases in services might be that **prices for services remain high.** Their conclusion for the period 1950-1970 was that consumers were prompted by the cost of services to innovate and 'self-service', i.e. buy goods to self-service in their homes. Instead of a post-industrial economy therefore the impact of lower productivity in services was in fact an increase in manufacturing, intermediate consumer services and social innovation in households.

These findings propose that the secondary and service sectors are intimately linked and that one cannot understand the development of new services without at the same time examining the relationship between the two sectors. These findings also suggest that post-industrial theories concentrate too much on supply-side factors, especially technological change as an explanation for social and service innovation. They propose, and this thesis concurs, that one cannot examine socio-technical change and industrial/occupational change without a broader perspective and recourse to demand and lifestyle changes. Changing combinations of hardware, software, infrastructure and informal labour constitute for these authors the significant dimensions along which one must examine social and service innovation. These dimensions are therefore important in the context of examining the establishment and growth of service industries like multimedia content organisations and will be returned to in Chapter Four.

2.5 Information Society and Information Economy Policies.

Despite their limitations the information society and information economy theories moved from the academic sphere into the political realm during the 1990s. This section will highlight linkages between the academic theories and these political policies, particularly as they relate to the multimedia industries.

2.5.1 American Policies on the Information Society

An important precedent was set when the Clinton Administration made it a government priority to develop a national information infrastructure (NII) and coined the term 'information superhighway' to encapsulate the importance of this 'transport' infrastructure to the emerging information economy. The NII was defined as a 'seamless web of communications networks, computers, databases, and consumer electronics that will put vast amounts of information at user's fingertips' (NTIA, 1993). The development of such a network would, they proposed, fundamentally change how people worked, lived and interacted. In particular, the network would help provide a better education, better health care system, telework opportunities, more entertainment services and better government at less cost. While this document does not explicitly use the term 'information society' it strongly suggests that if the right competitive conditions are generated society would benefit from having access to cheaper, better and more services and technologies.

The NTIA document acknowledged that the private sector was already developing an information infrastructure but it proposed that the government's role should be to create a better investment environment and act as a promoter of new technological developments. They proposed five main areas for action: to promote private sector investment through tax and regulatory policies, to extend universal service to information resources, to act as a catalyst to promote technological innovations and new applications, to promote open networks and to ensure information security and intellectual property rights. In addition the government would sponsor the development of demonstration projects in order to promote the use of new ICTs with end users.

The NII vision and plan of action was further developed by Vice President Al Gore in 1994 at a conference on World Telecommunications Development organised by the International Telecommunications Union (ITU). This speech became the basis for the *Global Information Infrastructure (GII): Agenda for Co-operation* (1994) which further developed the five main areas for action and advocated co-operation between nations globally. In relation to 'development' it was proposed that if under-developed nations developed a NII it would stimulate growth in the telecommunications, information services and information technology industries, industries which were both dynamic growth sectors in themselves and the main drivers of economic growth in other areas of the economy. 'Regardless of a country's overall level of technological development, active participation in the evolving GII can provide the tools to improve the quality of life' (IITF, 1994).

2.5.2 European Union Policies on the Information Society

The European Union has produced a number of documents since 1994 which have tried to develop a distinctly European 'information society'. An examination of these reports,

communications and directives reveals an initial focus, not unlike the American documents, on building infrastructure and developing new technologies. A number of later documents appear to recognise the importance of applications, content and end-users, although the strategies adopted continue to mainly focus on the supply side. The bulk of European monetary support for the information society is directed towards technological development, particularly through the research and structural programmes.

An examination of the language and visions, which underpin the EU's information society documents, bring to mind the work of Daniel Bell. They highlight how ICTs are generating 'a new industrial revolution' and that this revolution is based on information (CEC, 1994). They warn that the 'information society is on its way', triggered by a 'digital revolution' and leading to a 'knowledge-based economy' (CEC, 1994b). They urge fast action in order to capture first mover advantages and not lose out to American and Japanese competitors. 'We have to get it right, and get it right now' (CEC, 1994a). They propose that given the right political action at a European level the information society will create the following benefits:

> 'A more caring European society with a higher quality of life and a wider choice of services and entertainment,
> *(for) The content creators*: New ways to exercise their creativity as the information society calls into being new products and services,
> *Europe's regions*: New opportunities to express their cultural traditions and identities
> *Governments and Administrations*: More efficient, transparent and responsive public services, closer to the citizen and at lower cost.'
>
> (CEC, 1994a)

Importantly for this thesis the role of the content industries is highlighted within these documents. The strategic role of the content industries is seen as important in economic terms and in relation to the generation of new service industries, jobs and wealth (CEC, 1994b). The White Paper on *Growth, Competitiveness and Employment* (1993) points out that the European market for audio-visual products has been growing at six percent per annum and that new innovation in distribution technologies will create more capacity for serving this demand. It also points out that the audio-visual industries, in particular, are labour-intensive and that there is great potential for growth.

> '...there is remarkable potential for job creation in this sector. Recent estimates point to the doubling in the medium term of the share of household expenditure given over to audio-visual software products...the aim must be to..prevent increasing resources from being diverted to job creation in other parts of the world, with Europe becoming a passive consumer of other countries' audio-visual products and with both its economy and culture depending on others.'
>
> (CEC, 1994c:104)

The first reflections of the High Level Group of Experts concurred with this proposition and suggested that 'information-intensive services such as multimedia software and systems development' were likely to generate new employment opportunities. They also identified the media as 'core industries' in the Information Society. They proposed that in order to foster their potential and take account of the convergence of technologies and industries both telecommunications and media markets needed to be liberalised and harmonised across Europe. Reducing the dominance of American produced audio-visual products in Europe is a goal of both economic and cultural policy.

Within these reports it is proposed that Europe has a number of advantages relevant to content creation, including a rich European heritage and skilled content creators. However it is also recognised that content production costs remain high and content creators face a number of problems recouping their investment. Indeed it is acknowledged that while new media may theoretically reduce the entry barriers to content creation and ease distribution problems in reality there is an increasing trend towards concentration of ownership and vertical integration in order to control the distribution chain.

At the same time this Group recognised the role that the culture industries play in relation to the preservation of cultural diversity at a local level and recognised that the trend towards concentration may threaten this important social and cultural role. Balancing on the one hand the need to generate liberalised markets to ensure economies of scale and on the other the need to encourage the production of quality and locally specific information is seen as the major challenge facing policy makers. At a European level policies have to date mainly focussed on liberalising the market for cultural goods throughout Europe. By comparison little has been done to foster local cultural production and diversity.

> 'A vital step in the reinvigoration of the spatial community would be to promote cultural production and consumption at the local level...the natural place for cultural expression is in the public sphere, and policies for the IS should be avowedly committed to developing the public spaces and shared celebration of culture. ..These complex interactions between culture and technology are, for us, both a major area of concern and an opportunity for a wider, more democratised approach to cultural production. More serious investigation in this area is clearly needed.'
>
> (HLGE, 1996:78-79)

These European documents tend to discuss abstract visions about a single type of information society for all of Europe and deal little with national specificities, plans of action, resource allocation and budgets. They also fail to establish benchmarks against which progress and change can be ascertained. As William Melody points out, these visions often make 'unsupportable claims of potential social benefit' but behind all the hyperbole there is little about how these benefits will be attained (Melody, 1996). In relation to content producers the overwhelming sense is that the policies developed so far fail to deal with the

complex issues of market failures, concentration of ownership, diversity, minority languages and access. The information society and information superhighway metaphors tend to obfuscate rather than clarify these issues. They also tend to be used to support the erosion of public service ideals in favour of free market principles.

2.6 Conclusions

This chapter analysed some important development and social change theories and highlighted the continuities evident between industrial society and current socio-economic structures. It also noted, that while the development of an industrial society involved a wide ranging set of structural, value and philosophical changes, what has been defined as a post-industrial society is based on a more limited number of industrial and technological changes. These have occurred largely without any fundamental reorganisation of capitalist relations and the distribution of wealth.

Daniel Bell's work on post-industrial society and information society theories displays a technologically determinist understanding of societal change and innovation which is supply driven and politically and contextually naïve. By contrast the approach of Miles and Gershuny to analysing the same trends is more historical and broad. They identify a number of factors outside the firm which have influenced macro trends and crucially point to linkages between trends in the production, distribution, marketing and consumption of goods and services.

The model of development used by both modernisation and post-industrialisation theorists proposes that all societies will evolve from pre-industrial to industrial and finally to post-industrial societies. However the evidence from countries other than the US points to the weakness of this model. Webster claims that the important shifts in employment have been from agriculture to services and not from manufacturing to services (1995:41). Thus the dominance of service industries in societies-which Bell used to advance a theory of post-industrialisation-cannot suffice to indicate that a society has become 'post-industrial'. At the same time the growth of telecommunications, IT and information services industries highlighted by information economists point to important trends within the overall macro structures which require exploration. This thesis proposes that such an exploration requires a socially embedded and historical framework which attends to both supply and demand trends on different levels. The findings from this approach might provide a more complex, but ultimately a more useful, basis for policy development at local and regional level.

Chapter Three - Innovation Processes and Multimedia Content Producers

3.0 Introduction

The last chapter critically examined Daniel Bell's information society theory and his contention that new ICTs and new information industries were leading to radical changes in the form, structure and values of certain societies. It also looked at economic research, which showed that telecommunications, IT and information service industries emerged in the late 1960s as important growth sectors in many countries. These two perspectives emerged at policy level in the early 1990s and informed strategies in the US and Europe aimed at developing the information industries and promoting the concept of an information society.

This chapter focuses on meso and micro theories of socio-technical innovation and the relationship between new technological developments and the social sphere. The chapter also highlights research on the development of new media forms and the unique structural characteristics of one sub-sector of the information industries: the culture industries. The aim of this chapter is to develop an interdisciplinary and multi-level framework for analysing innovation in an emerging culture industry in a particular social context, i.e. multimedia content organisations in Ireland. This framework must attend to both the process of industrial innovation in a general sense as well as the more specific cultural concerns which inform this thesis. In developing this framework this chapter draws upon research conducted within the Social Learning in Multimedia (SLIM) Network (1986-1998) and its attempt to apply social shaping, learning economy and media studies theories to the study of multimedia developments.

3.1 Economic Approaches to Innovation

The dominant approach to innovation within economics has been the neo-classical approach which treated new product and process innovations as exogenous to the production process. Innovation was firmly placed upstream within basic research and development facilities which objectively produced 'black boxes'. These corresponded to user needs and were then simply diffused throughout society. This approach informed the early development theories presented in chapter two as well as providing justification for governments to focus investment on basic research and supply side factors. This section will briefly review this approach and follow this by an analysis of more recent evolutionary approaches to innovation. This approach emphasises more multifarious sources of innovation, the importance of multiple forms of knowledge, the contribution of learning processes and the role of context in the innovation process.

3.1.1 The Neo-Classical Approach to Innovation

Within economics it is uncontested that technical change and economic growth are strictly related (Dosi, 1982:147). This recognition however is relatively recent and according to some writers the topic only achieved a high profile within the economics field during the 1980s and 1990s (Freeman, 1994).The main reason for the relative neglect of 'innovation' within economics is due to the dominance of the neo-classical model of the firm, which treated technological change as an 'exogenous' factor. This model also presupposes that markets provide perfect information, that all firms have equal access to new technologies, individuals act with full information of the market place and the frontier of innovation possibilities, and that the assimilation of technology by a firm is efficient and unproblematic. Those who suggested the process of innovation might be otherwise were marginalised:

> 'Those economists, such as Marx in the nineteenth century and Schumpeter in the twentieth, who attempted to assign a more central role to technical innovation, were regarded as rogue elephants whose work..should not be taken seriously.'
>
> (Freeman, 1994:464)

As a result of the dominant model of the firm most of the early research conducted on technological change can be divided into 'demand pull' and 'science and technology push' categories. In the former it was believed that the source of innovation was the market and that consumers would reveal their preferences via their demand patterns. Innovation resulted from firms taking note of changes in the marketplace and investing in appropriate solutions (Efendioglu, 1995). This approach has been widely criticised for failing to adequately account for the emergence of radical products, which the market has no prior knowledge of, and, failing to differentiate between different types of innovation (Dosi, 1982). Furthermore, there was little in the approach which allowed one to differentiate between 'physical needs' and economically and socially constructed 'market demands'. The innovation process was seen as a reactive and passive process, and the innovation itself was largely treated as a 'black box', the domain of engineers and technologists, not economists.

The 'technology-push' approach placed the source of innovation upstream in basic science facilities or laboratories. This approach assumed that the innovation process involved the movement of a good, or service, from the laboratory to the firm and finally into the market, and was used to justify 'big science' programmes and large-scale state science facilities, which would create inventions which industry could then develop.

A related presupposition of these two approaches to technological change was the belief that late-industrialising countries could 'modernise' by importing technologies and 'best practice' from more advanced nations, and not by investing in their own technological capabilities. Such thinking was embedded in the 'modernisation' and 'development' works outlined in chapter two. This approach informed the work of international bodies like the

ITU, the World Bank and GATT who in the 1970s/1980s sponsored technology transfer projects to lesser developed regions and argued for the removal of national barriers to trade.

> 'Technology is taken to be freely available to all countries and, within countries, to all firms. Countries simply settle on appropriate levels of capital/labour intensity in accordance to their relative factor/price ratio, determined by their relative endowments of physical capital and labour...to the extent that technological lags are admitted, developing countries are taken to receive all relevant improvements from developed country innovators: there is no problem in assimilating the transferred technology: there are no adaptations required.'
>
> (Lall, 1992:165)

Many of the academic and policy works that contributed to this 'modernisation' theory, either implicitly or explicitly, accepted a technologically determinist and linear model of innovation and diffusion. They accepted that once invented, a technological innovation went through a number of stages in its lifecycle: introduction, take-off, maturity and decline. It was largely believed that the source of technological innovation was outside the firm and that the technological artefact itself changed little during the process of production, dissemination and use. Crucially, (and wrongly in the opinion of this author), these two approaches ignore differences between innovations, the varying absorptive and innovative capabilities of firms and nations, and the influence of end users and contexts on the innovation process.

3.1.2 The Evolutionary Approach to Innovation

An alternative to this neo-classical approach emerged in the last two decades and became known as the evolutionary approach. The starting point for this school is a rejection of the 'production function' model of the firm and the notion that technological change is exogenous to the firm. It argues that technological change takes place within firms, that innovation is a risky and uncertain process requiring expenditures of time and effort, and that innovation involves processes of learning which go beyond formal institutionalised processes. Furthermore, given the nature of information it is not shared equally between firms and not acquired easily. Indeed firms have more knowledge [tacit and codified] of their own processes than they do of other firms, in different or even the same industrial sector. This has significant implications for the process of networking and collaborative innovation.

The evolutionary school drew inspiration, although not uncritically, from the pioneering efforts of Schumpeter who in 1912 characterised innovation as a process of 'creative destruction' involving ruptures, uncertainty and risk. The source of innovation for him was the entrepreneur or 'exceptional individual' who foresaw innovation possibilities and pursued them as 'an act of will'. These innovators were followed by a larger group of

'imitators' who merely implemented the new processes and products. His distinctions between 'invention', 'innovation' and 'diffusion', while unquestionably difficult to operationalise, are still prevalent today.

While one cannot discount the contribution of the entrepreneur in the innovation process subsequent empirical work has done much to expand our understanding of the sources and factors affecting the rate of innovation in firms. Rather than reject all of the 'demand-pull', 'technology-push' work evolutionary authors have looked for ways of integrating aspects of this work and differentiating between different types of innovations. Christopher Freeman points out that while all types of innovation are crucial for economic growth there are fundamental differences between the effects of 'radical' and 'incremental' innovations (Freeman, 1992). He notes that radical innovations inevitably have bugs and teething problems, which give disappointing early productivity and profitability results. Incremental innovations are needed to overcome such problems. Incremental innovation involves distinct forms of learning and growing economies of scale, which contribute to productivity gains throughout the lifecycle of the product.

This approach to innovation attempts to incorporate cumulative as well as more radical and discontinuous processes of change. It proposes that firms act with a 'bounded rationality', without full information of the market and with much uncertainty. The approach also contends that firms are guided by their history and that firms may become 'locked-into' specific trajectories of development. External linkages and networks are seen as important components of more discontinuous innovation processes which enable firms, particularly those in new sectors and those involved in radical innovation, to learn and obtain information from upstream and downstream actors. Radical innovations are seen as the main source of development in economies but they also require significant shifts in existing socio-economic, institutional and social structures.

> '...we would argue,...that the breadth and strength of the production function framework is inherently limited. To obtain a more solid understanding of innovation and what can be done to influence innovation, it is necessary to study in considerable detail the processes involved and the way in which institutions support and mould these processes. Since the 'production function framework' contains at best a rudimentary characterisation of process and relevant institutional structures, a considerably more fine-grained theoretical structure is needed for these microscopic studies.'
>
> (Nelson and Winter, 1977:46)

This more fine-grained theory of innovation must be able to take account of different forms of innovation and how innovation varies between industrial sectors. This approach recommends that our understanding of innovation must be broadened to include not just technological innovation but also social, institutional and conceptual innovation. Indeed this approach also defines technology itself in much broader terms, as something which

can be embodied in material things but also disembodied as expertise, experience and perceptions.

> 'In attempting to explain inter-firm, inter-industry and inter-country differences ...neo-Schumpeterians have shown that such differences cannot be attributed to capital-embodied technical change but are heavily dependent in the first place on skill intensity, learning and training and on managerial and organisational innovations in such areas as labour relations, incentives, hierarchical management structures, communication systems between and within firms, stock control systems.'
>
> (Freeman, 1994:482)

Learning is increasingly seen within this alternative school as a factor influencing varying rates of productivity, innovation and competitiveness between firms, sectors and nations. The 'learning economy' approach emerged within economics as a response to what some economists saw as the failure of neo-classical economic theory to explain 'reality'.[15] Underlying this approach is a belief that knowledge is the most crucial 'resource' in modern economies. Thus while they acknowledge that knowledge and learning were fundamental to the organisation of pre-modern economies, what characterises present day industrial economies for these authors, is the **organisation** and **strategic importance** of learning and innovation (Lundvall, 1995).[16]

Fritz Machlup was one of the first economists to theorise about the characteristics of knowledge. He defined knowledge as 'anything that is known by somebody' (Machlup, 1962). He went on to define five different types of knowledge: practical knowledge, intellectual knowledge, pass-time knowledge, spiritual knowledge and unwanted knowledge. Lundvall and Johnson (1994) classify economic knowledge into four categories: know-what, know-why, know-who and know-how. They point out that some forms of knowledge cannot be codified and therefore cannot be taught or transferred through formal educational means. Know-who and know-how, for example, depend more on social relations, trust and tacit knowledge. These forms of knowledge are not as easily codified, or communicated, although the authors emphasise that they are just as important to the process of innovation.

As noted previously, information and knowledge pose fundamental problems as market goods. While conventional market transaction mechanisms may apply to the first two categories of economic knowledge, know-what and know-why, the final two are not as easily transferred but rather remain embedded in both human and organisational capital. This raises fundamental issues not just for relationships between buyers and sellers in market transactions but also for networks of producers working together on projects. It also

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[15] In particular, it stems from the research conducted by the IKE-group in Denmark on the relationship between technology and economic change.

[16] Here we must distinguish between processes of learning and interaction as an input to production and the approach of information economy/society theorists who focus on information/knowledge as output.

challenges Bell's prioritisation of codified and theoretical knowledge within processes of innovation.

Central to the development of Lundvall's theory is that while certain types of knowledge may be plentiful, and accessible, other forms are specialised, scarce and difficult to codify. Organised searching (R&D) within a firm is only one form of learning. Learning can be a by-product of routine activities within a firm, i.e. 'learning-by-doing' or 'learning-by-using' (Arrow, 1962);(Rosenberg, 1982). These concepts propose that individuals, or collectives, develop ways of efficiently using new technologies which overtime, contribute to increased productivity or may result in new sociotechnical practices or knowledge (Sørensen, 1996).

Learning involves processes of learning, remembering and forgetting (Lundvall, 1995b). Far from being a limitation, the destruction and/or storage of knowledge can contribute to reducing the restraining power of 'habits' and helping to avoid 'lock-in'. Lundvall and Johnson (1994) point out that the skills, competencies and previous experience of a firm strongly influence their rate and ability to innovate. At a more macro level they believe that the dominant techno-economic paradigm may also influence the innovation process by restricting the range of questions and options perceived.

These processes of learning and struggling within an organisation may provide information upstream to suppliers which could contribute to further incremental innovations. Studies of technological change in industrial settings highlight how a site of use may also be viewed as a site of innovation, or 'innofusion' (Fleck, 1988). Communicating the knowledge gained through struggling to make technologies work however depends on user-producer relationships both upstream and downstream. Furthermore, different types of knowledge require different types of interaction depending on the complexity of the innovation and the distance, both geographically and culturally, between actors.

The notion of 'learning-by-interacting' proposes that where relationships are stable, and communication channels develop, a 'learning economy' may evolve. This development extends beyond the level of the user-producer and may also develop at sectoral and national levels, as the next section will detail. It may also be more important in the case of consumer goods where the gap between supplier and final user is great and the supplier must develop means of gathering information in order to 'represent' or 'prefigure' the final users accurately in the product. This approach challenges well-established distinctions between innovation and diffusion, and between users and producers. However it has been criticised for its lack of attention to the conflictual and contextual processes which influence learning (Sørensen, 1996).

3.1.3 National Systems of Innovation

The 'post-Fordist' era is characterised by two interdependent trends of relevance to this thesis: the development of ICTs and a movement towards flexible specialisation. With the development of ICTs the cost of storing and distributing information has fallen but the cost of gathering information and acquiring the competence to use it has remained high. Flexible specialisation has increased the importance of communication networks both within, and between organisations, nations and continents. These trends, along with the need for constant innovation, have generated a demand for networking skills and the formation of varying forms of socio-technical constituencies (Molina, 1995).

A learning economy is one where technical and institutional change is 'endogenous'. Processes of learning and feedback have been institutionalised so that collective learning is optimised in both the production and consumption spheres. Organisational forms are chosen to enhance the learning and networking capabilities of the individual, the firm and the nation state.[17] A learning economy encompasses not simply the knowledge base but is rather a combination of the system of production and the entire institutional support system. A learning economy is distinct from an information economy in that it refers to qualitative processes and relationships rather than quantitative increases in data or workers.

The concept of a national system of innovation arose when studies found that different countries were not equally successful in adapting to the challenges posed by the diffusion of ICTs and what Freeman termed the new 'techno-economic' paradigm. His case study of the Japanese economy concluded that both institutional and social factors contributed significantly to the innovative potential and industrial competitiveness of the economy. He also found that being a technologically strong country did not necessarily require a strong scientific base. Instead Freeman argued that the abilities to learn and adapt, diffuse and exploit knowledge were more important (Freeman, 1988).

Building on this work, and in recognition of the differing economic histories of European nation states, a more institutional and systemic approach to economic development and technological change developed. This concept challenges the technocratic approach to explaining industrial/technological change, and argues in contrast that 'national institutional frameworks' viewed in an international context is a much better approach to analysing the complex patterns of socio-economic development within nations (Mjøset, 1992). Two phrases have become synonymous with this approach: the 'national innovation system' and the 'national system of innovation' (Nelson, 1993) (Lundvall, 1992).[18] The former is a much

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[17] Institutions are defined as 'sets of habits, routines, norms and laws that regulate the relations between people and thus shape human interaction and learning'. Lundvall and Johnson (1993:33).

[18] It has been acknowledged elsewhere that the national systems of innovation idea can be traced back to Friedrich List and his conception of 'The National System of Political Economy' in 1841.

narrower approach, which tends to focus on institutions involved in developing new knowledge and applying it, and the latter tends to examine all aspects of the economic system and institutional set-up.

Both approaches define 'innovation' in a broad sense and go beyond the technical to focus on institutions, networks and relationships. Furthermore, innovation involves 'collective entrepreneurship' and is viewed as cumulative and ubiquitous. The context of this process is the structure of production and the institutional set-up: within firms, and between firms and other institutions. This constitutes for them a 'system' or a set of units and their relationships. A system includes more than the formal institutions supporting research and development: it also looks at inter-firm and user-producers relationships. The institutional set-up, they argue, may affect both the rate and direction of innovation. Innovation is therefore a socially embedded, systemic process and in order to study the 'embedded' aspects of this process the appropriate unit of analysis, it is argued, is the nation state.

In defending their national approach to innovation the various authors argue that structures of production and institutions differ from country to country. Different histories, languages and cultures contribute to the creation of diverse systems. While some countries are clearly heterogeneous internally, the empirical work on which this theory is based draws upon the relatively homogeneous Scandinavian countries. With regard to Ireland the same argument may apply and thus this approach has much to offer in the context of this thesis. Ireland is a small country with a highly centralised political and economic system and is (relatively) culturally homogeneous.

The main 'elements' of a national system of innovation are:

a) The internal organisation of firms.

b) Inter-firm relationships.

c) The role and form of the public sector.

d) The institutional set-up of the financial sector.

e) The R&D system (Lundvall, 1992:13).

In addition, Lundvall noted that the original case studies had not analysed the national systems of education, training and other 'qualitative' factors. He highlighted that it is the interrelationship between these elements that is crucial to the success of the system and, in contrast to the neo-classical approach, that co-operation between firms was equally as important as competition in stimulating innovation.

A crucial criticism of the NSI approach is that it fails to take sufficient account of globalisation trends, in particular the activities of transnational corporations (TNCs). While the NSI approach highlights the unique characteristics of countries and links this to their economic performance, other writers have argued that globalisation has tended to erode the

importance of national borders, not only in communications but also in trade and economic processes generally.

In response the NSI school argues that it is necessary to understand both processes. Lundvall points out that localised learning, uncertainty and bounded rationality are important processes at the micro level which lead to differing local and national development paths, national specialisations and diversity. Thus both standardisation processes, as a result of TNCs, and diversification processes, as a result of national companies and institutions, co-exist. Close user-producer relationships are another source of diversity as producers, particularly transnational producers, adapt to the cultural markets with which they deal. At a national level differing educational and training contexts, languages and histories, all provide legitimisation for a national approach to analysing innovation processes.

> 'Technology is not easily transferable across countries but, on the contrary, is country-specific and rooted in skills, capabilities and knowledge which in turn are accumulated through time. Nations differ not only in the quantity of innovations introduced, but also in the methods by which these innovations are adopted and in their sectoral composition...The effectiveness of innovation policies will depend on their ability to build upon and exploit existing national advantages and capabilities.'
>
> (Archibugi and Michie, 1995:3)

The learning economy approach provides a useful foil to the more technologically determinist and macro level information society theories and neo-classical approaches to technological change. It highlights rather than ignores the difference between information and knowledge and attempts to define different types of knowledge and their role in the production/innovation process. Furthermore, a learning economy is not necessarily a high-tech, science-based economy. For these authors an agriculturally based economy may also be a learning economy. This more process-focused approach allows for traditional capabilities to be valued alongside modern capabilities and has important implications for conceptions of development and programmes aimed at assisting lesser developed nations to 'catch-up' with more advanced economies.

This thesis focuses on a field where firms are utilising generic technological innovations to produce radical and incremental content innovations. The NSI and learning economy approaches highlight how important institutional, organisational, and conceptual innovation are in this process. They argue that institutions provide stability in a world of uncertainty and in some cases, particularly for public and semi-public institutions, act as a forum for sharing accumulated knowledge and resources. Furthermore, they highlight how networks, both upstream and downstream relationships and a capacity to learn contribute to increasing productivity and innovation at both a firm and national level.

This thesis proposes that the NSI approach provides a useful tool for conducting a meso level analysis of nations and firms within a global framework. Far from ignoring globalisation, it allows a researcher to analyse the affects of globalisation at a firm and national level. The approach, it is proposed here, allows one to account for particular political, cultural and spatial influences on technological change while might help account for national differences. It also recognises the problems inherent in social interaction between firms and institutions and the complexities of communication. Finally, it questions the prioritisation of economic over social goals arguing that the latter may provide an environment more conducive to learning and innovation. In this regard the work argues that much could be gained through more interdisciplinary work.

3.2 Socio-Technical Factors and Innovation

The aim of this section is to review sociological and communications approaches to technological change with particular reference to the development of media and ICTs. The range of factors addressed by these approaches go beyond the techno-economic to include broader social, cultural and political processes, which shape the design, implementation and appropriation of an artefact. They also tend to address the symbolic level of the media artefact and the wider social and cultural role of the media/cultural industries in society. These approaches add an important dimension to the NSI and evolutionary approaches to innovation in that they are particularly sensitive to the socially constructed and conflictual nature of technological change.

3.2.1 Early Models of Innovation and Diffusion

Chapter two detailed some influential sociological theories which suggest that technology is the cause and driver of social change. These theories tend to focus solely on the impacts and outcomes of technological change, displaying similar weaknesses to the demand-pull/ science and technology push theories within the economics literature. The dominant model of innovation in sociological literature since the 1940s was the 'product-cycle' or diffusion model, which consisted of five stages, arranged in linear fashion:

- basic science or the generation of new technological knowledge,
- applied science or the generation of workable designs for products,
- introduction to the market,
- diffusion and more widespread adoption,
- impacts.

At least the first two stages of this model were largely seen as autonomous from broader societal processes and there was little recognition of the role of feedback. In fact, early sociological literature mainly disregarded the first four stages and merely examined the affects of new technologies on society. Much of the information society literature seems to, implicitly at least, adopt this approach. The first four stages are accordingly regarded as beyond a sociologist's area of interest and expertise.

The work of Marshall McLuhan probably best epitomises the technologically determinist approach within early communications literature. McLuhan was able to capture the public's imagination with powerful metaphors, which provoked images of a 'global village' and the power of the medium, rather than the message.

> '...the western world is imploding. During the mechanical ages we had extended our bodies in space. Today, after more than a century of electric technology, we have extended our central nervous system itself in a global embrace, abolishing both space and time.'
>
> (McLuhan, 1964:3)

Edge (1988) notes that early social shaping work on technological change tended to focus more specifically on the adoption or diffusion of new technologies. He notes that while some valuable work was conducted in the technological determinist/linear model tradition the focus was firmly on the consequences of diffusion rather than the factors shaping the innovation itself. This literature held out little hope that governments, firms or individuals might influence technological innovation or the trajectory of change.

In the 'diffusion' tradition the most imminent and persistent work is that of Everett Rogers (Rogers, 1983). Rogers defined an innovation as 'an idea, practice, or object that is perceived as new to an individual or another unit of adoption', and the innovation-development process as 'all the decisions, activities, and their impacts that occur from recognition of a need including research, development and commercialisation of an innovation' (Ibid., 1983:135).

Adopting the classic S-shaped model of a product lifecycle this work focused on the diffusion of innovations and how, and through what channels, one might increase the speed of this process. Rogers identified five stages in the diffusion of new innovations: awareness, interest, evaluation, trial and adoption. In the first two stages the mass media were seen as playing an important role while in the later stages interpersonal and social networks became more important. Rogers argued that by increasing the flow of information from early adopters to late adopters one could speed up the process of diffusion. What happened after a product was adopted was of little interest to him.

Rogers found that socio-economic status was an important indicator of innovativeness and speed of adoption. In general those with a higher social status and more cosmopolitan

behaviour tended to adopt innovations more readily. Rogers also saw the 'characteristics' of innovations as crucial to understanding the diffusion process. These characteristics included relative advantage over competing technologies, compatibility with adopter's needs and values, complexity of use and understanding, availability for trial of new innovation and availability or visibility of results of innovation to others (Ibid., 1993:14-16).

This approach clearly adopts a technologically determinist model of innovation and while later work allowed for re-invention and modification in use the final user was allowed little scope to influence the innovation or inventor. Essentially the innovation was treated as a 'black box': unknown and unknowable to those outside the core site of invention. Once invented, their task was to exploit available channels in the task of persuading 'certain' end users to purchase. They might also monitor the anticipated/unanticipated consequences of the innovation on society.

In a later edition Rogers acknowledged that there was an important pre-diffusion stage in the innovation process which most investigations, including his own early works, had ignored (Rogers, 1995). He then identified six stages in the innovation process including: recognising a problem or need, doing basic and applied research, developing an idea, commercialising it, diffusion and adoption, and consequences. While he did acknowledge that not all these phases occurred in each situation the underlying linearity and technological determinism is clear. Society is impacted upon by these innovations.

While there is useful information in this work on the role of uncertainty and change agents in the innovation process, and the correspondence between socio-economic status and innovativeness in final users, the overall model of the innovation process is simplistic and socially and politically naïve.

3.2.2 Social Shaping and the Social Construction of Technology

> 'Over the past few years, a new sociology of technology has emerged which is studying the invention, development, stabilisation and diffusion of specific artefacts. It is evident from this research that technology is not simply the product of rational technical imperatives. Rather, political choices are embedded in the very design and selection of the technology...Technologies result from a series of specific decisions made by particular groups of people in particular places at particular times for their appropriate purposes. As such, technologies bear the imprint of the people and social context in which they are developed.'
>
> (Wajcman, 1991:22)

During the 1980s the social shaping (SS) and the social constructivist approaches (SCOT) emerged and their approach to studying technological and social change rejected the dominant linear models of technological innovation. Drawing upon theories from the social study of science and technology, history, semiotics, feminism and labour relations studies, these authors aimed to show how technological developments, at all stages, involved

processes of negotiation and translation between a variety of social actors and between particular times and contexts.

These new approaches viewed society and technology, not as discrete analytical concepts, or stages of a product lifecycle, but as a 'seamless web', an intertwined and mutually shaping problematic. This approach radically challenged the dominant paradigms as espoused by information society and globalisation theorists. The notion that a technology is 'malleable' and must acquire meaning through use, allows one to study how producers inscribe users in an innovation and how end users negotiate, adopt or reject these inscriptions in their everyday life. It also allows one to account for how innovations incrementally change over time, based on knowledge gathered from relationships and upstream and downstream linkages. Furthermore, it highlights how scientific and technological innovations are not neutral, but are shaped implicitly and explicitly by the dominant discourses and social relations in society.

There are distinctions between the social shaping and social constructivist approaches in theoretical and methodological terms, which despite some blurring in more recent years remain important. The social shaping approach emphasises the importance of context, economic and political forces shaping the development, implementation and use of a technology. Accordingly it adopts a broad approach examining institutions, sectors and markets in order to understand the forces which constrain and influence the firm level/micro level (Williams and Edge, 1992). In general it is expected that developments can be explained in relation to social categories like class, gender, race or power relations. Much of the work conducted in this field has focused on technology in the context of the workplace and more recently in the context of the home.

By contrast the constructivist approach asserts that by examining the micro-processes of interaction and negotiation between actors and artefacts one can trace the influence of the macro and understand the complex nature of technological development. This micro-sociological/action-centred approach rejects a structural approach in favour of an agent-centred, actor-network approach (Callon, 1986; Callon, 1987); (Bijker, 1995). Most of the work conducted in this field has focused on radical innovations like the bicycle, fluorescent tube and the electric car.

Within the constructivist tradition the French anthropologist Michel Callon proposed that technologies should be conceived as 'actants' in the innovation process and that technologies and people should be treated as 'equal' within the social study of technology (Callon, 1986). Callon and Law also proposed that to study technological change one must study the construction and transformation of sociotechnical networks and the diffusion of

technology as a process of *translation*,[19] whereby relations between people, objects and goals are brought into being and become aligned over time (Callon and Law, 1989). These networks make no distinction between production and consumption centres (Latour, 1997).

By examining detailed processes of construction and negotiation in the development of technologies like the fluorescent light Bijker showed that while a technology may be 'flexible' when first introduced it acquires stability over time as certain preferred solutions and certain powerful interests prevail. Processes of closure and entrenchment contribute to a situation whereby certain technological options becoming more generalised, but may have negative consequences if firms and organisations become 'locked-in'. Within the constructivist approach the concept of 'technological frame' was developed to account for how technological and social factors or sociotechnical ensembles, i.e. techniques and concepts may restrict the field of innovation possibilities.[20] This concept is, according to Bijker, meant to be more flexible than Dosi's technological paradigm, Hughes' technological style and Nelson and Winter's technological regime in that it takes into account the practices of non-engineers and scientists (Bijker, 1987:172). Furthermore, it is meant to apply to the 'interactions between' actors and is flexible enough to change according to the consequences of these interactions.

In the view of this thesis the social shaping approach can sometimes lead to an overly socially determined account of technological innovation and fail to capture the micro negotiations over meaning. Similarly the social constructivist approach can tend towards a technologically determinist account of events or fail to recognise the existence and role of structural processes like gender, class and racial relations. Birgit Jaeger notes these theoretical and methodological problems in her application of the SCOT theory to the development of online services in Denmark (Jaeger, 1997). Maria Lohan, in her study of the feminisation of the telephone in Ireland, also argues that there are advantages to be attained from using both approaches (Lohan, 1997). The real innovation story can only be captured, it is argued here, when one is attentive to both macro structures and micro negotiations. Both social shaping and social constructivist approaches have important elements to add to any analysis of the process of multimedia content innovation and the shifting construction of culture and identity.

Sørensen argues that the distinctions between these two approaches have diminished over time and that one can indeed now refer to a single social shaping of technology approach to the study of technology:

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[19] This term mirrors Brian Winston's use of the term transformations. (Winston, 1990)

[20] Bourdien's concept of 'field' is also useful in distinguishing the differential hierarchies and priorities at work in different contexts; i.e. economic field, cultural field, educational field, but which may also serve to limit innovation horizons. See (1993:7)

'The term signifies a set of approaches that share the following set of assumptions and concerns; it explores the social processes related to technological change, negotiations between different social groups and actors is a focal point, emphasising concepts like flexible interpretation of technology and technological controversy, it highlights the choices between different technical options potentially available at every stage in the generation and implementation of new technologies. To study the social shaping of technology is thus to analyse the construction of sociotechnical entities.'

(Sørensen, 1997:4)

This alignment has emerged from conceptual developments in both approaches which have attempted to redress tendencies towards overly social, or overly technological accounts of change. The SS approach no longer focuses on artefacts but instead attention centres on socio-technical ensembles (Bijker, 1995).

'Society is not determined by technology, nor is technology determined by society. Both emerge as two sides of the sociotechnical coin during the construction processes of artefacts, facts and relevant social groups.'

(Ibid., 1995:274)

The social shaping approach has become more aware of all stages of the technological change process and pays increasing attention to the 'consumption junction', having incorporated the domestication and decoding/encoding concepts from media studies (Boczkowski, 1997); (Frissen, 1997a). More recent studies of technological change have become more alert to how technologies are acquired, used, and given meaning in use. They also explore the social and cultural implications of technological change. While elements of cultural and textual studies are still marginal to the main body of social shaping work it will be argued below that in relation to multimedia content innovations there are important lessons to be learnt from the development of more traditional media forms.

3.3 Lessons from Media and Communications Studies.

While the social shaping perspective is relatively recent and to date has focused on industrial and domestic technologies a fragmented literature exists which examines more specifically the development of media technologies and content from a historical, critical and cultural perspective. This body of work utilises a diverse range of approaches but is united in its study of the media and its examination of the social processes by which media technologies are shaped over time.

'Technology, the hardest of material artefacts, is thoroughly cultural from the outset: an expression and creation of the very outlooks and aspirations we pretend it merely demonstrates.'

(Carey, 1992:9)

3.3.1 Historical and Feminist Research

Historians of technology provide evidence which highlights the long history which proceeds 'inventions' and how 'malleable' technologies are throughout their life. They also demonstrate how established cultural codes and social structures act to restrain and shape new developments. Their approach focuses less, or at least not solely, on the artefact, taking into account the drama and negotiations involved in restoring 'social equilibrium' once a new media is introduced. Carolyn Marvin notes that:

> 'The early history of electric media is less the evolution of technical efficiencies in communication than a series of arenas for negotiating issues crucial to the conduct of social life; among them, who is inside and outside, who may speak, who may not, and who has authority and may be believed.'
>
> (Marvin, 1988:4)

Marvin's work on the history of the electric light and the telephone from a communications perspective goes beyond the technological innovation to examine managerial, occupational and social innovations within the context of largely stable social and power structures. She documents the strategies used by electricity technicians to construct legitimacy for themselves and how they attempted to marginalise and stereotype other groups in relation to their technical ignorance. Thus women were stereotyped as talkative and frivolous while men were more task-oriented and efficient in their use of the telephone. This history of the telephone demonstrates how a technology can be socially constructed during design and use, and how existing stereotypes and inequalities can be inscribed in the artefact. Marvin documents how existing oral and written codes were projected onto these new electrical devices in order to claim them as objects for social consumption. In addition, she documents how the introduction of these new media led to tensions and negotiations between old and new structures, beliefs and habits.

Work in cultural studies also emphasises how existing macro socio-cultural formations can enter into the media innovation process. Raymond Williams argues that the expanding capitalist economic system and the increasingly mobile, yet private, mode of living created the conditions for a new social form of communications, which was subsequently filled by broadcasting (1974:26). He proposes that an accurate account of this media innovation must take account of how, for example, World War Two (WWII) significantly delayed the development of public television systems (1974:29).

Although lacking a formal model of technological development Williams writes in a manner akin to social shaping authors. He notes how the development of television was closely tied to 'a set of particular social decisions, in particular circumstances, which were then so widely ratified that is it now difficult to see them as decisions rather than as

inevitable results' (1974:23). Television developed from diverse technical advances made during the first and second world wars and from social developments, e.g. 'mobile privatisation' which warranted the development of a new form of social communication to facilitate communications between central and dispersed locations.

Brian Winston is broadly in agreement with Williams and suggests that events like WWII act as 'social brakes' to innovation (Winston, 1996). However Winston goes on to argue that even an event like WWII is not sufficient to explain the two-decade delay before television was introduced to society. He proposes that other factors, like competition from existing radio and cinema industries played an equally important role in suppressing the 'radical potential' of this new technology. His account of how the potential of High Definition Television was suppressed in the 1980s highlights how technical, socio-economic and philosophical factors played a role in the demise of this new technological format and how inventions which are technologically superior to existing technologies do not necessarily succeed (1996:88-108). His analysis of the development of *Technologies of Seeing* (1996) points to the conservatism of actors and the slowness of technological 'revolutions'.

Winston contends that a historical perspective on the development of media places the more 'revolutionary' rhetoric in perspective and dampens the more outlandish claims about technologically determined social change. In particular he critiques the information revolution and information society discourses as 'hyperbole' and proposes that social formations have historically both adjusted to, and shaped, new technological innovations. His research on electrical and electronic communications systems led to the development of a general model of innovation and diffusion which foregrounds the role of the social sphere in all stages of the technological innovation process. The model links communications technologies to scientific knowledge, broadly defined, and proposes that as an idea is transformed from idea, to different types of prototype, to invention and product it is acted upon by a number of generalised social necessities, or accelerators, and a number of generalised social constraints or brakes. He proposes that in order to understand how ICTs develop one needs to analyse the interaction of these contending factors.

Winston's model goes beyond the industrial/economic models of innovation and provides a more socially and historically informed approach to the study of how ICTs develop within existing social formations. 'I hold our situation to be, basically, that business, media, alienation, nuclear families, right-wing governments...all these, and much else, continue as usual' (Winston, 1988:342). This model is broad, in line with the social shaping perspective, and allows for a multi-level approach to the object of study. The model has been applied to historical communications systems as well as emergent systems but tends to focus on the development of the technology rather than the content of the system.

These works are united in their critique of the dominant idea that technological change is necessarily progressive and that technologies can cause a radical restructuring or revolution in society. They contend that new technologies are continuously transformed in both development and use by a complex range of factors and they remind us that both developers and users are shaped by and in turn shape their cultures and societies. They encourage us to look beyond the artefact to examine people, organisations, structures, histories and geographical contingent factors.

> 'I observe a sequence of events with a more or less regular pattern which allows me to propose a model to describe..their introduction and diffusion over the past two centuries...The pattern displayed by the model is perforce quite complicated since it needs to take account of the uneven nature of the phenomenon–the accelerators as well as the brakes. It also needs to absorb Williams's fundamental insight as to the primacy of the social sphere.'
>
> (Winston, 1996:3)

Within this body of historical work feminists have usefully shown how artefacts may embody dominant ideologies, discourses and structures in society. From rewriting histories of science and technology to studying the development and use of household, industrial and biological technologies this work highlights the biases, values and interests of a predominantly male constituency and how this contributes and reinforces the unequal distribution of power in society. While the feminine or masculine values themselves may be contested, and the processes of exclusion debated, it has been demonstrated that women have been absent from many technological fields and discouraged from attaining technological literacy.

> 'I share Cockburn's view that this 'reluctance 'to enter' is to do with the sex-stereotyped definition of technology as an activity appropriate for men. As with science, the very language of technology, its symbolism, is masculine. It is not simply a question of acquiring skills, because these skills are embedded in a culture of masculinity that is largely coterminous with the culture of technology. Both at school and in the workplace this culture is incompatible with femininity. Therefore to enter this world, to learn its language, women have first to forsake their femininity.'
>
> (Wajcman, 1991:19)

Critical Marxist work traces these patterns of exclusion to the development of industrial capitalism and the movement of paid work from the home to the factory which contributed to a reinforcement of gender divisions in society. Moreover, men effectively resisted the access of women to both capital and education through the organisation of unions (Cockburn, cited in Wacjman, 1991:21). More contemporary work on the choices embedded in the design of computer technology points to the struggles between groups who seek to influence the pace and direction of technological change and the absence of certain groups, particularly women, from this process. They highlight the extreme sexual and racial division

of labour in both the production and consumption of IT products, the culture of masculinity revolving around the work and the extent to which these gender relations and cultures become embedded in the artefacts (Webster, 1997).

Other work has argued that one cannot simply extrapolate from the fact that the IT industry is predominantly male to the gendering of design processes and artefacts in a masculine or fixed way. Rather they argue that gender and technology are mutually constructed and continually re-negotiated. Following Sonya Harding it is argued that gender consists of three elements; gender symbolism, gender structure and gender identity (Berg, 1997). While women are increasingly more visible as users of technology, structurally, it is argued that the symbolism and identity of technology is still male. In fact the truth may be that some technologies display different combinations of gender or different genders at deep and surface levels.

> '...(the telephone) may be more plausibly characterised as a transvestite technology – a man's technology dressed up in women's clothes in that the feminine culture of the telephone sits within an industry which is socially shaped towards the interests of business customers.'
>
> (Lohan, 1987:167)

> '...the extent to which the meanings and uses of domestic technologies have a gendered character is perhaps even more clearly demonstrated with regard to the technology of leisure. While for women the home is primarily defined as a sphere of work, for men it is a site of leisure, an escape from the world of work. This sexual division of domestic activities is read into the artefacts themselves.'
>
> (Wajcman, 1991:90-91)

3.3.2 Representation and Domestication in Media Studies

The stage in the product lifecycle after diffusion has received relatively little attention in the industrial innovation and sociology literature. The development of 'active audience' theories within media studies has shown how this constituency can be an important site of innovation in itself and is strongly linked into the process of production. In particular this work has shown that in spite of attempts to 'encode' or 'represent' particular uses and discourses into an artefact at the design stage, these can be actively negotiated by end users.

Valerie Frissen notes that producers can be remarkably blind as to potential uses of their innovations (Frissen, 1997a). Studies from America have found that initially the telephone was conceived and marketed as a broadcasting device, and then as a business tool (Pool, 1977). In the Irish case the plain old telephone and newer networks like ISDN were also originally targeted at, and priced for, business users (Flynn, 1998a) (Kerr, 1994). Studies of actual telephone use highlight how end users adopt and reinterpret artefacts within the everyday work and leisure contexts of their lives and point to a much more complex and diverse pattern of use structured along gender and class lines (Lohan, 1997).

The processes by which users incorporate new technologies into their lives and make meaning of, and through them, has been conceptualised within media studies as a 'domestication' process. The domestication concept arose from ethnographic work, which attempted to understand how new media were incorporated into the everyday and to explore assertions that ICTs were radically changing social relationships, social identities and the structures of society. This work also sought to differentiate between different types of 'end user' and different contexts of use.

The concept of domestication highlights how individuals bring objects under control, bringing them in from the 'wild' public space into the safety of private space (Silverstone and Hirsch, 1992). This process of 'bringing in' involves various stages whereby the object and its meanings are negotiated. These stages are: the initial purchase of the artefact or 'appropriation', the physical placing of the artefact or 'objectification', the use and experience of the artefact or the 'incorporation' and the construction/reconstruction of boundaries between public and private or the 'conversion' of an artefact.

Studies of television in particular focus on how a household/home has existing 'economies of meaning' and how these may be traced along gender, class, race and public/private dimensions. New technologies and in particular new ICTs must negotiate these economies and generate meaning and practices within existing social relations and resources: financial, material and cultural. Importantly, changing commitments and roles in external networks can greatly influence how much time, and the quality of time, which is devoted to using new ICTs within the home. Indeed the home is not the only site of ICT consumption as intermediate, e.g. cybercafes, and work-spaces evolve in line with more flexible, networked and mobile working patterns.

Crucially for this thesis, this work approaches media artefacts as both material and symbolic object involving practices of use, and processes of signification. The EMTEL network referred to this as the 'double articulation' of ICTs while within the SLIM network ICTs were seen as 'doubly symbolic'. This attention to the symbolic is a feature which distinguishes this work from most of the social shaping work, which tends to treat the object itself as meaningful but not distinguish between the different levels of the object.

> 'From a media studies perspective the development of a meaningful message involves the encoding of a particular account in a text by the designers/producers. This text is then structured according to the formal rules of language and discourse and finally this 'interpretation' of events is decoded by end users using a number of strategies.'
>
> (Hall, 1973)

> 'The moment of use or reaction to this text can be considered as a negotiation space where the polysemy of the text comes alive. It is clear from empirical work on television consumption for example there is no direct correspondence between what is encoded and what is decoded and that audiences may in fact totally reject the message

> encoded in a text. An understanding of these 'encoding' and 'decoding' processes and the factors influencing them allows one to temper the more critical political economy or feminist work on structural inequalities and indeed early communication 'strong effects' theories.'
>
> (Fiske, 1982)

Far from rendering the theories of signification redundant this fact may become even more relevant in the context of new media where people select, demand and personalise content rather than accept what is broadcast to them. It is at this production/consumption junction or user/text interface that offered meanings and identities: cultural, sexual or other are negotiated. **Central to the approach adopted in this thesis is a recognition of the importance of this hub. It is proposed that the development by producers of innovative formalistic or semantic strategies aiming at specifying 'differences' between end users may prove a more successful innovation strategy that those aimed at maximising economies of scale by producing 'universal content'.**

McLuhan points out that if one adopts a transmission approach to communication even electricity can be defined as a form of 'content' (McLuhan, 1964:17). By contrast when this thesis refers to the culture industries and 'cultural content' it is in relation to cultural activities and the 'means of these processes', i.e. the arts or human intellectual works (Williams, 1981). Raymond Williams points out that the term 'culture' in anthropology or sociology can mean a complete 'way of life'. Following the 'cultural turn' in the social sciences this thesis contends that cultural activities and means are both constitutive of cultures, as whole ways of life, and draw upon the continually evolving signifying systems of cultures in order to impart meaning. This approach is following in the tradition of Durkheim and his concept of 'collective representations' (du Gay, Hall et al., 1997:12). It also takes into account Gidden's concept of the 'duality of structure', whereby people both draw upon, but continuously contribute to, social structures (Tucker, 1998:12). Both culture and signifying systems are viewed here as sites of struggle and negotiation.

> 'Culture, it is argued, is not so much a set of things...as a process, a set of practices. Primarily, culture is concerned with the production and exchange of meanings...between the members of a society or group. To say that two people belong to the same culture is to say that they interpret the world in roughly the same ways...Meaning is what gives us a sense of our own identity.'
>
> (Hall, 1997:2-3)

Following semiology, language is viewed here as a system of meaning which functions according to certain socially developed codes and structures. A language can mean any system of representation; photography, painting, writing. Each system employs certain codes and conventions to limit polysemy and establish 'preferred' meanings; thus the caption of a photograph serves to anchor the meaning of the image. Similarly, the convention of

Renaissance monocular perspective structures how we translate three-dimensional images onto two-dimensional surfaces while maintaining an illusion of 'realism' and a link between sign and referent. A signifying system, or a representational language, evolves over time but importantly for this thesis allows for the production and re-production of meaning as well as the construction of 'difference' (Hall, 1997).

Roland Barthes proposes that 'texts' may be analysed on two levels; a primary, literal and denotative level and a secondary, cultural and social level; the connotative level (Barthes, 1988). This follows Sassure's assertion that a sign may be divided into two levels: the signifier and the signified. The former is associated with the form or expression of the sign (sound, image) and the second with the underlying concept or meaning.[21] While there have been elaborations on this concept within media studies the basic distinction is still a useful tool for analysing multimedia content.

This approach is not to ignore the role that the technology, hardware and software, has as 'actant'; as both facilitator and barrier in the content production and consumption process. It also must acknowledge the contribution of external processes like advertising in the representation and generation of meaning around an artefact. As Stuart Hall points out in his 'circuit of culture' model: 'in fact, meanings are produced at several different sites and circulated through several different processes or practices', including during production of the text, through advertising and marketing (1997:3). This thesis therefore pays attention to an array of meaningful processes at all stages of the innovation process. In particular it aims to trace how identities, cultural 'tastes' and 'conventions' are encoded in both the form and content of multimedia texts and how feedback through various formal and informal channels continually influences subsequent developments.

Post-structuralism and constructivism argue that there is never a 'fixed' meaning or underlying structure in a text but rather meaning and identity are constructed in the 'text-reader' negotiation.

> '...reading, however, involves bringing to the text oral competencies developed in the immediate conditions of the reader's social history. Reading is thus a negotiation between a text produced from the top and a reading from below...Reading is participatory, it involves the production of relevance: decipherment, the perception and acceptance of distance (social and aesthetic).'
>
> De Certeau, cited in (Storey, 1996:79)

While accepting the notion that meaning is generated during the reader/text interaction this thesis proposes that designers nevertheless act to limit the potential number of readings from a text by inscribing 'preferred readings' in the text (Moores, 1990:16). The texts

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[21] Winston develops his model of technological change by analogy with Saussure's deep and surface structure in linguistics.

examined in this thesis were all constructed or localised for end-users in 'particular' cultural markets and based on the notion that these audiences had access to a certain 'cultural capital' which would enable them to decode the texts. Researchers like Morley alert us to the importance of 'culture' as one of a number of discourses that come into play in the process of reading and constructing meaning (Ibid., 1990:15). A crucial task for this thesis is to explore this notion of 'cultural distance' and 'cultural capital' as it works through signification to engage or alienate audiences. The reception of messages is influenced by a number of personal characteristics, (age, sex, class, nationality, resources, technical and media competence), the social context of reception, (place, individual or multiple reception) and competing alternatives. Thus this stage of the innovation process is highly uncertain.

The success of a media innovation may depend both on how it 'inscribes' and 'specifies' final users and on how it incrementally innovates and adapts to changing contexts of use. Many media innovations are successful not because they are technologically superior but rather because their various grammars (aural, visual, linguistic, narrative, dramatic, interactive) are 'accessible' to specific audiences. In the language of semiotics, a message must be 'significant' to its audience if it is to be reacted to, or acted upon. This more semantic and cultural approach is in sharp contrast to information based theories of communication.

> 'The transmission view of communication is the commonest in our culture–perhaps in all industrial cultures–It is defined by terms such as 'imparting', 'sending', 'transmitting', or 'giving information to others. .. In a ritual definition communication is linked to terms such as 'sharing', 'participation, and 'the possession of a common faith.' The tradition exploits the...common roots of the terms 'commonness', 'communion', 'community', and 'communication'. A ritual view of communication is directed not toward the extension of messages in space but toward the maintenance of society in time; not the act of imparting information but the representation of shared beliefs.'
>
> (Carey, 1992:15-18)

3.4 Conceptualising the Multimedia Industries

Having analysed the economic, sociological and communications approaches to technological innovation this section will complete the development of the research framework by looking at the structural specificities of the particular field under study: the culture industries and within this the multimedia content industries. This section focuses on the issues raised by the struggle between market forces/privatisation and social and cultural ideals/public service within this sub-sector.

3.4.1 The Culture Industries – Political Economic Issues

Within the information economy studies examined in the last chapter the information services were seen as potentially important generators of employment and wealth. Within

these broad category of industries one finds the traditional and new media industries which produce content aimed at intermediate and final users. While this category of industries are variously called audio-visual, information, applications or content industries, this thesis adopts the conventional term used within communications studies: the culture industries.

The 'culture industries' within the field of communications studies are generally taken to include audio-visual, (television and cinema) print, and popular music organisations. The term was coined to specify the industrialisation of both production and consumption processes which began in the early stages of industrial capitalism and cultural modernity in what were once public or artisinal activities (Adorno, 1991). The term 'culture industries' was initially used 'critically' to highlight the emerging dominance of industrial and economic imperatives over artistic, political or social concerns. More latterly the communications literature has been concerned with the increasingly unfettered extension of purely market-driven cultural production and how this trend conflicts with established and locally specific social and artistic ideals. This thesis conceptualises multimedia content industries as emergent 'culture industries' and is also concerned with the 'potential' conflict between increasingly global economic imperatives and the social and cultural role of this emergent industry in specific locations.[22]

Historical research has established that the industrialisation and post-Fordist trends which occurred in many secondary and tertiary industries this century are also characteristic of the culture industries. As the media of newspapers, broadcasting and cinema matured, internationalisation, diversification and concentration emerged as key trends. Traditionally, nationally specific regulation regimes acted to limit the impact that these trends on national markets and on content. However the deregulation of international trade barriers in all fields, the emergence of new technologies of transnational distribution and the introduction of competition into traditional media markets have placed new pressures on once nationally focussed media companies. Today large 'de-territorialised' media companies compete on a transnational basis for the largest audiences.

> '...significant transformations are now occurring in the information and communications media as a consequence of new technological forms of delivery. We are seeing the restructuring of information and images spaces and the production of a new communications geography, characterised by global networks and an international space of information flows.'
>
> (Morley and Robins, 1995:1)

Within this context new technologies of distribution (cable, satellite) and digitalisation have led to a 'convergence of modes' between media and challenged the established

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[22] It thus adopts a sector-specific approach to studying the process of innovation.

boundaries between industrial sectors particularly between broadcasting and telecommunications. Digitisation would appear to be leading to a convergence of hither-to-fore distinct activities and for some authors poses important challenges for policy makers (Pool, 1983). As companies move into diverse fields, offering a variety of services, traditionally separate regulation frameworks and concepts, such as 'common carriage' within telecommunications, 'freedom of speech' within print publishing and content regulation frameworks as applied in broadcasting are challenged. Most industrial innovation and information society policies adopt an uncritical acceptance of structural and technological convergence and the digitisation and commodification of information.

Political economists highlight the unique characteristics which define the culture industries and the tensions they face in trying to balance economic imperatives and cultural/social objectives. They argue that trends towards concentration and cross-ownership of media companies have traditionally led to a constriction of choice between products and programming: thus minority programming is restricted in favour of programming aimed at delivering the largest audiences to advertisers at least cost. In addition, they argue that as companies search to increase profits by exporting they produce programming which is less local or culturally specific. In many cases this means a reliance on 'stars' and proven formulae rather than 'gambling' on new innovations.

> '...the exclusion of the untried and the reliance on the familiar and already popular are also very evident in the cinema, where both the top box office films in 1972 .. were based on best-selling paperbacks, while four others in the top twenty were adapted from successful television comedy series. A parallel situation is beginning to emerge in the record industry.'
>
> (Murdock and Golding, 1997:23)

Nicholas Garnham contends that one needs to distinguish between social form and cultural form with regard to the culture industries (1980:26). Social form, for him, is the abstract system of material relations in which the culture industries operate while cultural form is the materially embodied symbolic form they produce. His work is focused on how the former influence, or determine, the latter. He asserts that the culture industries must be seen as economic entities which produce artefacts themselves and stimulate demand for the creation of other artefacts through advertising. This role is primary for him to their ideological or cultural role. Despite his prioritisation of the economic he points out that capitalists sometimes produce cultural commodities for prestige and reasons other than economic profit.

3.4.2 The Culture Industries –Cultural Issues

While the cultural industries are undoubtedly important economic entities communications research proposes that they also play an important social and cultural role in modern societies through the artefacts they produce. The culture industries are uniquely a 'mental machinery' whose artefacts must 'satisfy' intangible 'needs' as well as functions. While social shaping researchers would argue that an everyday utensil may fulfil symbolic uses, this thesis would concur with the EMTEL network in asserting that cultural artefacts represent a 'double articulation' (EMTEL, 1995). Media artefacts have meaning both as objects and as media which intermediate between public and private culture. Thus the media play an important role in helping to constitute, renew and transform communities in space and time through the communication of social experience using socially accepted cultural codes.

> 'The media have a unique twin role in our lives. On the one hand they create and distribute many of the symbolic and cultural resources we require to make sense of the social world we inhabit. From the language we speak to the identities and institutions which constitute our social life, the media are often primary, and rarely less than contributory, providers of the building blocks of our experience.
> On the other hand...the media are also major institutions in the economic and political fabric of our societies. They provide the vehicle for advertising which connects the world of production to that of consumption. They absorb considerable proportions of our disposable spending... They are also themselves political and economic actors of some magnitude.'
>
> (Golding and Murdock, 1997:xiii)

A recognition of this social and cultural role does not signal acceptance of the 'hyperbole' that new media may potentially democratise media production, revolutionise media consumption and empower end users and local communities. New media institutions and forms develop within the social sphere and as such are shaped by existing economic, political and social structures which attempt to 'suppress' their disruptive potential (Storey, 1996); (Williams, 1974); (Murdock and Golding, 1997). Indeed Annabelle Sreberny-Mohammadi points out that while new media forms may potentially offer important opportunities for ordinary people to communicate, historically, the institutionalisation of different media forms by society has tended to privilege the interests of dominant social groups. This was the case with 'revolutionary' media technologies like satellite, CATV, and video and increasingly appears to be the case with the Internet (Winston, 1998). The institutionalisation of the press in the last century was also closely bound up with the political need to establish nation states and the development of national cultures.

> 'Print...strengthened the power of states, which could now more easily inform their populaces of new laws, gather taxes, print stamps with royal faces... Print even served to promote nationalism, because it helped the spread of vernacular languages such as

English, French and German in preference to Latin, thus promoting the spread of national identity.'

(Mohammadi-Sreberny, 1990:51)

Political economists of the media have argued that the production processes of the culture industries are subject to the same institutional, economic and technical developments as other industries and that this creates pressures leading to the homogenisation of content. This is particularly the case with large-scale corporations which strive for both vertical and horizontal integration on an international basis. Herbert Schiller and Peter Golding argue that processes of globalisation serve to extend the 'capitalist' project in new ways (Schiller, 1981) (Golding, 1997). These pressures run counter to the moral and social ideals of 'diversity' and 'plurality' of content and the non-materialist, more artistic ideals which inform many cultural practices (Bourdieu, 1993). This thesis is particularly concerned with the influence of these pressures on the development of multimedia content processes and the implications for end users and minority cultures.

A concern with the global economics of content production and the implications for content quality and use is an important theme for international communications researchers. During the 1970s these researchers argued that the international flow of mass media products was controlled by a small number of nations and effectively excluded the voices of many minority cultures and nations. While the work conducted under the 'cultural imperialism' mantle highlighted important issues this thesis would argue that early 'cultural imperialist' work tended to ignore the role of internal national dynamics in shaping these international communications patterns. It also tended to conflate economic power with cultural affects, assumed that audiences are passive and implied that there exists 'authentic' national cultures in the first place. While one particular culture may dominate the electronic 'mediascape' in time and programming units, the cultural imperialism perspective often ignored the space available for intermediate and end users to resist and negotiate transnational media content.

A concern with content must be aware of both macro and micro patterns of development. Cultural and Media Studies have shown us that on a micro level active audiences negotiate these cultural flows in accordance with their cultural experiences and particular skills. Indeed cultures themselves are not static but rather must be seen as more 'evolutionary'. Sometimes they are aligned with national boundaries, sometimes they flow above and beyond such boundaries. Crucially they are based upon a sense of collective memory, a sense of lineage and heritage and a sense of common destiny. Irish culture, for example, displays a complex interweaving of external colonial and other cultural influences which have been shaped and adapted to the Irish context. Symbolic content has often been in

Ireland, consciously or not, involved in a political project to reshape and reinvent identity in relationship to imposed 'boundaries' and the foreign 'coloniser'. Whether the forms were novel or not, the content of some popular television programmes and oft recited songs 're-worked the specificity of Irish culture' (Gibbons, 1996:4).

As Scott Lash notes, global cultures have no such connections, histories or linkages (Lash and Urry, 1994). They are transient and disposable. The ironic outcome of globalisation and individualisation processes in modern societies is that in such a melange of cultural flows individuals are driven to seek a sense of 'identity' in new forms of socialisation and in the past. The outcome of media fragmentation and new media developments may be the emergence of new forms of social interaction in new 'imagined communities' as people search for, and remould 'narratives' of self in a continuously reflexive process (Tucker, 1998);(Turkle, 1997). The important question is whether the market and private organisations will provide these new forms and spaces or whether governments and international bodies will need to encourage their creation.

In order to investigate the 'actual' social and cultural role of new media developments once must attend to the macro factors shaping developments as well as to the everyday process of content development. In particular one must pay attention to the contextual and sectoral factors which shape what type of information is produced, the values attached to such productions and how end users negotiate and use these particular types of texts. This approach is in contrast to information theories which tend to conflate all sectors of the information economy (hardware, infrastructure, information producers) and all types of information together (Preston and Kerr, 1998). Drawing upon the work of Carey this approach calls for a replacement of the dominant transmission discourse by a more cultural and semantic approach to communication (Carey, 1992). This perspective on the culture industries will be applied in the context of the multimedia content industries in this thesis.

> '...cultural commodities...circulate in two simultaneous economies: the financial and the cultural. The financial economy is primarily concerned with exchange value, the cultural is primarily focussed on use–'meanings, pleasures and social identities'...the financial economy tends to favour the forces of incorporation and homogenisation, while the cultural economy tends to favour the forces of resistance and difference.'
>
> Fiske cited in (Storey, 1996:24-27)

3.4.3 Characteristics of Multimedia as Cultural Form

The political economy and cultural perspectives outlined above were developed in relation to the mass communications systems of broadcasting, print publishing, film and music. Can one apply these perspectives to the study of new multimedia industries and their products? Research conducted in the mid-1980s concluded that existing social theory was adequate to understanding new media developments. By the mid-1990s researchers were not

so sure that mass media theories could deal with the demassified, individual and interactive features of new media (Jankowski, 1996). This thesis proposes that these new media developments make it even more important to develop a historical understanding of traditional ICT developments and to explore empirically the form, content and institutionalisation of new media.

Multimedia is a contested concept and its active redefinition provides an informative site for the study of social shaping and the role that major actors play in such a process.[23] Less than ten years ago the definition of multimedia was associated with a new approach to education and performance art which involved many different media resources being used simultaneously. Today the dominant definition of multimedia is more likely to be associated with CD-ROMs and increasingly the Internet. Today's definitions are also more likely to be associated with the integration of different media forms within a single carrier of information and emphasise the digital nature of all these media forms. The dominant definition tends to focus on the transmission/technological characteristics of the media. The following table provides an overview of different perspectives on multimedia in the Irish context.

[23] Hansen, F. (27-8-96) e-mail to SLIM network.

Table 1 A Selection of Different Definitions of Multimedia, 1996.

- *The Italian Multimedia Market* excluding audiotex, videotex, teletext, videoconferencing, intranet and real time on-line financial information services from its definition of multimedia (The Irish Trade Board, 1996). It included:

  1) Bespoke Applications (customised)
  A) Offline- multimedia catalogues, corporate multimedia training tools
  B) On-line- website design and maintenance

  2) Off-line Titles
  A) Professional
  B) Consumer

  3) Internet Access Providers

- A multimedia developer in discussion with the author defined multimedia as the Internet, CD-ROM and audio-visual installations; 'you can't talk about one without the other'.

- The director of the Audio-Visual Centre, UCD defined multimedia as the use of multiple-media, combining many different media to perform a task. Their distance learning projects allowed students to interact with the lecturer via telephone, fax, e-mail and the Internet.

- An unnamed journalist wrote 'besides being entertaining, multimedia helps you to convey ideas more quickly than old-fashioned presentations ever could.....There's a lot of confusion about multimedia, a lot of hype.....including a strong perception outside the computer industry and in the general business world that multimedia is vaguely something to do with U2, the Internet and kid's video games.' (Computerscope, 1995)

Source: Interviewees and desk research

The 'interpretative flexibility' of multimedia is characteristic of a new technology as competing actors struggle to achieve consensus and stabilisation around 'their' definition and product. The focus on technology also reflects the lack of content applications and forms available to exploit the new technologies. The popular understanding of multimedia in Ireland in the 1990s has been formed in industrial organisations, conferences, and in both editorial and advertising features in the media. Within the last decade the primary actors have been the established hardware and software developers like Intel, Gateway, Microsoft and Apple who have appropriated this 'revolutionary' technology into their portfolio of products. At the same time the term has been incorporated into political discourses particularly surrounding the information society project. These discourses and representations tend to reinforce a consensus that multimedia is the integration of digitally based video, sound, text and images on media to be accessed via the computer. Alternative distribution platforms or trajectories like interactive television and Minitel have largely faded into the background. The dominant definition of multimedia today is based primarily

on its technological attributes and sees multimedia as a configuration of many different component technologies.

> 'Multimedia applications–defined ..in terms of computer-based systems that handle graphics, sound and even video channels as well as text information'
>
> (Williams, 1999)

> 'Multimedia refers literally and most generically to the facility to present information in a variety of media through a single integrated channel. Today it is used more specifically to refer to the expected convergence of information and communication and broadcasting technologies...enabling the storage, processing and transmission of large volumes of digitised information....multimedia does not refer to a particular technology, but to a cluster of innovations.'
>
> (Williams, 1997:328)

This thesis defines multimedia as an emerging new media and cultural form. The definition acknowledges multimedia's origin in scientific knowledge, (microprocessors, information theory, networks and software) but also highlights the influence of the following factors: the increase in mobility, the de-structuring of the working day, competition and conventions set by other cultural activities (films, gaming, television, photography, music, theatre, books), government investment in ICTs, regulation of content and industrial innovation programmes. This approach takes us beyond the technical to look at the social appropriation of the technology as well as the form, content and use of the medium. Raymond Williams in his analysis of the development of television wrote:

> 'There is a complicated interaction between the technology of television and the received forms of other kinds of cultural and social activity. Many people have essentially said that television is essentially a combination and development of earlier forms: the newspaper, the public meeting...yet it is clearly not only a combination and development...it will be necessary to look at those forms which are not in any obvious way derivative and which can usefully be seen as the innovating forms of television itself.'
>
> (Williams, 1974:44)

Most definitions of multimedia tell us little about its specific characteristics as a 'cultural form' and distinct mode of communication. It is widely agreed in the popular and academic press that what is unique about multimedia is its 'interactivity'. However the literature focuses on the technical attributes of the artefacts rather than the content or the use to which they are put. The literature lauds the multi-sensory human/computer interfaces embodied in CD-ROMs, touch-screen information kiosks and the human/computer/human interfaces such as video-conferencing and the Internet. A second feature presented in the literature is the 'multimedia-ness' of the product or the extent to which they present 'data through more vivid forms' (Jankowski, 1997:329). For these writers the rapid development

of computer memory, bandwidth, compression techniques etc. have cleared a path for 'revolutionary' new content developments.

> 'The real power of multimedia lies in interactivity...at the interface with the viewer or user-on screen-the material can respond to or be controlled by the user, following whatever path of interest the search...suggests. That is what makes it an entirely new way of presenting or obtaining information-potentially changing the way we work, learn and communicate.'
>
> (Business and Finance, 1995)

However, these definitions are not entirely satisfactory. Many have argued, convincingly, that traditional media technologies and forms can be defined as 'interactive' and 'multi-media.' A more useful definition might be attentive to different levels of interactivity and the ability of the end user not only to interact with the screen and navigate around the text, but also to interact at a more fundamental level both with the form, content and other users. More recent work on multimedia argues that interactivity is not inherent in technology but rather is a product of how the artefact is configured by the designer, how this is negotiated by final users and crucially for some, how the system responds to this negotiation. For them, quasi forms of interactivity have existed with other media, i.e. the use of an index to search through a book, the use of telephone call-ins in television and radio programming. However with digital media the immediacy and scope for full interactive communication seems to have developed to a new level. This development also seems to call into question our conception of how the mass media communicate, the role of the author, the integrity of the text and the role of the end user in adapting and generating content. Communications via digital media has the potential to be genuinely symmetric.

> 'Interactivity is seen as an event involving users, media and messages – and particularly how messages refer to earlier messages, i.e. their responsive character. Rafaeli distinguishes three levels of communication: 1) two-way (non-interactive) communications, 2) reactive (or quasi-interactive) communication, and 3) fully interactive communication. The last two levels differ from the first in that role exchange is central to each subsequent reactions.'
>
> (Hansen, 1996:63)

Associated with notions of interactivity are the 'new' techniques of hypertext, non-linearity and multi-linearity. Critics from within media studies have shown how such forms exist in cultural forms such as printed texts, painting and film. Furthermore, they argue that meaning is always generated in the reader/text interaction and that this moment is both a 'creative' and cultural process. Friedman points out that hypertext is a limiting paradigm for interactive textual development rooted in 'traditional notions of textuality' (Friedman, 1995). Much of the commentary on 'innovative' multimedia systems and how CD-ROMs, web-sites and interactive displays improve learning and communication possibilities have

suffered from what might be called 'techno-fetishism' and 'historical amnesia' (McBride, 1998).

One area of multimedia developments which deserves formal analysis is computer games and virtual reality. From multi-user domains (MUDs) to high-end PC games the construction and use of these spaces often involves learning a 'distinct semiotic structure' for the user (Friedman, 1995:74); (Turkle, 1997). While initially game production was a small-scale process today the term 'New Hollywood' more properly invokes the complex industrial process of games production. On examination however one still finds traditional concepts of puzzles and hypertext shaping the human/computer possibilities into a limited number of pre-defined options. Even commercialised simulations and virtual reality artefacts draw upon traditional viewpoints, forms and themes.

Much of the research about new interactive media content has been driven by a sense of 'moral panic' over the form and content of new media and the impact it will have on the isolated individual. It can also be interpreted as society attempting to suppress the 'radical potential' and threat to convention offered by these new systems. Shifting identities, simulations and virtual constructs are seen as 'dangerous' manipulations of 'reality', which may lead to a denigration of the social world as individuals retreat from society into their cyberworlds. As representations are increasingly denuded of 'referents' in the real world and become merely 'simulations' it is argued that our sense of ourselves in the world and our understanding and models of the whole process of meaning construction will become unhinged. Others argue that new cyberspaces and networked technologies may enable the creation of new forms of communities across time and space and contribute to the active recreation of 'real' identities through the process of communication and use (Jones, 1995);(Jones, 1997). This shift from seeing interactive multimedia products as tools, and networks as 'pipes', to seeing them as media for communication and seeing communication as constructed 'in' rather than by networks reflects the approach of this thesis to multimedia as 'structured' cultural form with 'negotiated' social implications across space and time.

> '...it makes sense to explain media use in terms of interaction between the actors involved. In this interaction-centred approach, communication processes are regarded as processes of negotiation. Media use in specific interactions must be understood against the background of interpretative, normative and political 'struggle', and cannot be looked at in isolation from other social interactions in time and space. ...The use of communications technologies must be understood in terms of interactions between the designers of the technology, those who use the technology for intervention purposes, intermediaries, end users and others related to the social networks of these actors.'
>
> (Leeuwis, 1996:88)

3.5 Conclusions

This thesis conceives of information service industries as a diverse set of industries which produce information products for both intermediate and final users. It also differentiates between multimedia software producers who produce desktop applications, specialist - information services who produce specialist financial services and multimedia content producers who produce symbolic content aimed at final users. This thesis defines the latter as culture industries and points to their dual role as both an economic and a cultural entity. As economic and cultural entities one must be attentive to both the wealth and job creation potential of the sector as well as the nature of the information produced and the social and cultural role of their products in use. This thesis is concerned with both the process of content development in these industries and the influence on this process of tensions between economic imperatives to generate profit and jobs and wider cultural and social ideals. These concerns relate directly to both industrial and cultural policy making as well as the information society theories already discussed.

The approach to analysing multimedia content innovation developed in this and the last chapter is multi-level and inter-disciplinary. While the thesis adopts a broad social shaping approach at all levels this is supplemented with insights from other theoretical approaches where necessary. At a macro level (Chapter Four) the thesis will examine socio-economic trends in a number of European countries by adopting the social innovation approach developed by Miles and Gershuny (1983) and supplementing this with other significant social trends. This provides a useful approach to analysing and relating trends in production and consumption and overcomes the focus on production evident in information economy/society research. The social innovation approach also allows this thesis to compare structural developments in Ireland to broad international trends.

In order to explain national specificities and explain how Ireland diverges from international trends at a macro level this thesis then moves to a meso-level of analysis and applies both national systems of innovation and social shaping approaches. In accordance with the pertinent factors identified by the national system of innovation approach Chapter Five will examine a number of factors which can either stimulate or inhibit the direction and rate of innovation. It will supplement the NSI approach with broad political and cultural factors relevant to the Irish context.

Within these macro and meso structures individuals and firms embark upon processes of change at a micro level. This final level of analysis examines how the NSI impacts upon the translation of multimedia content ideas into prototypes in four organisations (Chapter Six). This approach is attentive to innovation as a process of transformation and negotiation between upstream and downstream factors, supervening social necessities and social barriers. In Chapter Seven the process of further developing these prototypes into finished

artefacts is examined using a social shaping approach informed by communications perspectives. In this chapter the thesis is particularly concerned with the specificities of the content innovation process, the 'newness' of multimedia forms and content, and the role of the-end user in defining and improving multimedia content innovations. It is proposed that new interactive media may enable the development of new types of relationship between producers and consumers, and consumers and consumers. This has implications not just for the content innovation process, notions of authorship and representation but also for wider processes of cultural and identity formation.

Micro instances of innovation in this thesis are seen as a continual process of incremental change interrupted by instants of more radical change. Innovation is seen as a circular process of flows, interactions and negotiations between firms, individuals, artefacts and end users and a search for equilibrium between processes of stability and change. The process of innovation as examined in the following chapters, is a broad process which involves the micro negotiations involved in content creation, the actions and programmes initiated by institutions and powerful interest groups and wider macro processes of socio-economic change. This thesis challenges industrial innovation and social shaping theorists to look at the content innovation process as both an economic process as well as a cultural process of meaning construction.

> '...an interactive model of the relation between context and action is the key to overcoming the separation of micro and macro approaches to understanding technology as a social product, with different but consistent forms of analysis appropriate to each, rather than an application of the same action concepts regardless of level.'
>
> (Williams and Russell, 1988:26)

Part Two

The National and Institutional Context of Innovation

Chapter Four–Socio-Economic Developments in Ireland, 1958-1997.

4.0 Introduction

> 'All accounts of change also involve showing what remains stable, as a baseline against which to measure alterations.'
>
> (Giddens, 1993:649)

This chapter will present a macro analysis of socio-economic trends in Ireland from 1958 to 1997 in order to further critique the claims made by the information society theorists discussed in Chapter Three and to situate the subsequent empirical work in multimedia content industries within a broader socio-economic context. This analysis aims to compare and contrast broad structural developments in Ireland with trends in a number of other European economies and to map and measure the growth of information goods and information service industries within these broad trends. Finally, the chapter will begin to account for these trends by applying the 'social innovation' concept developed by Miles and Gershuny (1983).

The approach adopted in this chapter is in line with the framework outlined in previous chapters which proposed that in order to understand change at a micro level one needs to place it in a broader context. The unit of analysis adopted here is the macro European level. In analysing trends in Ireland in relation to other European countries this chapter rejects both technologically determinist and convergence models of socio-economic change adopted by many information economists and information society theorists. Instead it applies a social shaping perspective which is sensitive to national differences and looks for both demand and supply side influences on patterns of change.

This chapter begins by looking at social trends in Ireland, which have an influence on, and are influenced by, the development of the economy. The chapter then examines the broad sectoral development of the economy and the development of information goods and information services industries within the secondary and tertiary sectors. Finally the chapter applies the 'accounting model' developed by Miles and Gershuny (1983) in order to begin to explain the origins and nature of socio-economic changes in the Irish case. This model provides five dimensions along which one can relate changes in both intermediate and final demand to the overall growth in information goods and services industries at a national level. Chapter Five will further develop this analysis by placing these trends in their historical, institutional and policy context.

4.1 Demographic Trends

Ireland has experienced some unique demographic trends since 1958 which have strongly influenced the structural transformation of employment and consumption. This section will briefly examine these features in relation to their influence on the national system of innovation and trace the origin of the subsequent economic transformation from 1994.

4.1.1 Population Trends and Emigration

In 1996 the population of the Republic of Ireland (RI) was 3.626 million and the labour force was 1.430 million. Ireland constituted about 1 percent of the total EU-12 population in 1991 although the country's demographic profile has uniquely fluctuated in comparison to other European countries. A century and a half earlier Ireland had a population of over eight million and a population density of 241 per square mile (Courtney, 1995:48). The rapid decline in population in the last century is one of the defining characteristics of the Irish case and has left an indelible mark on the socio-economic landscape.

Table 2 Population of Ireland 1841-1991

(000s)

	IRELAND	26 COUNTIES	6 COUNTIES
1841	8,175	6,529	1,646
1851	6,552	5,112	1,440
1891	4,705	3,469	1,236
1901	4,459	3,222	1,237
1911	4,391	3,140	1,250
1926	4,229	2,972	1,257
1936	na	2,968	na
1946	na	2,955	na
1951	4,332	2,961	1,371
1961	4,243	2,818	1,425
1971	4,514	2,978	1,536
1981	4,975	3,443	1,532
1991	5,102	3,525	1,577
1996	5198	3,621	1,577

Source: CSO, Statistical Abstract, various years.

Emigration and famine were the main factors contributing to the decline in population in the years immediately after the great famine in 1848. Improvements in transport facilities, e.g. steamships and the railroads, coupled with more attractive economic conditions abroad contributed to this emigration trend. Meanwhile a fall in birth rates (which nevertheless remained high by European standards) meant Ireland would never again experience the population levels which preceded the famine.

Table 3 Annual births, deaths, natural increase and net migration for each intercensal period, 1911-1996.

(annual average change per 1,000 population)

PERIOD	TOTAL BIRTHS	TOTAL DEATHS	NATURAL INCREASE	CHANGE IN POPULATION	NET EMIGRATION
1911-1926	21.1	16.0	5.2	-3.7	-8.8
1926-1936	19.6	14.2	5.5	-0.1	-5.6
1936-1946	20.3	14.5	5.9	-0.4	-6.3
1946-1951	22.3	13.6	8.7	+0.4	-8.3
1951-1956	21.3	12.2	9.2	-4.3	-13.4
1956-1961	21.2	11.9	9.2	-5.6	-14.8
1961-1966	21.9	11.7	10.3	+4.6	-5.7
1966-1971	21.3	11.2	10.1	+6.4	-3.7
1971-1979	21.6	10.5	11.1	+15.4	+4.3
1979-1981	21.5	9.7	11.8	+11.0	-0.7
1981-1986	19.1	9.4	9.7	+5.6	-4.1
1986-1991	15.7	9.0	6.8	-0.8	-7.6
1991-1996	14.0	8.8	5.2	+5.3	+0.2

Source: CSO (1996:26) Statistical Abstract. Table 2.3.

While in most countries population increase is determined by the rate of natural increase in Ireland the most important factor has been the rate of migration. An examination of emigration figures for the last 150 years shows that the troughs and peaks have historically corresponded with the prevailing economic conditions on the domestic scene. Indeed while emigration reached 60,000 per annum after the famine, it rose to 40,000 a year between 1951-1961. The culmination of these demographic trends (emigration, falling death rates, rising marriage ages) was an unusually low population density compared to the rest of the EEC member states by 1975: 42 per square km as compared to a European average of 166 per square km (CEC, 1975:1).[24]

During the early 1970s Ireland recorded net immigration for the first time. Indeed from 1961 to 1986 Ireland experienced population growth and declining emigration rates. Table 4 illustrates that this trend had reversed by 1986 in the context of severe economic problems in Ireland, a falling birth rate and rising emigration. Emigration reached 27,000 annually between 1986 and 1991. The destination for these emigrants over the last century has largely been the United Kingdom (UK) and the United States of America (USA). Between 1986 and 1989 the UK received 68 percent of all emigrants from Ireland while the USA received 14 percent (NESC, 1991:9). This flow of migrants led to the establishment of strong emotional and economic ties between these countries.

[24] 51.4 per square km in 1988. EuroStats, (1991) Demographic Statistics.

In comparison with other European countries the rate of emigration from Ireland has remained remarkably high throughout the last century. The re-emergence of an emigration trend in the 1980s, however, distinguishes Ireland from other less developed European nations such as Greece, Spain and Portugal who underwent similar structural transformations in the last two decades (NESC, 1991:10). As Mjøset notes 'this demographic pattern constitutes the most distinctive feature of Ireland's development...there is simply no similar demographic experience anywhere in the modern world, so far' (Mjøset, 1992:7). For him population decline via emigration was one of the national characteristics which generated Ireland's development problems in the 1970s and 1980s. Table 4 shows that the emigration trend had reversed by 1994 and Ireland began to record net immigration as emigrants returned and political refugees arrived, attracted by the growing economy and new employment opportunities. Once again Ireland diverged from the prevalent trends in a selection of other European countries.

Table 4 Net Migration

(annual average change per 1,000 population)

	EUR 12	FRANCE	ITALY	IRELAND	UK
1960	0.2	3.1	-1.9	-14.8	2.1
1965	0.1	2.3	-3.0	-7.5	-0.8
1970	2.0	3.5	-0.9	-1.2	-0.3
1975	1.0	0.3	0.2	5.4	-0.8
1980	1.8	0.8	-0.1	-0.2	-0.7
1985	0.9	0.0	1.4	-7.3	1.3
1989	3.3	0.9	0.6	-10.0	-0.7
1992	3.7*	1.6	3.2	0.5	0.8
1997	1.4*	0.7	2.2	5.5	1.5

Note: * 1992 and 1997 figures refer to EU-15
Source: EuroStat (1991) (1998) Demographic Statistics, table A-3.

The emigration of people, primarily in their most productive years, is a significant and distinctive feature of Ireland's socio-economic development throughout the 20th century. NESC figures from 1946 to the late 1980s discovered that most emigration took place in the 15-24 and 25-34 age groups while net immigration mainly took place in the over 65 category (NESC, 1991:12). The emigration of people between the ages of 25 and 34 has contributed to Ireland's unusually high ratio of dependency, particularly in the youngest categories. In 1991 almost 45 percent of the population was aged under 25 years and a further 28 percent was aged between 25 and 44 years. Another factor which has influenced population distribution is the unusually high birth-rate by European standards which by 1996 was still

14.0 per 1,000. The size of the under 25 category of the population has exacerbated the demand for education, childcare and employment opportunities but nevertheless has been promoted as a positive characteristic by development agencies.

Table 5 Population by Age 1961-1981, 1981-1996.

AGE GROUP	1961 (000)	1981 (000)	1996 (000)	CHANGE 1981-1996	PERCENT CHANGE 1981-1996
0-14	877.3	1,037.9	859	-178.9	-17.23
15-24	391.9	608.4	633	+24.6	+4
25-44	635.2	839.2	1,016	+176.8	+21.06
45-64	598.9	589.9	704	+114.1	+19.34
65+	315.1	368.0	414	+46	+11.9
Total	2,818.4	3,443.4	3,626	+182.6	+5.3

Sources: (Bannon, 1985) & Statistical Abstract 1996

Table 6 Percentage of Population in Dependent Age Groups, Ireland, EC and US, 1980, 1991.

AGE	1980 IRELAND	PERCENT EC 12	PERCENT US	1991 IRELAND	PERCENT EC 12	PERCENT US
0-14	28.2	18.6	21.6	26.6	18	21
65+	11.1	14.1	12.3	11.4	14	13

Sources: EuroStat, Demographic Statistics (1990) & (1991), Labour Force Statistics (1968-1988), Statistical Abstract (1994).

4.1.2 Implications of Emigration

The level of emigration from Ireland in the1980s led to the 'brain-drain' concept, i.e. that many of the most highly educated individuals were leaving the country. Given that certain types of knowledge, particularly tacit and experiential knowledge, are embodied in individuals the existence of a 'brain drain' could have serious consequences for a country's innovative and learning capabilities. From a national system of innovation perspective this problem is considered a 'leakage' from the system.

> 'No nation-building process can be complete unless it is possible on the home ground to translate science into relevant industrial technology and to keep the best innovative people at home doing it, using temporary emigration creatively to pick up experience.'
> (Johnson, 1983:62)

The Higher Education Authority (HEA) conduct annual surveys of third level graduates nine months after graduation and provide some evidence which supports the 'brain drain'

concept, particularly during the 1980s. These figures reveal that between 1980 and 1988 the numbers who emigrated in the months after graduation increased from over 8 percent of graduates to almost 30 percent. By spring 1989, 30 percent, or almost 3,000 graduates left Ireland in pursuit of employment. These figures would appear to confirm the hypothesis that many of the most qualified workers emigrated during the 1980s. During the 1980s primary degree holders were more likely to emigrate than students with other levels of qualification (NESC, 1991). When primary degree holders were examined by discipline the NESC found that the highest rate of emigration was amongst those with engineering degrees: 48 percent of the graduates in that discipline emigrated in 1988. The average emigrant profile in the 1980s was predominantly young, male, and increasingly university educated. Studies found that the expectation of employment abroad combined with the failure to find employment in Ireland was prompting the 'upwardly mobile middle classes' to emigrate (Courtney, 1995:70)

The same survey conducted in 1997 found remarkably different results. By 1997 of the 29,289 graduates only 10 percent of graduates had emigrated nine months later, 39 percent had continued to further study and only 2.1 percent were unemployed (HEA, 1997:5). The percentage of science and engineering degree holders emigrating had declined to 17.1 and 19.6 percent respectively. Many of those who were emigrating by 1997 were non-nationals who had trained in medicine, dentistry and veterinary science. Over 51.1 percent of primary degree holders found employment in the private services sector in 1997, reflecting the rapid growth in that area in the 1990s (HEA, 1997:14).

These studies would suggest that there was an outflow of university educated and technical graduates from Ireland during the 1980s. In relation to the development of the labour force, education and industrial policies and the capabilities of the scientific base which remained in Ireland three points are relevant:

- While there was significant state investment in education and training in both engineering and technical areas in the 1970s/1980s, these graduates had a high propensity to emigrate until 1990[25] (Forfás, 1993).
- There was a high propensity for males to emigrate (NESC, 1991).
- Females have a low participation rate in the labour force in Ireland in comparison to the rest of Europe and are less likely to choose technical subjects/occupations. See Section 4.2.6 and (Connolly, 1997).
- The profile of emigrants contributed to a deteriorating age profile of technical and engineering staff in the public sector (STIAC, 1995:122).

[25] 52.7 percent of science and technology funding was spent on education and manpower programmes in 1993. Most of this was spent it the higher education sector on undergraduate courses. (Forfás, 1993)

The psychological as well as the economic costs of the rate of emigration until the early 1990s has arguably been considerable (NESC, 1991). Some authors argue that high emigration levels tend to encourage 'conservatism' instead of a culture of innovation in those who remain. (Kennedy, 1988:147) This issue has certainly been highlighted by a number of innovation reports on Ireland and will be returned to in the next chapter.

> '...the ready outlet of emigration has provided the remaining population with a reasonably satisfying standard of living and this has been responsible for the acquiescence in conditions of under-development which are capable of considerable improvement.'
>
> (NESC, 1991:228)

A more positive perspective on emigration might see each emigrant as a potential candidate for return at a future date. By 1997 Ireland recorded the fastest growing population in Europe caused by a rapid fall in emigration, relatively high birth rates and rising immigration. While few immigration studies have been conducted it was found that during the 1980s returned emigrants were concentrated in the 25-34 year age band and that many returned in family units (NESC, 1991:91). These features suggest that the maintenance of high unemployment rates until 1993 in the context of economic growth might mean that many new jobs were being taken by immigrants in those years, particularly returned university educated emigrants who had gained considerable experience abroad.

The high rate of emigration until the early 1990s, the profile of those who emigrated, and the rate of their return in the mid-1990s are important issues to consider in relation to explaining the pattern of economic development in Ireland, the capabilities of the knowledge base and the innovative capabilities of Irish firms. The emigration trends have also sustained a popular belief that there is a large diaspora market of almost 70 million Irish people worldwide to whom Irish cultural goods and services could be marketed. While the veracity of this belief has to be fully explored there is no doubt that it was an important factor in the development of multimedia content ideas (see Chapter Six) and that a unique and deeply ingrained memory of emigration permeates all aspects of the social sphere in Ireland.

Ireland is currently in a unique demographic position in Europe given the percentage of the population aged below 44, who are well educated and English speaking, combined with the dividend of returned emigrants who have gained considerable work and cultural experiences abroad. These factors may be crucially important in relation to the development and consumption of new information goods and information services.

4.2 The Development of a Service Economy

The United States was the first 'information economy' according to Miles and Gershuny (1983:15). This observation was based on studies conducted by Machlup (1962) and Porat

(1977) which highlighted the importance in employment and output terms of the service sector and in particular the 'knowledge and information industries' in the United States. For many economists the shift in labour from agriculture and industry to services indicates a more advanced level of development which all nations would eventually attain.

The aim of this section is to analyse the trends in industrial and occupational employment in Ireland and relate them to other European economies and the demographic changes detailed in section 4.1. This will allow us to investigate the growth of information goods and information service industries and to establish if Ireland fits into wider international development trends.

4.2.1 Industrial Distribution of Employment

Employment trends in Ireland must be viewed in relationship to the demographic trends presented above. Over the last hundred years the total number of people who have emigrated from Ireland is greater than the remaining adult population (over four million).

Table 7 Broad Sectoral Changes in Employment 1961-1996

Sector	1961	1971	1981	1991	1996
Primary	388,372	283,499	199,675	175,304	164,223
Secondary	249,195	312,329	354,768	305,915	307,298
Services	414,972	459,011	583,384	609,936	677,559
Total	**1,052,539**	**1,054,839**	**1,137,827**	**1,091,155**	**1,149,080**

Sector	PERCENT '61	PERCENT '71	PERCENT '81	PERCENT '91	PERCENT '96
Primary	37 %	27 %	18 %	16 %	14 %
Secondary	24 %	30 %	31 %	28 %	27 %
Services	39 %	43 %	51 %	56 %	59 %
Total	**100**	**100**	**100**	**100**	**100**

Source: Census of Population, various years. CSO, Statistical Abstracts.

Table 7 shows that while total employment grew until the early 1980s there has been a dramatic decline in the numbers employed in the primary sector, from 37 percent of employment to 14 percent between 1961 and 1996. Secondary employment has maintained its share of employment over the past thirty year period although the numbers employed have fluctuated. The period from 1961-1971 saw an increase of 25 percent in the numbers employed in industry. Between 1981 and 1991 the decline in total employment is reflected in figures for industry, while during the same period there was modest growth in employment in services. Since 1991 industry recorded a slight increase in the numbers

employed while services increased by a total of 67,623, up to 59 percent of total employment.

Some analysts have highlighted the uniqueness of the decline in non-agricultural employment that took place in Ireland in the 1980s compared to growth in the EU of 0.2 percent per annum and 1.0 percent for the OECD as a whole (NESC, 1992). An OECD report noted that the percentages employed in agriculture in Ireland were still high by OECD standards, with only Greece and Portugal having larger primary sectors (OECD, 1995:43). The numbers employed in industry and services by 1996 were slightly below the European average.

A more detailed examination of manufacturing employment over the period 1973-1990, and classified according to an OECD system for identifying high growth industries, illustrates that within the secondary sector there were considerable shifts in employment between industries (OECD, 1994). The significant growth, as indicated by Table 8, was in high technology industries like pharmaceuticals, electrical and instrumental engineering and office and data equipment. These four sectors accounted for over 22 percent of employment by 1990, up from 7.5 percent in 1973, and over 40 percent of output. Of considerable interest to this thesis is the growth in computer hardware industries which are categorised within the office and data processing equipment category. Employment in medium technology industries meanwhile halved their share of employment in the same period while significant losses were recorded in more traditional industries like food, textiles and clothing, footwear and leather industries. By 1990 low technology industries, while declining, still accounted for 58 percent of employment in 1990. Within this final sector one finds the paper and printing industries which includes newspaper, magazine and book publishing.

Structurally over the period 1970-1995 there has been significant growth in modern, high technology manufacturing industries, particularly computer hardware and engineering industries, although food related industries also remain significant. Another feature was the growth in output per worker, particularly in pharmaceutical, office and data equipment and food industries.

Table 8 Changing Structure of Output in Ireland's Manufacturing Sector, 1973-1990.
%

	NACE	Employment			Employment, %			Net Output/IRL millions			Net Output, %			Net Value Added per worker		
		1973	1980	1990	1973	1980	1990	1973	1980	1990	1973	1980	1990	1973	1980	1990
High Tech		16,500	28,259	43,627	7.57	12.46	22.45	74.4	604.2	3596.3	10.23	21.80	40.46	4509.1	21380.8	82432.9
Pharm	257	1800	3004	6220	0.83	1.32	3.20	21.8	227.2	1120.7	3.00	8.20	12.61	12111.1	75632.5	180176.8
O+D equip	33	1000	3995	7423	0.46	1.76	3.82	5.4	131.2	995.8	0.74	4.73	11.20	5400.0	32841.1	134150.6
Electrical Engineering	34	11300	15018	22081	5.19	6.62	11.36	31.1	164.1	1111.2	4.28	5.92	12.50	2752.2	10926.9	50323.8
Instrum. Engineering	37	2400	6243	7903	1.10	2.75	4.06	16.1	81.7	368.6	2.21	2.95	4.15	6708.3	13086.7	46640.5
Medium Tech.		41,200	44,484	37,973	18.91	19.61	19.54	140.3	479.3	1199.1	19.30	17.29	13.49	3405.3	10774.7	31577.7
Prelim. Metal Process	22	4300	2552	1744	1.97	1.13	0.89	12.4	22.6	61.4	1.71	0.82	0.69	2883.7	8855.8	35206.4
Chemicals (excl Pharm)	25-26(-257)	8000	9348	7367	3.67	4.12	3.79	41	148	351.1	5.64	5.34	3.95	5125.0	15832.3	47658.5
Mech. Engineering	32	5700	8625	8465	2.62	3.80	4.35	18.1	86.9	230.7	2.49	3.14	2.60	3175.4	10075.4	27253.4
Motor Vehicles	35	7900	6634	3177	3.63	2.92	1.63	21.6	43	54.4	2.97	1.55	0.61	2734.2	6481.8	17123.1
Other Transport	36	5900	5655	4388	2.71	2.49	2.25	15.3	49.1	132.2	2.10	1.77	1.49	2593.2	8682.6	30127.6
Misc. Inds	14. 48-49	9400	11670	12832	4.31	5.14	6.60	31.9	129.7	369.3	4.39	4.68	4.15	3393.6	11114.0	28779.6
Low Tech		160200	154057	112697	73.52	67.90	58.00	512.3	1688.4	3583.8	70.46	60.91	40.32	3197.9	10959.6	31800.3
Non-Metallic Minerals	24	13500	15759	11117	6.20	6.94	5.72	54.6	223.5	441.4	7.51	8.06	4.97	4044.4	14182.4	39705.0
Metal Articles	31	12500	17161	12612	5.74	7.56	6.49	34.5	162.6	283.5	4.74	5.87	3.19	2760.0	9475.0	22478.6
Food	411-423	49000	47647	36881	22.49	21.00	18.98	164.6	614.1	1848	22.64	22.16	20.79	3359.2	12888.5	50107.1
Drink , Tobacco	424-429	10300	10354	6030	4.73	4.57	3.10	69.5	198.3	45.7	9.56	7.15	0.51	6747.6	19152.0	7578.8
Textiles	43	21400	16318	10627	9.82	7.19	5.47	55.6	123.7	192.4	7.65	4.46	2.16	2598.1	7580.6	18104.8
Clothing, footwear	44, 45	26100	20449	13401	11.98	9.02	6.90	52.2	112.3	167.4	7.18	4.05	1.88	2000.0	5491.7	12491.6
Timber & Wooden Furniture	46	10700	9877	7580	4.91	4.35	3.90	26.5	74	154.6	3.64	2.67	1.74	2476.6	7492.2	20395.8
Paper & Printing	47	16700	16492	14449	7.66	7.27	7.44	54.8	179.9	450.8	7.54	6.49	5.07	3281.4	10908.3	31199.4
Total Mfg. Ind.	1-4, less 13 13, 16, 21,23	217900	226800	194297	100	100.00	100.00	727.1	2771.8	8889	100	100	100	3336.9	12221.3	45749.5

Note: Net Value Added at Market Prices
Source: EireStat diskettes, CSO, Ireland. Own Calculations.

4.2.2 The Growth of Service Industries, 1960-1978.

Table 7 showed that since 1961 service industries have employed the greatest proportion of the workforce in Ireland. By 1981 over 50 percent of employment in Ireland was in the services sector. This stage was reached in the United States by the 1950s and in the EEC by 1977 (Miles, 1983:15). In order to understand the evolution of service industries, however, one must go beyond a broad tripartite division of the economy. As Webster points out 'services' is a residual category...something which accounts for anything not classifiable in primary or secondary sectors.. the classificatory convenience which separates the tertiary sectors from others is grossly misleading' (Webster, 1993:42).

As noted in Chapter Three Miles and Gershuny (1983) define services by looking at the point of consumption and found Greenfeld's distinction between producer and consumer services useful (Greenfeld, 1966). In order to understand 'demand' they distinguished between final marketed, intermediate marketed and non-marketed services (1983:43). This classification system–final/intermediate, marketed or non-marketed – is used throughout their text as a framework for understanding patterns of change in service provision and employment. In terms of disaggregating the tertiary sector Miles and Gershuny adopt a typology developed by Browning which, they argue, is broadly in line with their own classification system (Browning and Singlemann, 1978). This typology distinguishes four categories of services: distributive, producer, social and personal. Distributive services are those which distribute and sell material goods; producer services provide a service to other industries (e.g. financial, design); social services are those which are provided on a collective basis (e.g. health services) and personal services include a broad range of services orientated towards individuals such as hotels, restaurants and domestic service. Miles and Gershuny place entertainment and recreational services within their personal services category.

Table 9 contains the Miles and Gershuny cross-national comparison of the distribution of employment by industry for 1961 to 1978. Based on this data, and data compiled by Joachim Singlemann (1978), the authors stated that the tertiary sector employed the greatest number of people in a selection of European countries, except in the FRG and Luxembourg by 1970. They also found that employment in manufacturing was declining as a proportion of the total. Within the broad services sector they deduced that producer services, or marketed intermediate services were growing rapidly until the 1970s, albeit from a low base. These services included banking, insurance and business services. The distributive sector displayed more conflicting trends with employment increasing in Germany and Italy, remaining stable in France and declining in England and Wales.

Table 9 Industrial Structure of Employment in EEC Countries, 1961-1978.

	Proportions of total	1961	1968	1973	1978	63-68	68-73	73-78
Ireland								
	1. Primary	10.4	7.4	5.8	4.7	-3	-1.8	-1.1
	2. Manufacturing	26.2	27.3	28.1	27.5	1.1	0.8	-0.6
	3. Construction/Utilities	9.8	11.6	11.4	10.4	1.8	-0.1	-1
	4. Distribution, hotels restaurants	17.3	18	17.9	18	0.7	-0.2	0.1
	5. Producer services	10.1	10.3	10.8	11.4	0.2	0.5	0.6
	6. Other personal and collective services	25.7	24.9	25.6	27.6	-0.8	0.7	2
		1963	**1968**	**1973**	**1978**	**63-68**	**68-73**	**73-78**
Italy								
	1. Primary	13.5	10.9	9.3	8	-2.6	-1.6	-1.3
	2. Manufacturing	36.4	37.2	38.2	33.3	0.8	1	-4.9
	3. Construction/Utilities	16.8	15.8	14.3	12.8	-1	-1.5	-1.5
	4. Distribution, hotels restaurants	7.2	7.6	7.9	11.3	0.4	0.3	3.4
	5. Producer services				9.8			
	6. Other personal and collective services	26.1*	28.4*	30.2*	24.6	2.3	1.8	4.2
		1961	**1968**	**1973**	**1978**	**63-68**	**68-73**	**73-78**
France								
	1. Primary	8	5.8	4	3	-2.2	-1.8	-1
	2. Manufacturing	35.5	32.9	33.3	30.8	-2.6	1.4	-2.5
	3. Construction/Utilities	11.1	12	11.2	9.9	0.9	-0.8	-1.3
	4. Distribution, hotels restaurants	12.2	13.3	13.7	14.4	1.1	0.4	0.7
	5. Producer services	11.6	12.6	13.3	14.7	1	0.7	1.4
	6. Other personal and collective services	21.6	23.6	24.2	27.2	2	0.6	3
		1961	**1968**	**1973**	**1978**	**63-68**	**68-73**	**73-78**
UK								
	1. Primary	6.1	4.4	3.5	3.2	-1.7	-0.9	-0.3
	2. Manufacturing	37	36.4	34.3	32.2	-0.6	-2.1	-2.1
	3. Construction/Utilities	8.2	8.6	7.6	7.2	0.4	-1	-0.4
	4. Distribution, hotels restaurants	15.8	15.2	15.6	16	-0.6	0.4	0.4
	5. Producer services	11.4	11.6	12.2	12.4	0.2	0.6	0.2
	6. Other personal and collective services	21.1	23.8	26.3	29.2	2.7	2.5	2.9

Miles and Gershuny (1983:19)
Calculated from the EEC (1978) Not referenced.
Note: * personal and collective services includes producer services.

Table 9 also shows that social services, or final non-marketed services, expanded in all countries from the 1950s driven by increasing employment in public services. Personal services displayed mixed patterns with domestic service, entertainment and laundries declining, while employment in car repair, hotels and cafes was increasing. In conclusion, Miles and Gershuny found that employment growth in services was slowing and, in contrast to information society accounts, they speculated that the tertiary sector might not provide enough employment to combat rising unemployment in the other two sectors (Ibid., 1983:17). Within this analysis the data indicates that Ireland seems to follow European trends during the mid-1970s with a general increase in employment in services (1983:55).

4.2.3 The Growth of Service Industries, 1963-1997

In order to update the Miles and Gershuny study for the same countries this thesis re-categorised OECD and EuroStat data into the Miles and Gershuny categories.[26] EuroStat provide two sets of data in their analysis of employment by industry. The first gives *'Employees by economic activity'* while the second gives *'Total persons in employment by economic activity'*. The distinction lies in the latter's inclusion of non-wage workers. The tables presented by Miles and Gershuny would appear to use *'Employees by economic activity'* which would tend, in the Irish case, to underestimate the numbers employed in the extractive sector (1983:19). Thus the figures presented by Miles and Gershuny for employment in the primary sector in Ireland in 1963 was 10.4 percent. By contrast national figures calculated from national census data for 1961 suggest that 37 percent of the population were employed in the primary sector. The inclusion of farm families and non-wage workers in the later figure is important, it is argued here, in any analysis of Irish socio-economic development.

Table 10 illustrates that by 1997 the tertiary sector in Ireland employed just over 60 percent of the total numbers employed while industry maintained a constant share of employment over the thirty year period, and increased during the 1990s. In Italy a similar proportion was engaged in services while in France and the UK the service sector employed

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[26]Updating the figures was problematic given the variety of statistical sources used in the original analysis by Singlemann, and the changing categorisation systems of various national and transnational statistical bodies. To ensure comprehensiveness OECD Labour Force Statistics (1963-1978), EuroStat Population and Social Conditions data, (from 1978-present) and national data were reclassified into the Miles and Gershuny categories. The OECD has been publishing data for a longer period than the EuroStat office and thus provides continuity with the data used by Miles and Gershuny. From 1983 EuroStat and Irish national data surveys were harmonised and thus from 1983 this source is used. Both OECD and EuroStat data are presented for 1983 to provide an indication of how compatible the two sources of data are

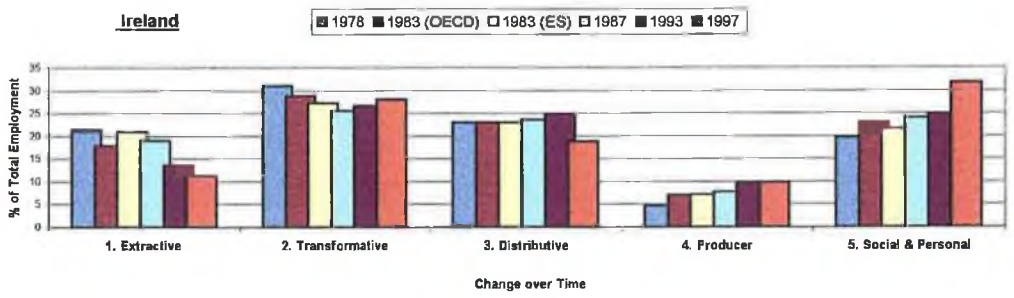
The main classificatory difference is that EuroStat aggregates chemical industries with mineral extraction industries. In most countries this means that the figures for extractive industries increase when one moves from OECD data for 1983 to EuroStat Data for 1983.A feature of the OECD data is that the figures are based on *civilian employment* only, i.e. it excludes the army. While this is of little importance in the Irish case it does have implications for understanding the data on other European countries. See Chapter One on research issues also.

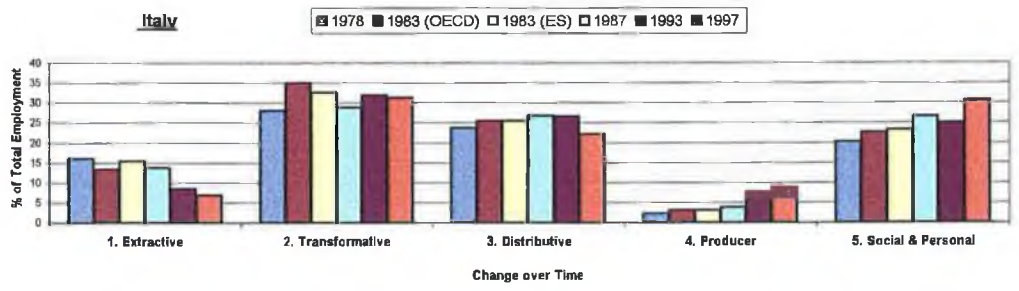
a slightly greater proportion. In France and the UK the proportions employed in manufacturing had declined quite dramatically by 1993 whereas in Italy there was an undulating pattern. The proportion of those employed in agriculture also declined in all countries although it remained a significant sector in Ireland, again highlighting the different development patterns between countries. The decline in manufacturing and the 'slow-down' in service growth anticipated by Miles and Gershuny while evident in other European countries did not occur, in relative or absolute terms, in Ireland during this period.

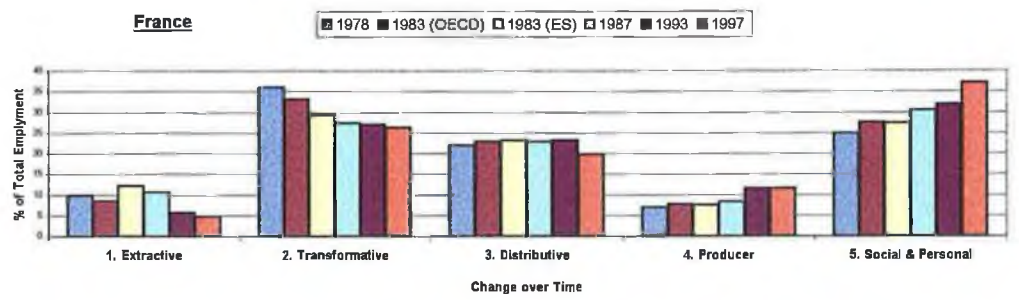
By 1993 the greatest numbers of service workers in Ireland were employed in distributive services and, social and personal services.[27] Producer services accounted for a further 10 percent. The largest expansion had taken place in producer services, from 1.5 percent in 1963 to almost 10 percent in 1997. This sector includes computer-related industries including multimedia companies. Similar trends emerged in France, Italy and the UK during this period, particularly with regard to producer services. More sustained and slower growth took place in social and personal services sectors while in all countries distributive services declined during the 1990s.

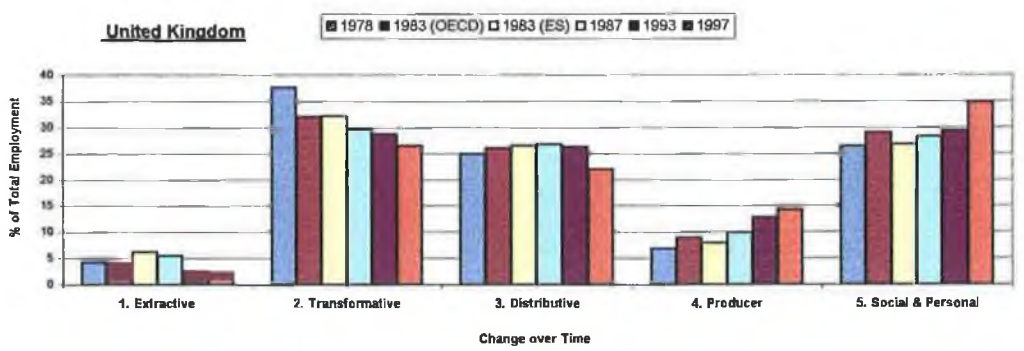
[27] Unlike the Singlemann classification the OECD and EuroStat classify restaurants and hotels as distributive services.

Table 10: Industrial Structure of Employment in EEC Countries, 1978-1997.









Reference: OECD (1984) Labour Force Statistics,1962-1982, Paris, for 1978 & 1983.
EuroStat (1983-1997) Population and Social Conditions, Luxembourg - Labour Force Sample Surveys, for 1983-1997.

Given that the OECD/EuroStat data does not disaggregate these service categories further it was necessary to analyse national census data in order to establish the sub-sectoral trends. This examination found that within services, and even between sub-sectors, there have been significant shifts. Before 1951 domestic service was a significant employer. This sector declined over the next thirty years while the expansion of state funded social services during the 1970s more than compensated. Social services increased dramatically by 124,373 in the 1971-1981 period. These trends mirror the findings of the earlier Miles and Gershuny findings. However with government cutbacks in the early 1980s the growth in social services dramatically slowed. Since then the main growth sectors have been in personal services, (hotels, restaurants, charities, theatres, broadcasting,) in wholesale and retail distribution, and in producer services, (business, finance, advertising, computer software services). By the late 1980s and early 1990s market services were providing most of the growth in services. Over the period 1973-1990 the average annual rate of growth for services in Ireland was 1.7 percent. By international standards however this figure placed Ireland fourteenth out of sixteen OECD countries with the EC average at 2.0 percent and the OECD average at 2.4 percent (NESC, 1993:331).

On the basis of their evidence Miles and Gershuny agree with Daniel Bell's assertion that the manufacturing sector was declining as a proportion of the total amount of economic employment in many advanced Western economies (Gershuny, 1983). However, they argue, that it is wrong to assume that manufacturing is declining in importance and that some economies are becoming post-industrial. This statement is particularly relevant to the Irish case. Industrialisation took place in Ireland at a relatively late stage and despite a downturn during the 1980s this sector continued to grow in absolute terms during the 1990s. Within this sector the growth of office and data processing equipment producers, or information goods producers, has been particularly significant. This analysis would suggest that while Ireland could be classified as a service economy it cannot be classified as post-industrial.

A service economy is one where the majority of the population is employed in industries which produce 'impermanent' or 'immaterial' products. A closer examination of the Irish economy illustrates the diversity of the service sector and the complex internal shifts which have occurred since 1958. Many service industries provide distribution services to manufacturing industry and are directly influenced by growth in that sector. Other social services are directly created by government policy. This thesis is concerned with the rate of growth, which has emerged since the late 1980s in market services, and in intermediate market services aimed at producers and households. According to the broad data presented here producer services, which include the multimedia content industries, have experienced increasing demand during the 1990s. This trend would appear to confirm the belief that new ICTs 'may give rise to a new category of service industry, which produces intermediate

services, for example, computer or television programmes, advice and equipment maintenance' (Miles & Gershuny, 1983:2).

4.2.4 The Growth of Service Work.

From an industrial perspective any worker who is employed in a service industry is considered a service worker. It can be argued however that not all workers employed by service industries are engaged in information handling. Similarly with automation many workers employed in manufacturing industries may be engaged in information production. While calculating trends from an industrial perspective captures the changing demand for service industries a more realistic assessment of the expansion of 'service-type' work requires an occupational perspective.

> 'A service worker...is anyone who engages in work whose immediate output is typically either non-material or ephemeral.'
>
> (1983:47)

Obtaining data on the occupational distribution of employment across nations for 1960-1980 was difficult for Miles and Gershuny and they were forced to collate data from a diverse set of sources. They also decided to exclude the primary sector from their analysis and their figures refer to proportions of all non-primary employment.[28] Furthermore, they note that where categories exist across different national statistical systems 'cultural differences often make them suspect' (1983:57). Analysing data for France, Ireland, Italy, and Great Britain for 1960-1980 the authors conclude that even where the proportions differ, similar trends emerge over time. Thus the Administrative, Professional and Technical (APT) category grew in all countries while the 'manual' category declined in all countries except Italy. The 'clerical' group expanded during the 1960s and again, but more irregularly, in the 1970s. The categories of 'sales' and 'security, cleaning and catering' displayed less regular patterns, which the authors argued indicate 'national differences in institutional structure and scale of provision' (1983:58).

The Miles and Gershuny analysis focused on the increase in white-collar workers and the decline in manual workers in all countries except Italy, where the Italian construction industry was a factor. The authors highlighted how the ratio of white collar to manual replacement accelerated particularly in the 1960s, which they attributed to innovation in production processes. They also hypothesised that changes in the productivity of clerical workers due to technological innovations were leading to a decline in the ratio of clerical workers to APT staff (1983:60).

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[28] See footnote 9, (Gershuny, 1983:71)

Conducting a shift-share analysis on this data they attempted to estimate what amount of change in the occupation distribution of employment could be accounted for by intra-industry change and what could be accounted for by inter-industry change. They deduce that for the majority of cases the occupational effect on employment was larger than the sectoral effect and conclude that organisational innovation across all sectors rather than demand for new services/products is accounting for much of the growth of services-type work.

The International Labour Office (ILO) produce figures on the occupational distribution of employment and their international standard classification systems serve as a guide for national statistical institutes. While their categories are not directly comparable with those used by Miles and Gershuny they allow a reasonably accurate investigation of the trends they identified, but with the addition of the primary sector.

Table 11 illustrates that the number of Professional, Technical and related workers and Administrative and Managerial, (roughly equivalent to the APT category used by Miles and Gershuny), rose in all countries between 1961 and 1980, with a slight decline between 1975 and 1982 in France. In Ireland administrative and managerial workers only maintained their percentage of the workforce at 3 percent, a much lower percentage than in the UK or Italy. The number of clerical workers meanwhile increased and by 1981 the numbers rivalled those of sales and other services workers. Similar growth trends were found in the UK, France and Italy. The ratio of APT to clerical workers would seem to be increasing very slowly and this data would not support the hypothesis that technological innovations were leading to significant productivity rises amongst clerical staff.

A significant fact indicated by these figures is the continuing importance of agricultural workers in Ireland and in Italy by the early 1980s. This was in stark comparison to the UK and France which would appear to have undergone a structural shift away from agriculture at an earlier date. In addition, the proportion of manual workers in the workforce remained relatively stable in Ireland from 1961 to 1981 whereas in the UK, France and Italy from the late 1960s this section of the workforce was in decline as a proportion of the total.

This ILO data would suggest that Ireland was experiencing a structural transformation at a later stage than the other European cases and uniquely, while employment was growing in white-collar work, it was also growing in manual and semi-skilled labour between 1961 and 1981, reflecting the growth in manufacturing industry during this period. An important feature of the Irish case, which does not appear in the Miles and Gershuny account, is the continuing significance of agricultural workers. Both these features again suggest that Ireland cannot be termed a post-industrial or an information economy.

Table 11 Proportion of workforce by Occupation and Country, 1961-1981.

Ireland		1986	1981	1971	1966
	1. Professional, technical and related workers	13	12	9	8
	2. Administrative and managerial	3	3	2	1
	3. Clerical and related	11	11	9	8
	4. Sales workers	11	11	10	10
	5. Service workers	8	7	7	8
	6. Agricultural, forestry, fishery, hunters	14	16	26	31
	7-9. Prod. related workers transport equip. operators	35	36	36	33
	X. Non classifiable	1	2		0
	Armed forces	1	1	1	1
	Unemployed not previously employed	3.3	2	1	2
	Total	100	100	100	100

Italy		1981	1971	1961
	1. Professional, technical and related workers	11.5	7.3	5.2
	2. Administrative and managerial	16	0.6	1.2
	3. Clerical and related		10.6	7
	4/5. Sales workers	16.7	8.7	7.3
	Service workers		9	7.8
	6. Agricultural, forestry, fishery, hunters	9.6	16.4	27.9
	7-9. Prod. related workers transport equip. operators	36	42	39.7
	X. Non classifiable			0.6
	Armed forces		1	0.5
	Unemployed not previously employed	10.2	5	2.8
	Total	100	100	100

France		1982	1975	1968	1962
	1. Professional, technical and related workers	14	15.5	11.4	9.1
	2. Administrative and managerial	0.3	3.2	2.7	3.1
	3. Clerical and related	17.1	14.1	11.7	8
	4. Sales workers	7.8	7.2	7.6	8.6
	5. Service workers	10.7	8	8.4	7.5
	6. Agricultural, forestry, fishery, hunters	7.6	9.6	15.3	19.9
	7-9. Prod. related workers transport equip. operators	30.9	36.1	34.6	38.5
	X. Non classifiable	0.7	1.4	5	1.1
	Armed forces	2.1	1.1	1.2	4.2
	Unemployed not previously employed	8.7	3.8	2.1	
	Total	100	100	100	100

United Kingdom		1981	1971	1961
	1. Professional, technical and related workers	15.9	11.1	8.6
	2. Administrative and managerial	8.9	3.7	2.6
	3. Clerical and related	15.1	17.9	12.9
	4. Sales workers	5.4	9	9.5
	5. Service workers	11.8	11.7	10.4
	6. Agricultural, forestry, fishery, hunters	1.3	3	4.3
	7-9. Prod. related workers transport equip. operators	30.8	40	48.8
	X. Non classifiable	0.8	2.6	2
	Armed forces		1	1.4
	Unemployed not previously employed	10		
	Total	100	100	100

Source Yearbook of Labour Statistics 1945-1989
ILO: Geneva

A major FÁS/ESRI study found that within the context of overall employment growth in Ireland between 1971 and 1990 employment, agricultural occupations declined by 108,000 (Corcoran, Sexton et al., 1992). The most rapid growth was in professional and related associate professional workers, which grew by 84 percent. Similar patterns of rapid growth were recorded in managers, proprietors and security. The numbers employed in skilled maintenance jobs, clerical work and personal service type work increased at a more moderate pace while there was a decline in the number of labourers, foremen, skilled production workers and transport workers. Between the years 1981 and 1986 even skilled maintenance, clerical workers and labourers declined only to recover again by the late 1980s.[29] In comparison to other countries this study found that the proportion employed in agricultural occupations was still higher than average, while the numbers employed in professional and associate occupations was relatively equal to the UK, and relatively higher than in the US (Corcoran, 1992:9).

.....The most recent national statistics available at the time of writing show that during the late 1980s the fastest growing occupational category was sales, followed by professionals and managers. Between 1971 and 1991 the largest increases in proportional terms were in associate professionals, professionals and security. However between 1981 and 1991 by far the largest increases were in manual labourers, followed by sales and associate professionals respectively. By 1991 for the first time the largest category of workers was clerical, (170,870). By combining the managerial, professional and associate professional categories one discovers that the ratio of clerical to APT workers is now decreasing, indicating increasing productivity levels.

[29] Professional and technical occupations include journalists, lecturers, camera operators and technicians. Clerical workers include computer operators, clerks and typists.

Table 12 Persons by occupation - 1971-1991.

	1971	%	1981	%	1991	%
1. Agricultural	276,848	26.25	191,093	16.79	165,112	12.24
2. Managers/proprieters	66,650	6.32	94,282	8.29	118,269	8.77
3. Professionals	74,243	7.04	105,462	9.27	142,298	10.55
4. Associate Professionals	28,862	2.74	46,903	4.12	65,904	4.89
5. Clerical workers	117,758	11.16	157,942	13.88	170,870	12.67
6. Skilled maintenance	37,833	3.59	55,955	4.92	63,092	4.68
7. Other skilled workers	90,380	8.57	93,132	8.19	94,164	6.98
8. Semi-skilled operatives	85,396	8.10	99,494	8.74	102,497	7.60
9. Foremen	13,881	1.32	17,126	1.51	17,606	1.31
10. Transport workers	48,159	4.57	49,555	4.36	54,124	4.01
11. Sales workers	65,517	6.21	74,180	6.52	109,407	8.11
12. Security workers	19,966	1.89	31,274	2.75	36,920	2.74
13. Personal service workers	57,121	5.42	61,650	5.42	84,702	6.28
14. Labourers and others	72,225	6.85	59,779	5.25	123,890	9.18
	1,054,839	100	1,137,827	100	1,348,855	100

Source: Corcoran, T., Sexton, J.J., O'Donoghue, D., (1992) A Review of Trends in the Occupational Pattern of Employment in Ireland 1971-1990, Fas/ESRI Manpower Forecasting Studies. pg. 35, based on the Census of Population, 1971, 1981.
Figures for 1991, own calculations based on Census of Population, 1991, table 2.26, Statistical Abstract (1996:46-51).

The FÁS/ESRI study conducted a shift share analysis of the Irish employment situation between 1971 and 1990. They found, in contrast to the findings of the Miles and Gershuny study, that in the Irish case structural and demand led changes had the most significant impact on the distribution of employment:

> '...it can be said that changes in the industrial structure of employment have had a more widespread influence on occupational change over the last few decades than have changes in the occupational structure of employment within industries. ...the decline in agriculture was so substantial, and so dominated other changes in industrial structure in the 1970s, that only a small number of non-agricultural industries with stagnant or declining employment levels actually experienced reductions in their share of ... employment.'
>
> (Corcoran, Sexton et al., 1992:49)

It is forecast that in the context of the current expanding economy in Ireland agricultural employment will decrease by a further 19 percent while non-agricultural employment will increase by 12.7 percent between 1991 and 1998. Rapid growth is forecast for professionals, managers and security workers followed by sales, service workers and skilled maintenance workers. Unskilled manual workers will continue to decline but at a slower rate given the 'expected expansion' in manufacturing and building. Finally, it is anticipated that industrial/structural shifts will continue to exert a stronger effect on employment trends than the occupational effect or organisational and technological innovation (Corcoran, Hughes et al., 1996). The continuing impact of structural effects on employment in Ireland reflects, it is proposed here, the late industrialisation of the Irish economy and the strength of the foreign owned industries within manufacturing. These features will be returned to in the next chapter.

The data on the occupational distribution of employment indicates that in Ireland white-collar employment has been increasing, particularly over the last decade. However the data also indicates that both manual and agricultural workers remain important in the Irish context illustrating that the Irish case does diverge from the patterns evident in the UK and the US.

4.2.5 Unemployment

Historically an important feature of Ireland's development has been the high rate of unemployment. While emigration has contributed to relieving pressure on the national labour market the rate of unemployment in Ireland in 1993 was 16.8 percent, well above the EC average (10.4) and second only to Spain (21.9).[30] While the rate of unemployment has fallen dramatically since 1993 (by 1998 it was below 8 percent) the historical persistence of

[30] See CEC annual *Economic Report* for comparative European figures.

unemployment is an important factor to consider when examining the slow growth in total employment, the slow growth of market services, the factors influencing government policies, and the attractiveness of Ireland as a surplus-labour location for foreign owned companies.

Table 13 presents labour force, employment and unemployment trends based on national statistics. This long-term view shows that between 1971 and 1981 while the total numbers employed grew by almost 100,000 and the total labour force grew by 162,000, unemployment grew by 66,000. The most striking feature of this table is the fall in total employment and the rise in unemployment between the years 1981 and 1986 in the context of a growing labour force.

While Ireland generated considerable employment growth between 1989 and 1993 the rate was not high enough to contain that rate of unemployment which, with the exception of 1988-1991, continued to rise until 1993. In the context of a growing labour force an increase in the numbers at work of 36,000 in 1989 had little impact on unemployment or emigration figures. In European terms the only country with a comparable unemployment rate in the 1980s and early 1990s was Spain. The expansion of the labour force during this period was partly caused by the numbers of young people leaving full time education and the weakening of external labour markets.

Table 13 Annual Estimates of Total Numbers at Work, Unemployed and Annual Change in Migration.

Year	At Work	Unemployed	Labour Force	Net Migration
1980	1156	91	1247	-8
1981	1146	126	1272	2
1982	1146	147	1293	-1
1983	1124	183	1307	-14
1984	1103	204	1307	-9
1985	1079	226	1305	-20
1986	1081	227	1308	-28
1987	1080	232	1312	-23
1988	1091	219	1310	-42
1989	1090	202	1292	-44
1990	1126	179	1305	-23
1991	1125	208	1334	-2
1992	1125	225	1350	2

Source: NESC (1993)

A unique feature of unemployment in Ireland is the extent and scale of long term unemployment. A major study on unemployment in Ireland in 1993 found that over 80,000

individuals had been out of work for over two years and 19 percent had been unemployed for over 3 years (NESC, 1993:77). A more recent survey in 1997 found that 86,300 had been unemployed for one year or more and that 68 percent of these were male (Labour Force Survey, 1997:64).

The long-term nature of unemployment in Ireland until 1994 is further evidence of the structural shifts which have taken place in the economy. According to O'Hagan the long-term unemployment rate in Ireland until 1994 is unique amongst most OECD countries and rose particularly during the period 1980-1993 (O'Hagan, 1993). By the early 1990s an analysis of live register found that over 10 percent of the labour force was long-term unemployed (1995:242). The challenge, it was suggested, was the low level of qualifications of those who were unemployed. Three quarters of unemployed people included in the Labour Force Survey (1991) had no qualifications or only Intermediate/Group Certificate level.

Table 14 Educational Qualifications of the Labour Force, 1993.

		unemployed	
	At Work	**< 12 mnths**	**12 Mnths +**
No Qualification	14 percent	21 percent	47 percent
Group/Inter Cert	24 percent	37 percent	33 percent
Leaving Cert	35 percent	28 percent	14 percent
Third-Level	27 percent	14 percent	5 percent

Source: Labour Force Survey, 1993, cited in (O'Hagan, 1995:243)

Since 1990 the numbers at work have grown steadily while unemployment has declined: from 14.5 percent in 1994 to under 8 percent by 1998. Strong growth in output, a stable economy and the strength of the US economy have been important contributory factors. In addition the introduction of the Employment Action Plan (1998), new interventionist labour policies aimed at the medium to long term unemployed and tax reform at the lower rates have acted to provide increased work incentives for both the unemployed and employers. The main problems facing the labour market by 1998 were skill shortages in specific high technology areas and the low level of training/educational attainment amongst the remaining unemployed. These problems are of particular relevance to the development of new information goods and services industries, as reflected by the reports of the Irish Council for Science, Technology and Innovation (ICSTI, 1999).

> '...employment increased by 4 percent per annum from April 1994 to April 1997, and then its growth rate shot up to an estimated 6.9 percent in the year to spring 1998. ...sharp increases in construction (23.5 percent) and market services (14.6 percent) pushed up employment growth in 1997-1998, while significant, albeit slowing growth has also been observed in manufacturing.'
>
> (OECD, 1999:69)

4.2.6 Part-time Work

A caveat to this examination of structural shifts in employment and the growth in service type work must highlight the growth in non-standard and informal types of labour. In the context of long term unemployment, and the domination of males in this category, it is particularly illuminating to find evidence which suggests that at least some of the reduction in unemployment since 1993, and the increase in professional and service workers, is accounted for by the creation of part-time, sub-contract, and informal jobs.[31]

The FÁS/ESRI study suggested that between 1986 and 1990 the number of part-time workers increased from 66,000 to 92,000, an increase of almost 40 percent. By analysing trends from the Census of Services they found that almost three-quarters of part-time workers are engaged in services. They also found that women constituted a higher proportion of part-time workers than they did in the general labour force: 17 percent as opposed to 8 percent (Corcoran, Sexton et al., 1992:4 & 23). The *Annual Services Inquiry* provides further information on the growth of part-time work in certain services sectors.

Table 15 The Growth of Part-Time Work in Service Industries, 1991 and 1996.

SECTOR	1991, F-T.	1991, P-T.	1996, F-T	1996, P-T	TOTAL NEW JOBS '96	P-T. PERCENT OF NEW JOBS '96
Wholesale	37,601	2,485	37,657	3,531	1,102	94 percent
Retail	69,591	32,744	85,799	60,029	43,493	62 percent
Hotel & Catering	22,096	15,353	29,921	23,765	16,055	51 percent
Total	129,288	50,582	153,377	87,325	240,702	36 percent

Source: Annual Services Inquiry, 1991, 1996. CSO: Dublin
Note: PT: part-time. FT: full-time.

Table 15 illustrates that during the 1990s a significant proportion of the employment growth in these three marketed service sectors was in part-time work. In fact the percentage of part-time employment increased from 28 percent in 1991 to 36 percent by 1996 in these sectors. Findings from the Living in Ireland Survey (1994) suggest that part-time work is lower-paid than full-time work and would suggest that the increase in employment that is taking place in the 1990s is accounted for, by and large, by part-time and low-paid jobs (Callan, Nolan et al., 1996). The introduction of a minimum wage shortly will have a significant impact on employee wages in producer, personal service and production industries (OECD, 1999:131)

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[31] My thanks to P. Kirby, DCU, for bringing this to my attention.

A significant factor contributing to the increase in the labour force and the inability of the country to generate enough employment in the early 1990s was the rising participation rate of women in the workforce. By the mid-1980s women's participation rose above 30 percent for the first time and the total numbers of women employed rose by 11 percent during this decade (Corcoran, 1993:15). While this was from a very low base by 1991 the female participation rate stood at 39.9 percent (O' Hagan, 1995:232). In the context of a falling birth rate and an increase in part-time and service jobs this trend is likely to continue. It also emerges from an analysis of the economy by industry and sex in 1997 that women were concentrated in professional and personal services and in clerical, professional and service occupations; i.e. those categories of employment which are experiencing the greatest growth (Labour Force Survey, 1997:36).

This evidence suggests that firstly, data which does not take into account part-time work may understate the growth in employment that has taken place in services in Ireland in the 1980s and 1990s. Equally, it could signify that in contrast to the 1980s the structural effect on employment in the 1990s might be lessening.

The move in the 1990s from non-market to market, and from rigid to part-time, flexible jobs in wholesale, retail and social service areas presented above is supported by evidence from more in-depth studies. Due to government policy and new technologies the Irish audio-visual industries for example, during the early 1990s, shifted from a sector dominated by one monopoly player to a more competitive sector characterised by flexible specialisation, sub-contracting relationships and vertical disintegration. These organisational transformations were found to have created an independent sector, which is characterised as young, insecure, and badly paid (Hazelkorn, 1997). In addition, the present government's commitment to privatisation of state monopolies would suggest an even greater shift in the future to marketed, demand-driven services.[32] These trends are in line with EU and GATT moves to dismantle barriers to trade, particularly in services.

4.2.7 Summary

This broad structural analysis of Ireland has identified a number of characteristics which diverge from international trends identified by Machlup (1962), Porat (1977) and Miles and Gershuny (1983). The first unique characteristic of the Irish case is the continuing importance of the primary sector in Ireland, which up to the 1990s when this research project commenced still employed one of the largest shares of total employment. This feature was largely overlooked by the Miles and Gershuny study due to their classification methods. The second unique characteristic is the late growth in manufacturing employment

[32] The sale of both CableLink and Telecom Eireann are examples.

in Ireland from the late 1950s and the shifting but nevertheless sustained rate of employment in this sector. In the context of a growing population, a growing labour force and high rates of unemployment and emigration these two unique characteristics have contributed to the slower than average growth of services in Ireland. By 1993 services in Ireland had the lowest share of employment and output in the EU (Fingelton, 1995:305).

A more detailed analysis of shifts in employment found that the development of services in Ireland has taken place as a result of structural shifts in the economy and in particular the continuing high rate of decline in agriculture. In addition government policies during the late 1970s contributed to a rapid expansion of non-marketed services during that decade and a reversal of this policy in the 1980s contributed to the proportional growth of market services. It would appear from this section of the analysis that the rise in service employment cannot be attributed to the decline of manufacturing industry in Ireland although there has been significant shifts between low technology and high technology industries within this sector.

From the early 1990s and in the context of overall economic growth, manufacturing has maintained its high technology structure and a stable share of total employment. While Ireland had clearly become a 'service' economy in terms of the structure and distribution of employment by the mid 1980s it is evident from the data presented here that over time there have been significant shifts between different service categories. In the Irish case while social and distribution services contributed most to growth in this sector during the 1970s and 1980s it was market services which have contributed most to the total increase in service employment and the decrease in unemployment and emigration in the 1990s. The growth of this sub-sector of services is of particular interest in relation to the particular focus of this thesis i.e. the culture industries and in particular the multimedia content industries.

4.3 Factors influencing Service Innovation and Growth

In economics and post-industrialisation theories the dominant explanation for the development of service employment is the combination of increased final demand, due to the income elasticity of demand for services, and the 'productivity gap' between growth in output per worker in manufacturing and in service industries. Thus as economies expand and get wealthier the service sector grows. Miles & Gershuny (1983) argue that this explanation overemphasises the effect of productivity increases/technological change within industries and the influence of rising incomes on final demand. They argue that it fails to capture the complexity of the interrelationships between a number of factors including changing patterns of final demand, changes in the composition of intermediate demand and crucial linkages between services, manufacturing and the informal economy.

Miles and Gershuny propose that the effect of the 'productivity gap' between manufacturing and services is that the price of final services must rise relative to the rest of

the economy over time. However, they argue, the demand for final services is 'price elastic' and thus people are motivated to provide for service functions in new ways which may not involve final services. This model of 'social innovation' proposes that as prices for final services increase final demand for 'self-service' goods may also increase as households change their 'mode of service provision' from buying final services to buying self-service goods. This model of innovation links production and consumption, users and producers, 'lifestyle and economic structure' (1983:96).

> '...the rising relative price of the products of final service industries may lead people to seek to provide for 'service functions' in innovative ways which involve the final service industries only indirectly, or not at all.'
>
> (1983:29)

The 'social innovation' concept is a useful way of accounting for the various factors which may influence socio-economic change at a macro level. It proposes that in order to properly account for the growth of service or information economies in Europe one must go beyond employment and occupational changes in the formal economy. Instead one must analyse the distribution of household expenditures between goods and services in the informal economy and relate this to both the distribution of value added by industry and changing patterns of employment in the formal economy. This section will map changes in the informal economies in a selection of European countries and relate this to productivity and employment growth by sector in Ireland.

4.3.1 Consumption Trends and Final Demand for Services

This section will analyse the consumption of final services and goods in Ireland and other EU countries from 1985 to 1992. In particular this section will explore the hypothesis that the development of certain types of service industry can be explained by examining 'modal shifts' within the informal economy from the purchasing of final services, to the purchasing of goods in order to self-service. This analysis of the Irish context will, in line with our theoretical framework, also enable us to include final users in our analysis of factors influencing service innovation.

Miles and Gershuny examined total household expenditure on seven different service functions (e.g. shelter, entertainment) and in eight European countries between 1970 and 1979.[33] They found no clear patterns of change for expenditure on domestic-service functions, a decline in expenditure on shelter and clothing, except in Denmark, and an increase, or constancy, in figures on expenditure in entertainment and transport. Within the entertainment function the authors disaggregated catering and noted that there was a shift

[33] (1983: 103 &113.) Table 6.1, A6.2, A6.3

away from expenditure on eating out. With government expenditure they found that expenditure on education increased, except in the Netherlands, while all other categories decreased. In general there was a shift in total expenditure from basic needs to more 'sophisticated' functions like entertainment, transport, education, health and defence (1983:100-101). In the Irish data transport increased, (+28), medicine and domestic service, including social services increased (+5) respectively while shelter (-18) and food (-12) decreased. The share of expenditure spent on entertainment in Ireland also declined (-3) between 1970 and 1979.

Examining the modal shift between goods and services within these service functions the authors found that most of the expenditure was spent on goods in the food and shelter function (1983:105, Table 6.2). However in domestic and entertainment functions there was a shift from services towards goods. This shift was found in six of the eight economies examined in relation to the transport function. The remaining functions, which were mainly provided by governments, displayed no clear trends. The authors concluded that during the 1970s in Europe household expenditures were shifting *away from the consumption of final services and more towards goods and self-service provision*. In relation to total expenditure the proportion spent on primary products had fallen while the proportion spent on manufactured goods had risen in all the cases examined. They concluded therefore that the source of growth in services was not the growth of final demand for marketed services. Indeed over the period examined there had been a shift from the consumption of final services to the consumption of goods.

Looking at the annual percentage change from services to goods in the Irish case it was apparent that the greatest shift took place in transport (+8), following by domestic (+4) and entertainment (+3). In Belgium the greatest shift occurred in entertainment (+10) while in Denmark and the Netherlands it was in domestic (+7) and (+8) respectively. Interestingly the only shift recorded in the UK case was in entertainment, a shift to goods of (+4) (1983:105).

In constructing their tables Miles and Gershuny combined data on household and government final consumption from the European System of Integrated Economic Accounts for 1970 and 1979 in constant prices (1983:98). In updating this work using the same source a number of issues arose;

1. Data was given in current prices of national currencies until the 1980s when it was given in ECUs. All data has been converted into ECUs.
2. The Miles and Gershuny data was in constant prices and thus all data has been deflated to 1985 constant prices.
3. The system for classifying government expenditure was revised in 1978 and changed from the ESA system in 1995 to COFOG.

4. It was not always clear how Miles and Gershuny classified their data and so the author could not be sure that she was following their approach exactly. Household and Government expenditures are shown separately as a result.

Appendix B presents updated household expenditure by function in constant 1985 figures for four European countries. These tables show that within the context of rising household expenditures the proportion of household expenditure spent on food for Ireland, France, Italy and the United Kingdom continued to decline from 1979. With shelter there was no clear pattern with increases in Ireland and France and a reduction in the UK and Italy. Also with domestic expenditure there was no clear pattern with increases in Italy and the UK but proportions remaining fairly static in Ireland and France.

The main difference between these findings and those of Miles and Gershuny are in relation to household expenditure on entertainment goods and services, a category which covers the cultural content services. In all four countries the proportion spent on entertainment increased with particularly large increases between 1985-1992 in Ireland and France. In Italy and the UK only food and shelter accounted for a larger proportion of expenditure while in Ireland and France food, shelter and transport account for a larger proportion. Examining government expenditures the only clear pattern is that expenditures on health as a proportion of total expenditure were increasing in all countries except France. In Ireland the proportion spent on both education and health increased.

Examining the household data in relation to the modal shift between goods and marketed services in Table 15 one finds a clear pattern emerging in the entertainment function. When one excludes catering from this function it is found that in all four countries there was a shift away from buying final marketed entertainment services and towards buying information goods. In all four countries the proportion of entertainment expenditure spent on catering also declined although in Ireland it increased between 1985 and 1990 and then declined between 1990 and 1992. During the 1980s while the proportion of total household expenditure on transport and other functions declined the proportion of expenditure spent on entertainment goods and catering continued to grow. The growth in expenditure on non-catering entertainment has significant implications for the potential growth of the information goods and information services industries. It indicates that people are spending an increasing proportion of their income on buying entertainment goods and intermediate information services like content to self-service this particular function at home.

Table 16. Modal Split in household provision of service functions, 1985-1992.

	Ireland			Italy			France			UK		
% of expenditure by function	1985 proportion	1990 proportion	1992 proportion	1985 proportion	1990 proportion	1991 proportion	1985 proportion	1990 proportion	1992 proportion	1985 proportion	1990 proportion	1992 proportion
a. Food												
goods	100	100	100	100	100	100	100	100	100	100	100	100
marketed services	0	0	0	0	0	0	0	0	0	0	0	0
b. Shelter, clothing												
goods	90.9	91.76	93.86	90.69	88.81	84.77	93.96	93.36	93.52	93.86	93.01	93.16
marketed services	9.1	8.24	6.14	9.31	11.19	15.23	6.04	6.64	6.48	6.14	6.99	6.84
c. Domestic												
goods	66.67	62.06	60.29	58	62.61	62.29	67.82	67.97	65.45	75.12	76.22	76.27
marketed services	33.33	37.94	39.71	42	37.39	37.71	32.18	32.03	34.55	24.88	23.78	23.73
d. Entertainment												
goods	58.94	57.17	60.81	31.08	35.38	36.54	35.82	39.9	39.78	34.14	37.1	38.83
marketed services	41.06	42.83	39.19	68.92	64.62	63.46	64.18	60.1	60.22	65.86	62.9	61.17
of which												
catering										0	0	0
goods	0	0	0	0	0	0	0	0	0			
marketed services	100	100	100	100	100	100	100	100	100	100	100	100
non-catering												
goods	73.01	72.67	73.33	20.15	72.62	72.96	70.45	70.23	71.69	61.93	62.89	65.32
marketed services	26.99	27.33	26.67	79.85	27.38	27.04	29.55	29.77	28.31	38.07	37.05	34.68
e. Transport												
goods	69.76	66.58	64.04	77.94	78.02	76.88	75.91	76.1	74.73	67.89	68.59	65.88
marketed services	30.05	33.42	35.96	22.06	21.98	23.12	24.09	23.9	25.27	32.11	31.41	34.12
f. Education												
goods	0	0	0	0	0	0	0	0	0	0	0	0
marketed services	100	100	100	100	100	100	100	100	100	100	100	100
g. Medicine												
goods	0	0	0	41.96	51.39	52.59	29.79	33.23	32.88	45	40	39.64
marketed services	100	100	100	58.04	48.61	47.41	70.21	66.77	67.12	55	60	60.36
h. Other goods and services												
goods	26.04	38.71	43.29	74.89	77.81	78.54	29.95	27.9	28.02	30.23	27.46	27.91
marketed services	73.96	61.29	56.71	25.11	22.19	21.46	70.05	72.1	71.98	69.77	72.54	72.09

Note 1: Clothing and Footwear is included in the Shelter category, however it was not possible to disaggregate between goods and services (repairs) in this category. Similarly education is given as an aggregate.
Note 2: No breakdown was given for medical in Ireland
Note 3: MECU at 1985 constant prices
Note 4: % of household expenditure by function

Eurostat, National Accounts, ESA, Detailed by Branch, 1984-1989, 1989-1992
Final Consumption of households by Purpose, Table 5.

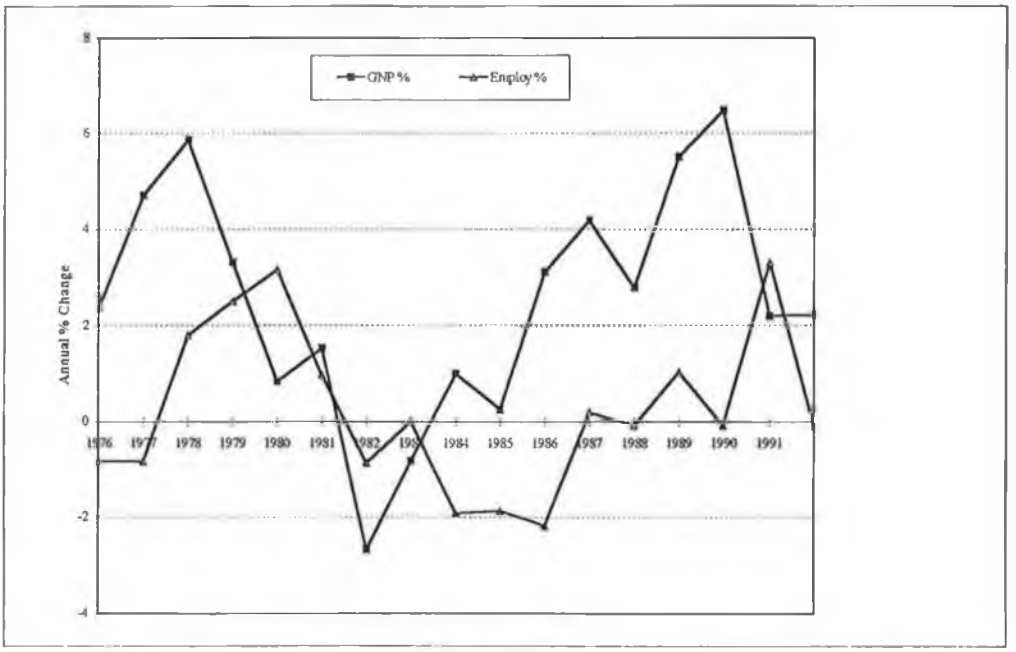
Reclassified according to Miles and Gershuny (1983:99&105) but excluding government expenditures.

4.3.2 Productivity

Miles and Gershuny found in their empirical analysis that productivity growth in both marketed and non-marketed services was 'below average' in relation to total productivity growth and that this was contributing to the growth of employment in those sectors (1983:35). They proposed that if quality in service provision is increasing and productivity growth slow, then prices for services must rise. In turn this influences final demand and the mode of service provision. Comparing value added by sector, to consumption by sector, they also found that intermediate rather than final demand was contributing most to the growth in marketed services (1983:108). Changes in this sector related more to the process of division of labour in manufacturing. This section updates this work and examines the distribution of value added by industry in relation to the changing patterns of employment and output in Ireland.

According to a NESC report, several countries in Europe experienced a rise in employment-intensity due to an increase in the proportional share of labour intensive services in total output, and a slowdown in the rate of productivity growth in the services sector during the last half of the 1980s (NESC, 1992). This suggests that the trends identified by Miles and Gershuny in the 1970s continued into the 1980s in Europe. Ireland largely conforms to these trends although the timing and underlying factors are quite different.

Figure 1 Percentage Annual Change in Gross National Product and Employment.



Source: EireStat.

Figure 1 illustrates that between 1980 and 1987 while output recovered from the effects of the OPEC II crisis and the fiscal problems experienced in Ireland, employment did not. Indeed while employment intensity was increasing in mainland Europe during the 1980s it was declining in Ireland. A report by the NESC suggests that the continuing decline in agricultural employment, the contraction of non-market service employment in the 1980s, the slower than normal growth in market services and the rapid growth of manufacturing output during the 1980s together accounted for this anomaly (NESC, 1992). In particular they highlight the overall distortion caused by the extremely high levels of productivity and low-labour intensity of the manufacturing sector by international standards during a period of international slow-down.

Table 17 clearly demonstrates that productivity in the manufacturing sector in Ireland between the years 1979 and 1989 was higher than a number of other countries, including Japan. The high rate of manufacturing output in conjunction with negative employment growth contributed to this. It is also clear that output per employee dramatically increased from the previous decade.

Table 17 Average Annual Growth Rates of Manufacturing Output (Vol.), Employment and Productivity, OECD Countries.

(% Change per Annum)

	Period:1970-1979			Period: 1979-1989		
	Manuf. Output	Manuf. Employ	Output Per Empl.	Manuf. Output	Manuf. Employ	Output Per Empl.
USA	3.6	1.0	2.6	2.4	-1.2	3.6
Can	4.4	1.8	2.6	1.9	0.3	1.6
Japan	5.6	-0.6	6.2	6.7	0.9	5.8
France	4.0	-0.1	4.1	0.4	-2.1	2.5
Italy	5.8	1.0	4.8	2.7	-1.5	4.2
UK	0.7	-1.5	2.2	0.8	-2.9	3.7
Ireland	5.3	1.5	3.8	6.0	-1.2	7.2

Source: NESC (1992:34).
Note: Data for US refers to 1979-1987, data for Japan refers to 1979-1988.

On closer examination the NESC found that the high rates of output and the low labour-intensity of the manufacturing sector was due to the structural upgrading of Irish industry during this period and the dominance of capital-intensive, largely foreign-owned, high technology and high productivity firms. The expansion of this high technology foreign owned manufacturing sector in the 1970s and 1980s is vitally important to understanding the growth in total productivity in Ireland and the proportional share of the service sector within

this. Furthermore, the structure and form of the high technology manufacturing sector and its capital rather than labour-intensity accounts for, it is proposed here, the relatively slow growth in intermediate producer and consumer services in Ireland during the 1980s

Transfer pricing is another factor, which may inflate the rate of productivity of manufacturing in Ireland, and suggest lower than average productivity rises in services.[34] Various studies have highlighted how TNCs have tended to contribute to the high level of imports and engage in implicit policies of transfer pricing. While much of the evidence for this assertion is difficult to validate the divergence between GDP and GNP, particularly during the 1980s does point to the possibility of such a practise (Foley, 1991). The high level of imports in those sectors, which contain mainly foreign-owned firms and the very high ratios of net output per person compared to similar companies in other countries, leads Foley to conclude that output figures in Ireland overstate the contribution of foreign firms to the economy (O' Malley, 1985). The NESC report concurred:

> '...there can be little doubt but that the productivity data for Irish manufacturing industry are artificially inflated by transfer pricing practices carried out by some multi-national corporations.'
>
> (NESC, 1992)

The strong growth in output from manufacturing is one factor which has contributed to the declining share of services in total productivity. Indeed over the past twenty years the share of output contributed by services has declined from 55 percent to 49 percent. In line with other countries total productivity in Irish services declined during the 1980s (Table 18).

Table 18 Productivity Growth in the Services Sector.

	1973-90	1973-79	1979-90
Japan	1.9	2.3	1.7
Canada	1.4	2.5	0.8
USA	0.2	-0.1	NA
France	1.4	1.5	1.4
Italy	0.8	1.4	0.4
UK	NA	1.3	NA
EC	1.1	1.7	0.7
Ireland	1.1	1.3	1.0

Source: (NESC, 1992:76)

The data in Table 18 shows that while Ireland had one of the fastest rates of growth for total service employment in Europe during the 1970s, due mainly to the growth in non-market services, it had one of the slowest rates of growth in the 1980s. Looking at market

[34] This highlights the problems of such macro economic measures.

services in more detail the NESC found that while there was a steady rate of growth during the 1970s and early 1980s (1.6-1.7 percent), between 1987-1990 employment in market services expanded more rapidly at 2.9 percent per annum. Meanwhile non-marketed services had the lowest employment growth rates in the EC by the late 1980s (NESC, 1992). The decline in this sector accounts for the relatively slow growth in total service employment in Ireland during the 1980s and the smaller than average decline in productivity in services during this period.

A factor which may have influenced the growth in market services is the late 1980s and 1990s in Ireland is the increase in FDI investment in the tertiary sector to 32.8 percent of total FDI stock by 1986 (UN, 1993:32). These figures would suggest that FDI is increasingly diversifying into tertiary industries and in particular into the distributive, finance and insurance sectors (1993:37).

4.3.3 Sources of Service Innovation and Growth

Miles and Gershuny found that productivity growth in both marketed and non-marketed services for a selection of five European countries was 'below average' and that this was contributing to the growth of employment in those sectors.[35] Comparing value added by sector, to consumption by sector, they also found that marketed services constituted twice as large a proportion of value added than of consumption in all of their cases (1983:117). They concluded that intermediate rather than final demand was contributing most to the growth in marketed services (1983:108).

In the last section it was established that productivity growth in services by the end of the 1990s was declining in Ireland, although it was still 'above average' taking the average of the EC as a whole. The decline in the share of services in total output in the Irish case can be attributed to the unusually high rate of productivity growth in manufacturing, the relatively small decline in agriculture and the relatively large decline in the share of non-market service output.

[35] Calculated as a proportion of national average for the '1970s', Table A6.10,pg.120.

Table 19 Sectoral Share of Total Output, 1970-1990.

	1970	1980	1986	1990
Agriculture	12	10	9	10
Industry	33	35	37	41
-Construction	(7)	(7)	(6)	(5)
Services	55	56	53	49
- Market Services	(37)	(38)	(36)	(35)
- Non-Market Services	(18)	(18)	(17)	(14)

Source: (NESC, 1992:65)[36]

Taking the data already presented on value added and on final consumption one clearly sees in table 20 that the value added for marketed services in Ireland is over twice what is consumed by final demand. This would appear to indicate that the expansion of marketed services, in terms of employment and output in Ireland is being driven more by expansion in the intermediate marketed sector and less by final demand. The slight decline in the overall proportion accounted for by marketed services and the decline in the proportion of non-marketed services must be viewed in relation to the expansion of the manufactured sector and the modal shift in consumption towards goods and intermediate services.

Table 20 Employment, Consumption and Value-Added by Sector, 1985-1990.

(%)

	EMPLOYMENT		CONSUMPTION		VALUE ADDED	
	1986	1990	1985	1990	1985	1990
Primary, Manufacturing & Construction	44	43	38	42	46	51
Marketed Services	37	40	14	13	36	35
Non-Marketed Services	19	17	48	45	17	14

Source: EuroStat, National Accounts ESA, (1984-1989); (NESC, 1992:65).

4.4 Conclusion

This chapter found that by the 1960s the service sector accounted for the largest proportion of employment in Ireland and that in line with other countries this sector continued to grow during the last thirty years. Over the period under examination the overall rate of growth in the service sector in Ireland was found to have grown more slowly than in

[36] Data based on constant 1985 output data.

other countries, particularly during the 1980s when the country experienced considerable economic difficulties. This chapter proposes that the rate of emigration, the relative importance of agricultural employment and the particular characteristics of manufacturing employment are three important factors shaping this pattern of growth.

The Miles and Gershuny model of social innovation allows us to account for growth in service employment by analysing a number of macro socio-economic trends in both the formal and informal economies. Their classification of services into distributive, producer, social and personal services, while relatively crude, does expose some important trends. In the Irish case it was found that while initial employment growth in this sector was mainly in the social and distributive services, by the late 1980s it was producer and personal market services which were contributing most to the growth.

The data presented on employment and value added in relation to consumption highlights the growth in intermediate producer services, especially in finance and computer-related services, by the late 1980s and reflects in part the growth and organisational innovation taking place in manufacturing industries. It also reflects shifts in final consumer demand and, of particular interest to this thesis, the modal shift in household expenditure on entertainment to goods (televisions, computers) and the purchase of intermediate services (programmes, software) for these goods. This shift may indicate that Miles and Gershuny were right to conclude:

> '... that the production of new intermediate services for consumers may emerge as an important area of service employment...If households acquire appropriate telecommunications facilities...there should be increasing markets for an extended range of new services...the industries which provide the programmes...for these new services may provide long-term prospects for substantial job creation.'
>
> (1983:8)

These findings indicate a much more complex pattern of economic and social development than the information society theorists allow for. They point to the continuing importance of manufacturing industries and the indirect influence organisational and technological changes in this sector can have on service employment through the creation of employment in intermediate producer services. They furthermore illustrate how lower productivity and rising prices in the service sector may lead to changes in the informal economy, which may in turn lead to innovation in goods and intermediate service provision. Slower levels of productivity growth in services may partially account for the growth in market services employment in Ireland from 1.5 percent per annum during the 1980s to 2.9 percent between 1987-1990. According to the NESC (1992) report this rate of growth compared favourably to other European countries, although it was from a smaller base.

A macro approach to socio-economic change cannot, however, explain certain anomalies in the Irish case. It fails to account for the late industrialisation and the growth in high technology manufacturing industries during the 1980s in the context of rising unemployment and the emigration of highly skilled workers. It also fails to account for the continuing importance of agriculture, the renewed growth in manufacturing during the 1990s and the slow growth of services during the 1980s. Chapter Five will try to explain these anomalies with reference to history, institutions and policy in the Irish context.

Chapter Five – Industrialisation, Public Institutions and Learning by Regulation

5.0 Introduction

Chapter Four documented changes in employment and consumption patterns in Ireland and a number of European countries from 1958-1997. While it found that Ireland has largely conformed to international trends in the growth of high technology manufacturing and intermediate and final services employment it also noted certain unique characteristics which could not be explained purely by examining quantitative measures at a macro level.
This chapter will develop this analysis further by examining the historical and contemporary national innovation system and assessing its implications for this study's concern with the potential for multimedia content innovations in the Irish socio-economic settings. It will identify the main barriers and triggers to social change from 1958 and within this the key players (governments, institutions, firms, individuals) and their role. In accordance with the multi-level framework already outlined it is proposed that these socio-technical constellations, situated in time and space, constitute learning economies which influence both the macro and meso level socio-economic trends (Chapter Four & Five) and particular micro instances of innovation and change within this (Chapter Six & Seven).

The first section of this chapter briefly examines the historical process of industrialisation in Ireland and the factors which led to the creation of a high technology manufacturing and service economy by the early 1990s. This section also examines the accelerating economic growth from 1994. Section 5.2 examines the socio-institutional set-up and policies which attempt to stimulate indigenous entrepreneurship and innovation, particularly in the multimedia and 'content' industries. The focus on national institutions and policies is in line with the definition of a 'national system of innovation' (NSI) as 'a set of institutions whose interactions determine the innovative performance…of national firms' (Edquist and Lundvall, 1993);(Nelson and Rosenberg, 1993:4).

In drawing upon both the social shaping and the NSI approaches, this chapter aims to overcome the limitations of both. It will supplement the institutional bias of the NSI approach with political, social, and cultural processes which operate at a meso level in Ireland. More particularly it will focus on the development of indigenous technological and knowledge capabilities and 'technology regimes' which directly impinge upon the subsequent development of multimedia companies and artefacts in Ireland. While concentrating on the national context this chapter will also pay attention to the impact of globalisation processes.

5.1 Periods of Industrialisation and Policy

This section aims to further explore the specificities of Irish socio-economic development identified in Chapter Four by providing a historical overview of industrialisation, state institutional development and relevant government policies. The first section examines the growth in ICT related industries and the role of foreign direct investment policies and companies in the process of structural transformation from 1958. The second section highlights the impact of external shocks and internal adjustment policies on the economy to 1995.

5.1.1 Industrialisation and Export-orientated Policies, post 1958

Great Britain, her proximity and political aspirations have historically exerted a considerable influence on socio-economic development in Ireland. Some sociologists argue that Ireland displays aspects of under-development and dependency which can be attributed to the legacy of colonisation (Munck, 1993); (Yearly, 1989); (Mjøset, 1992). A historical examination of the development of the Irish economy shows that during the 19th and early 20th centuries Ireland remained an agriculturally based economy. When Ireland attained partial independence in 1921 the economy was heavily reliant on agricultural exports particularly live cattle. Kirby has compared this to a 'typical "Third World" mono-crop type' economy (Kirby, 1997:129).

The first government of the Irish Free State was more concerned with placating political extremists at home and achieving political recognition abroad than developing industrial policies. A new government in 1932 however was committed to the ideals of self-sufficiency, import substitution and protection for infant industries. A series of Finance Acts throughout the thirties imposed tariffs ranging from 15 to 75 percent on a wide range of imports including food, textiles and fuel. While industrial employment and output grew during this decade, the focus on, and the size of, the domestic market restrained growth. Productivity was low and GNP only rose by a total of 10 percent during the thirties. Even after the war output from Irish industry lagged behind other countries. Between 1949 and 1956 GNP rose by 7.6 percent in Ireland as compared to 14.6 percent in Britain and 29.3 percent for OEEC countries. Emigration averaged 40,000 per annum during these years.

By the late 1950s Ireland had established power, transport, health and housing infrastructures but the high rates of emigration and unemployment in the context of low productivity and output contributed to what historians have called 'a crisis of national self-confidence' (Fitzgerald, 1959). However there was an absence of co-ordination in public sector developments, a lack of education policy and a lack of investment in science and technology capabilities. The failure of the import substitution policy to generate a substantial

industrial sector and balance of payment problems generated a desire for change in the mid 1950s.

Chapter Four documented the growth in industrial and service employment which took place during the 1960s. This shift in employment from agriculture was stimulated in part by a shift in government thinking contained in three coloured documents during the late 1950s. These were the (grey) book on *Economic Development* by Whitaker[37] (May 1958), the (blue) pamphlet from the Capital Investment Committee[38] and the subsequent publication of a government White Paper, the *Programme for Economic Expansion* (Nov. 1958). According to Lee, this White paper, also called the first programme for economic development, marked 'the transition of policy making from the age of faith to the age of reason' (1989:346).

These documents focused on industrial development, reoriented policies from protection to free trade and from discouragement to encouragement of foreign investment. The underlying aim was to shift capital from social to productive investment in manufacturing and thus increase the output and export of goods and services. The main target was to achieve annual growth of 2 percent over a five-year period. Critics of the White paper highlighted the lack of evaluation methods and procedures, the lack of attention given to manpower and educational policies and to improving indigenous science and technology skills (Lee, 1989). Industrial policy from 1959 was based on three fundamental strategies: capital grants and tax concessions aimed at attracting export oriented production, the attraction of manufacturing FDI and finally the dismantling of protectionism. In 1956 the Export Profit Tax Relief (EPTR) was introduced to encourage industrial expansion through tax concessions on profits and investments made in Ireland.

Government agencies like the Industrial Development Authority, (IDA) and An Foras Tionscal were vital elements in the industrialisation strategy. The IDA was established in 1949 as an advisory body to government. Its functions included the establishment of industrial schemes and the encouragement of FDI. An Foras Tionscal was also founded in the early 1950s but focused on giving non-repayable grants to industries which located in 'undeveloped' areas in Ireland. By the end of the 1950s it was responsible for all industrial grants towards machinery/capital, buildings/land and training/R&D. By 1969 An Foras Tionscal and the IDA had merged into one body. While ostensibly responsible to the Minister for Industry and Commerce the agency, in effect, tended to dictate policy rather than the other way around (Foley, 1991:60-61).

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[37] Mr. Whitaker in a paper, 'Capital Formation, Saving and Economic Progress' provided the theoretical background to many of these new policies. See Fitzgerald, G. in (Chubb, B. & Lynch, P. eds. 1969:121)
[38] The Capital Investment Advisory Committee was established in 1956 and composed of persons from outside government.

The third element of industrial policy was the systematic elimination of tariffs and the introduction of free trade. Within this context an application was made to join the EEC in 1961 along with Great Britain, but was unsuccessful. Shortly afterwards the Committee on Industrial Organisation was established to analyse the efficiency of industry. This committee, which brought together members of the civil service, employers' organisations and trade unions, completed an extensive survey of twenty-six industries and found that Irish industry was badly prepared for the advent of greater competition. They recommended that 'Adaptation Councils' be established to supervise a modernisation programme.[39] In response the government empowered An Foras Tionscail/IDA to grant up to 25 percent of the total cost of improving buildings and machinery and the ICC to give loans for the same purpose (1965-1969). The Department of Industry and Commerce also ran a grant scheme which paid a proportion of the costs of providing technical assistance to companies. The Anglo-Irish Free Trade Agreement of 1965 gave Ireland tariff free access to the British market and some experience of free trade.

By 1963 there was an extensive set of grants and incentives available to both overseas and indigenous industries in Ireland. However it is clear from the information available that the attraction of foreign owned manufacturing firms dominated the work of both the IDA and An Foras Tionscail in the 1960s. A survey of grant aid in Ireland from 1952-1974 conducted by the IDA found that foreign firms received almost two thirds more aid than indigenous firms (O' hUallachain, 1984). These firms were concentrated in the metals and engineering, textiles and chemical sectors.

This brief overview illustrates that from 1958 government policy and a number of public institutions drove industrialisation in Ireland. It also indicates that industrial policy was most successful in terms of encouraging foreign direct investment in a limited number of manufacturing sectors. Between 1958 and 1973 manufacturing output grew by 6.7 percent while employment grew by 2.4 percent (O'Malley, 1992:34). Exports also increased to 41 percent of national output by 1978. By 1973 overseas firms accounted for almost one-third of manufacturing employment.

These economic developments both stimulated and occurred alongside a number of social developments. Emigration declined during the 1960s as a result of the improved labour market at home. The Investment in Education report (1966) highlighted the need to re-orientate educational priorities in line with economic objectives and challenged the ideology of cultural nationalism and Catholicism which had to date dominated school curricula (Clancy, 1995). Subsequent initiatives introduced vocational and community post-primary education with an emphasis on business and technical subjects in the 1960s. The

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[39] Twenty four councils were established but few were very active. Bristow, J. and Tait, A. (1968:168)

development of Regional Technical Colleges and the Dublin Institute of Technology at third level supplemented this development. In a country where there was strict censorship on publications another significant development was the launch of Telefís Éireann in 1962. Although initially debate on the 'national question' was censored television provided a forum for developing aspects of national identity as well as debating important social, political and economic issues.

> '...of greater importance to the Southern media...are economic questions and the liberalisation of family law. The media discussion of economic development, unemployment and Irish membership of the EU and ERM (provides) a clearer strategy regarding Ireland's place in the EU and in the wider global system.'
>
> (Kelly and Rolston, 1995:574)

Given the level of foreign direct investment in Ireland, membership of the EEC and the dependence of the economy on imported fuel it is not surprising that during the late 1970s the country suffered in particular from the OPEC oil crises. Economic growth initially continued, stimulated by increased government expenditure. The economy was to suffer the consequences of these policies in the 1980s when in the aftermath of the second oil crisis and membership of the EMF (from 1979) Ireland experienced severe balance of payment difficulties.

5.1.2 Crisis 1981-1987

The period from 1981-1987 is of particular importance in relation to the structural developments analysed in Chapter Four. The 1980s are characterised by balance of payment difficulties, high unemployment and high emigration. The adjustment policies pursued by governments entailed spending cuts and had a major impact on public service/non-market service growth, industrial and S&T programmes. Substantial tax and interest rate increases stifled private sector investment and exchange rates affected the competitiveness of Irish exports and led to job losses.

Table 21 Average Annual Growth Rates, 1975-1988

	1975-1980	1981-1985	1986-1988
GDP	4.3	1.6	2.6
GNP	3.4	-0.15	3.36
GNDI	-0.44	2.5	3.9
Private Expenditure	4.6	0.44	5.47
Public Expenditure	4.9	0.87	-2.35

Source: EireStat

Table 21 provides an overview of economic performance for the transition period immediately after joining the EC, the decline in the early 1980s and the recovery in the late 1980s. After the first oil crisis output growth was stimulated by increased public expenditure

financed by borrowing abroad. The total exchequer borrowing requirement (EBR) rose to a peak in 1975 of almost 16 percent of GNP (NESC, 1989). By 1977 the government had succeeded through tax policies in countering the growth in the current account deficit but a second period of deficit growth is closely associated with attempts by government to create full employment in 1977. Employment in non-marketed service sector expanded rapidly as a result and the share of public consumption in GNP rose to a peak of 21 percent in 1982. During the same period the current budget deficit rose to 8 percent of GNP and the current account remained in deficit until 1990.

Ireland joined the EMF in 1979 without the UK and as sterling depreciated in value it placed increasing pressure on Irish exporters, particularly smaller indigenous firms. Growing international interest rates on an expanding debt, national disillusionment with rising taxes (to service the national debt) and unemployment all contributed to the difficulties encountered by the government. Sexton argues that certain features of the 1980s recession were unique (Sexton, 1982). He points out that there were fundamental changes taking place in the overall structure of employment, a decline in the more traditional industries, new work practices and technology in industry, and as a result a need for retraining and re-skilling of both workers and the unemployed. According to Cullen the failure of government to adequately address the structural problems of the 1970s and what he calls 'the conservatism' of the working population in relation to adopting new working methods prolonged the economic depression (Cullen, 1976). McAleese points out that the world recession contributed to the deterioration of the Irish economy in the early 1980s (McAleese, 1989).

Certainly both external and internal factors contributed to the balance of payments problems encountered in the early 1980s and the uncertainty of the economic environment stifled investment. However the impact of external and internal pressures effected indigenous firms in traditional manufacturing industries severely. The 'dualistic' structure of the Irish manufacturing sector was exposed.

Table 22 Value of Net Output by Sector and Nationality, 1986.

SECTOR	FOREIGN		IRISH		
	000 IRL	percent of foreign output	000 IRL	percent of total output	Foreign as percent of total output
Food	456,360	12.9	761,962	33.8	37.5
Drink & Tobacco	262,316	7.4	144,219	6.4	64.5
Textiles	74,665	2.1	79,589	3.5	48.4
Clothing & Footwear	52,464	1.5	95,744	4.2	35.4
Timber & Furniture	19,000	0.5	85,864	3.8	18.1
Paper & Printing	44,094	1.3	261,057	11.6	14.4
Chemicals	776,564	21.9	115,265	5.1	87.1
Non-metallic minerals	102,397	2.9	239,136	10.6	30
Metals & Engineering	1,598,255	45.1	386,386	17.2	80.5
Miscellaneous	156,872	4.4	85,512	3.8	64.7
Total	3,542,986	100	2,254,834	100	61.1

Source: Census of Industrial Production, 1986.

Various commentators have commented upon the 'dualistic' structure of Irish manufacturing industry (Mjøset, 1992); (Foley, 1988; Foley, 1991);(O' Malley, 1985; O'Sullivan, 1993). While recognising the contribution of foreign owned firms to the Irish economy in terms of employment they argue that the type of companies and jobs which locate in Ireland were generally lower skilled jobs than located in more advanced economies. While new ICTs were clearly enabling new modes of transnational production they did not necessarily result in the technological upgrading of indigenous industries. These factors might also help to explain the emigration of highly educated skilled workers from Ireland in the 1980s as found in Chapter Four (Mjøset, 1992:395); (Telesis, 1982); (IPRG, 1992);(O'Hearn, 1995).

In 1982 an independent consultancy report argued that government grants to foreign companies were too high and that there was an over-reliance on foreign industry as a means of generating wealth, employment and developing the industrial base (Telesis, 1982). Furthermore, it argued that employment in TNCs was vulnerable and that these companies

lacked key strategic functions like R&D. The report also questioned the excessive reliance on sunshine industries like chemicals and microelectronics which the IDA had been specifically targeting. This report generated much debate within government and its agencies and it was a further three years before the government published a White Paper on Industrial Policy (1984). This paper advocated a reduction in the level of grants offered to foreign companies and advocated positive discrimination towards projects which wanted to locate key strategic functions in Ireland (NESC, 1993). In the context of economic instability there emerged a desire to shift policy focus to indigenous companies and to building human related competencies rather than investing in capital.

This advice drew upon a number of reports which highlighted the vulnerability of indigenous manufacturing firms to the economic problems experienced during the 1980s. One contributing factor was their size. According to IDA employment survey data the average number of employees in foreign firms in 1988 was 90 while the average in Irish-owned firms was 17 (Foley, 1991). The Sectoral Development Committee argued that 'we must establish and strengthen the capacity for technological development in indigenous Irish industry' (SDC, 1985:9). This report recommended that the State needed to provide more flexible incentives to firms for innovation, R&D and to encourage better linkages with higher education.

An OECD report on innovation in Ireland also noted the lack of technological skills, technological awareness and innovation culture in Irish society. While it pointed out that the heavy burden of taxes was stifling entrepreneurship it stated that given the monetary situation in the 1980s the government could not afford to increase public expenditure and must stimulate private investment instead (OECD, 1987). A European Management Forum report (1985) placed Ireland 17th out of the 22 countries reviewed in terms of overall competitiveness. This report noted that Irish firms lacked long-term strategies, innovativeness, had a low rate of national creativity (patents per 100,000) and a low investment in R&D: while 17 percent of foreign owned firms invested in R&D only 5 percent of indigenous firms did so. This body advised that the government needed to create a more stable macroeconomic climate, encourage an innovation culture and support the creation of indigenous technological know-how in order for indigenous industry to compete on world markets.

By 1990 Ireland had undergone 'the largest fiscal adjustment of all OECD countries' (Martin, 1992:315). The beginnings of recovery were evident by 1986 and were consolidated by the first tripartite programme agreed between the government, employers and trade unions: *The Programme for National Recovery* (1987-90). This agreement froze the tax/GNP ratio and set wage increases at less than the rate of inflation. The fall in industrial disputes and the control over wages generated a stable investment environment.

Government moves to slowly liberalise the telecommunications market and other sectors also created a more competitive market (OECD, 1999:53). In the context of government spending cuts development agencies choose to narrow their attention to firstly attracting FDI in the electronics industry and later FDI in the IT hardware and software industries. By 1997 foreign owned manufacturing industries dominated the electronics and pharmaceutical industries and employed 43 percent of total manufacturing employment, contributed 52 percent of output and 74 percent of exports (O'Malley, 1998: 35). Foreign owned firms were to the forefront of Ireland's involvement in EC-funded technology programmes (Grimes, 1993) and the digitalisation of the telecommunications infrastructure from the mid-1980s was seen by some as another 'incentive' aimed at multinationals as costs to the household remained high by European standards (Bell and Meehan, 1988).

5.1.3 Stability and Growth 1987-1997.

The period from late 1987 to 1997 is characterised by stability and accelerating growth. Since 1987 there have been four national agreements between the social partners and each have contributed to economic stability and restraining inflation and wages. The main objectives of the current programme, *Partnership 2,000* are to maintain high economic growth, reduce social disparities, respond to global competition and the information society (Government of Ireland, 1996). These programmes have succeeded in reducing real unit labour costs in relation to other European Union member States between 1987 and 1994.[40] This was a further incentive for foreign investors to locate in Ireland. The government's approach to managing the economy has been mindful of EMF and EMU criteria and has striven to restrain government borrowing and reduce interest rates.

From 1986 to 1994 output as measured by GDP recovered, achieving growth rates of up to 4 percent per annum. While private consumption slowed public expenditure recovered bolstered predominantly by inflows from the Community Support Framework (from 1989) and the Structural Funds. By 1994 however important problems remained: income per head was only 70 percent of the EU average which contributed to continuing emigration; government debt was still almost 100 percent of GDP and unemployment was the second highest in Europe at almost 17 percent. Meanwhile almost 60 percent of unemployed people were classified as long term (ESRI, 1993).

From 1994 the Irish economy 'has notched up five straight years of stunning economic performance' (OECD, 1999:9). Between 1994 and 1998 GDP growth has averaged over 9 percent and GDP per capita rose above the European average. GNP is used by the OECD as a more accurate measure of wealth in the Irish context and by 1998 this was one percentage

[40] See the CEC's *Annual Economic Report*, (1995:263), Table 74 for European comparisons.

point lower than GDP.[41] In the context of an increasing population and falling emigration this output was translated into jobs and unemployment fell rapidly to below 8 percent by 1997. The origins of this growth lie in a number of areas. The OECD factors in the favourable demographic situation in Ireland, the return of emigrants, improving education and skills, EU Structural Funds, integration into the EU market and government policies. Nevertheless the OECD points out that government policies have succeeded in generating an atypical industrial structure with a stronger than average manufacturing sector and an unusually small share of output generated by non-government services (1999:62).

An examination of the components of GDP over this period confirms this statement. It shows that the contribution of industry grew from 24.1 percent in 1975 to 41.7 percent by 1995. This reflects the late-industrialisation process which took place in Ireland, the reduced contribution of the agricultural sector and the high productivity of high technology manufacturing firms. In particular chemicals, computers and electrical engineering have demonstrated strong growth in the last decade contributing just over 18 percent of GDP in 1995. In the same year distribution, transport and communication services contributed just over 17 percent of GDP (OECD, 1997:176). The OECD noted that the share of output generated by wholesale, retail, restaurants and hotels, distribution and communications services was the smallest in the OECD and that the share produced by producer services constituted the third lowest share. Only in personal and social services was the output considered significant and it was noted that this sector contained government funded services (1999:59). This reiterates the findings presented in the last chapter.

Exports

From the late 1950s FDI was seen as a mechanism which would enable Ireland to address the negative balance of trade and diversify the geographical spread of Irish exports away from a dependence on the United Kingdom.[42] By 1995 just under 23 percent of Irish exports were going to the UK and just under 47 percent to the EC (CSO, 1996:147). From 1985 Ireland recorded a trade surplus for the first time since WWII. This trade surplus has remained and exports of goods and services contributed 69.5 percent of GDP in 1995.

A clear indication of the growth of computer and information related sub-sectors of manufacturing and services is given by the changing composition of exports classified by industrial origin (CSO, 1998). Industrial exports rose to 91.2 percent of GDP by 1998 (CSO, 1998).

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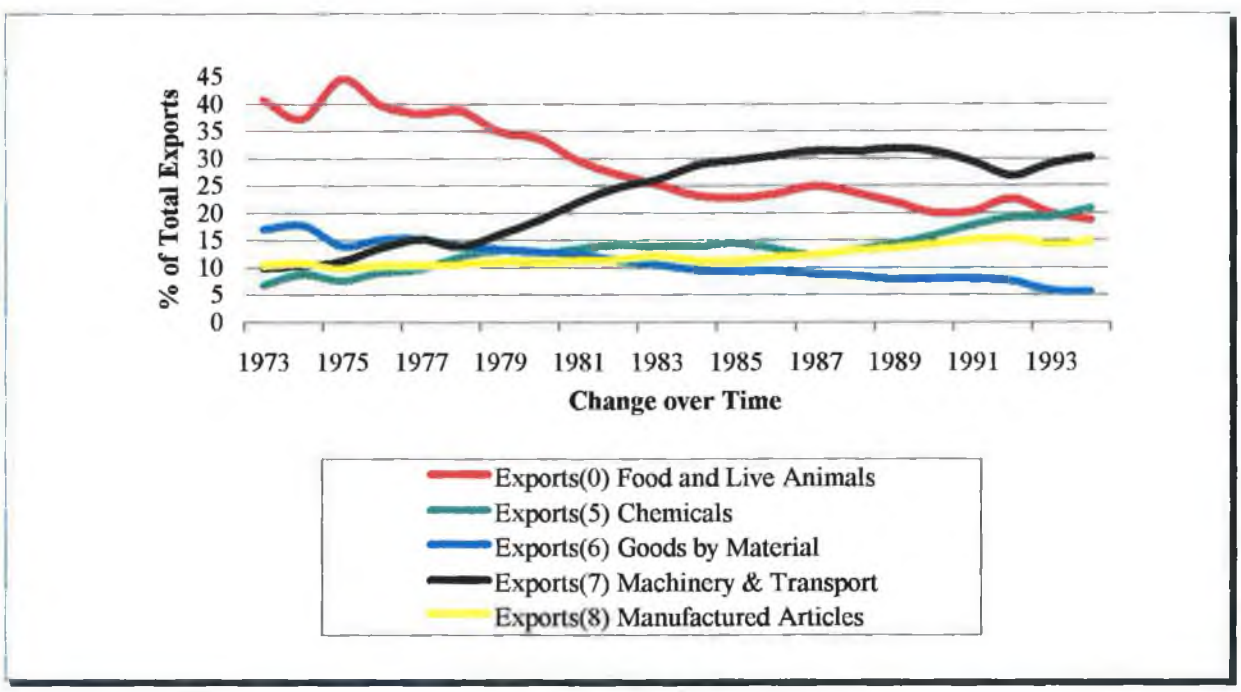
[41] Due to the extent of outflows from Ireland, including profits and royalties from foreign owned manufacturing industries. See OECD (1995:5) for more detail.
[42] In 1929, 89 percent of Irish exports were to the UK. (Mjøset, Dec. 1992:254)

Within industrial exports some sectors contributed more than others to this growth and the relative importance of certain sectors and sub-sectors varied. The declining share of live exports and food is in contrast to the growth of certain sectors in which Ireland would not necessarily have any natural resources. Within the growth sectors (section 7 and 5) the fastest growing sub-sectors have been office equipment (75), electrical machinery (77), medicine and pharmaceuticals (54), organic chemicals (51) and cosmetics (55). By 1998 office machines and automatic data processing machines (75) constituted over 25 percent of total exports (CSO, 1998).

Figure 2 Exports by SITC and as a percentage of Total Exports, 1973-1994.



Source: EireStat.

By 1995 it was estimated that the 'modern' sector contributed 62 percent of total exports with computer hardware and software alone contributing 29 percent of this (OECD, 1997:19). Surveys of the software sector highlight the growth in employment from just under 3,000 in 1987 to almost 12,000 in 1995. The sector comprises just over 90 large multinational firms and over 400 smaller Irish owned firms whose products range from desktop software to systems, network and market-specific software (Irish Trade Board, 1996). All indications were that employment and turnover were increasing rapidly with the Minister announcing that by 1999 the sector employed over 22,000 (Harney, 1999). Similar growth was recorded in multimedia industries with 120 hardware, software and content

companies employing 2,200 employees by 1997, and increasing by 10 percent per annum (Sparks and Group, 1997). However concern has been expressed at the low rate of investment in R&D and the sustainability of current levels of growth given emerging skill shortages, a lack of investment capital and the lack of institutional support structures. Recent job losses of 760 in Digital and 600 in Amdhal have served to remind people of the vulnerability of both FDI and the computer sector, even in the 1990s.

The policy focus on microelectronics and information technologies in the 1980s also led to the identification of information distribution and production as strategic activities in relation to industrial development in the 1990s. Hazelkorn (1997) and Preston (1996&1997) both emphasise how successive governments in the last decade have re-conceptualised the culture industries as 'content industries' and firmed placed them within an industrial/information economy paradigm. A series of reports in the 1990s identified the employment and wealth generating potential of electronic and print media, film, music, broadcasting, publishing and multimedia while emptying their content of any semantic, social or cultural value to Irish society. In 1994 a study commissioned by Temple Bar Properties estimated that the cultural industries had a gross revenue of £450 million, (at least £100 million in exports) and employed approximately 21,500 people (fte) (Lybrand, 1994).[43] By adopting a slightly wider definition the Information Society Ireland report estimated that the content industries employed 30,000 people and produced £1 billion in output by 1996 (ISSC, 1996:42). While the definitions adopted by these reports are questionable a more important feature is their lack of attention to the role of the culture industries as media which contribute to the (re)generation of culture in a wider sense. As a result of this technology and information based definition information society/multimedia reports have tended to advocate a continuation of FDI policies, e.g. the localisation of content, at the expense of indigenous content innovation and production. Without the stimulation of indigenous multimedia production aimed at the domestic market it is likely that the liberalised distribution channels in Ireland (telecommunications, cable) will largely be used to disseminate foreign produced or de-localised types of content.

It is apparent that from 1958 Ireland underwent substantial structural transformation and became an open, export focused and modern high technology manufacturing and service economy. Government policies and agencies played a pivotal role in these developments. In the main the export orientated technology-driven development paradigm was embraced by

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[43] fte- full-time equivalents. This report defined the 'culture' sector as the creative elements of the performing arts (theatre, drama, opera, mime, puppetry, live dance, live and recorded music), the media (film, television and video animation, radio production and broadcasting, literature and book publishing), combined arts (arts centres, arts festivals), visual arts and design (visual arts, illustration and photography, art galleries, applied design, craft) and heritage and libraries (heritage centres, museums and libraries). The definition excluded those involved in retailing and education. (Irish Times, 4-11-94:3)

major actors with little interrogation of the social or cultural implications of this approach for a small country like Ireland. The Telesis (1982) and Culliton (1992) reports provided the main challenge to the accepted development path but many of their recommendations were never implemented.

> '...far greater integration of foreign industry into the Irish economy is needed in terms of linkages with other industrial firms and the undertaking of important management functions in relation to investment, marketing and R&D...the focus must shift to indigenous companies...in Ireland the shift has been "too little and too late" and that there has not been a full commitment to the slow process of developing a broader base of indigenous firms.'
>
> (IPRG, 1992:67)

The desire to shift the focus of industrial policy from foreign to indigenous firms which emerged in the 1980s met with considerable resistance from vested interests, not least the multinationals and public institutions themselves (Lee, 1989:532). Those policy changes that were implemented during the 1980s were often ineffectual given their lack of resources (Kerr, 1996). A further weakness has been the failure to place industrial policy in a wider context and to address the linkages with science and technology policy, manpower, education and cultural policy (STIAC, 1995); (Hayward, 1997) (Preston, 1996). The dominant discourses have predominantly pointed to the macro economic growth figures as justification, and evidence of Ireland's convergence towards European living standards. Many of these accounts fail to explain the continuing high levels of unemployment until 1994, the lack of social mobility and unequal access to education, the increase in poverty and social exclusion (Kirby, 1997); (Wickham, 1998); (Whelan, 1995). They also fail to address, or even consider, the impact of increasingly global media operations on national, local and traditional cultures in Ireland. This thesis is particularly concerned with the failure of the national institutional system to significantly stimulate indigenous innovation and to exploit natural resources both in agriculture and in the cultural industries.

> 'If Ireland can marry its technical strengths in software with the design and creative skills of its writers, artists, animators and film makers, it may have a bright future in multimedia.'
>
> (Ó'Riain, 1997)

By 1995 a number of structural weaknesses were evident in the Irish socio-economic structure. The outflow of profits, the dominance of foreign companies in high technology sectors, the lack of strategic functions in these plants in Ireland and the mobility of these global corporations meant that the basis of Ireland's economic growth was vulnerable and working to corporate priorities set outside the country (O'Hearn, 1995). At the same time the scale of indigenous industry, (only 20 companies employ over 500 people), their concentration in low technology sectors, the low level of market service growth and the low

level of investment in R&D meant that there was a questionable indigenous base for sustainable economic development. The development of linkages between the large multinational high technology companies and small indigenous cultural or sub-supply organisations has at best been partial and indigenous organisations have traditionally failed to add value to their creative ideas and exploit them fully (Preston, 1997). On the basis of this analysis it can be argued that the outcome of industrialisation policies in Ireland since 1958 has been the generation of a weak indigenous industrial base, the neglect of the scientific knowledge base and the creation of an innovation-adverse culture.

5.2 The National Institutional System and Learning by Regulation

Having examined the historical process of industrialisation this section will examine the innovation culture in Ireland, the political system and public support for innovation in computer-related, telecommunications and culture industries, the R&D system and academia. These are viewed as four important elements of a national system of innovation which may crucially influence the rate and direction of multimedia developments in Ireland.

This section takes account of the definition of institutions in the strict physical sense and in the sense of a mental map (Mjøset, 1992:33) (Lundvall, 1992:10). It will focus on a selection of institutions, physical and cognitive which were influential in shaping the growth of computer hardware, software and culture industries and which may crucially influence the emerging multimedia sector.

5.2.1 The Innovation Culture in Ireland

While the claim that there is a technological gap between Irish owned and foreign owned firms is confirmed by a number of innovation surveys conducted in the manufacturing sector, there is little information available on innovation in service industries or the culture industries. Clear evidence was provided by a survey of the Irish manufacturing industry in 1994 that small, Irish-owned manufacturing firms in all sectors encountered significant financial, resource (skills and capital) and regulatory barriers to innovation (Forfás, 1994)[44]. The dominance of foreign owned multinational companies in manufacturing and their lack of investment in R&D in Ireland may be one factor which militates against a more general innovation culture in Ireland.

While these studies pinpoint important financial and capability barriers to innovation in manufacturing industries they rarely deal with the wider culture of innovation in Ireland. The STIAC report (1995) acknowledges that an innovative culture must work at both the micro and macro level if national competitiveness is to be advanced (STIAC, 1995:22, Vol.

1). The macro innovation culture in Ireland however has rarely celebrated the entrepreneur or the scientist. This is reflected in the lack of attention given to S&T in the media and the lack of recognition given to science heritage in accounts of the development of the nation state. There is arguably a much greater appreciation of cultural achievements, popular traditions and localism than technological inventions, 'progress' and internationalism.

One factor contributing to the neglect of innovation and S&T in Ireland might be found in history. Various commentators argue that traditionally S&T have been associated with the Anglo-Irish tradition and were not therefore part of the 'cultural identity' created and fostered by governments in the new State. In the rush to create a distinctive national identity after 1921 school curricula focused on the development of the Irish language and Irish cultural traditions. The time devoted to maths and science dwindled. The fact that in the previous century the most active scientific researchers were members of the Anglo-Irish class was sufficient reason for cultural nationalists to ignore this tradition.[45]

More recent historical research has established that Ireland achieved a considerable international reputation for scientific research during the last century. Notables have included Robert Boyle (1627-1691) who developed Boyle's Law, Francis Beaufort (1744-1857) who developed the Beaufort scale and Ernest Walton, the 1932 winner of the Nobel Prize for Physics. However historians maintain that this scientific 'elite' worked in the interests of the Empire and pursued science as a cultural activity with little relevance to Irish socio-economic objectives.

> '...science and technology, and their interactions, are embedded in the culture of the Irish proto-nation, the roots however being primarily in the Protestant component, and the fruits being sequestered and digested by the Empire, particularly in the 19th century, the dominant process being emigration of scientist towards the application of science in the imperial interest abroad.'
>
> (Johnson, 1983:62)

In order to generate a wider innovation culture in Ireland the government faces therefore a number of historically constructed barriers. A further problem has been the failure of successive governments in the 1960s, 70s and 80s to align industrial, education and cultural policies with S&T policies. Indeed, cultural and industrial policies were often conceived as diametrically opposed with the former the protector of tradition and the latter the promoter of modernism.

> '...the effects of technological change are not confined to economic development alone: they pervade all of society, and not always for the better. S&T policy cannot therefore be divorced from society's perception of the whole process of knowledge

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[44] The questionnaire was concerned with radical and incremental product innovations as well as process innovations. It was part of a wider European study.

[45] 'Anglo-Irish' is the term used in Ireland to describe those English who settled in Ireland. They were encouraged to settle in Ireland by being given land and other incentives.

generation and its dissemination because of the ethical, moral and cultural issues that accompany innovation.'

(Kinsella and McBrierty, 1994:2)

The influence of this culture is reflected in the traditional lack of investment in scientific knowledge generation, application and appreciation. One historical review of S&T policy in Ireland found that expenditures by both government and industry on generating new knowledge and applying it have been low since the 1960s (Kerr, 1996). In 1967, for example, total GERD was only 0.57 of GNP, which by European standards only surpassed expenditures in Greece. At a time when industrial policy was explicitly trying to modernise the industrial structure the Cooper-Whelan report of 1973 noted that the government was not investing in upgrading national capabilities in those sectors.

'It appears as if the growth of Irish industry-and the growing exports of Irish manufactured goods-have not depended to any significant extent on Irish R&D.'

(Cooper and Whelan, 1973:23)

Given the level of imports generated by FDI policies the Cooper-Whelan report argued that there should be a re-orientation of policy towards indigenous firms, (in terms of resources), and natural resources as a basis of real competitive advantage. By 1993 Irish GERD as a percentage of GDP compared favourably with Spain, Portugal and Greece but was significantly behind countries like France, Germany, Norway and Denmark. For a country with an increasing proportion of its output and expenditure coming from high technology industry it was a bizarre situation.

Table 23 Percentage of GERD Financed by Industry and Government, 1993.

COUNTRY	FINANCED BY GOVERNMENT	FINANCED BY INDUSTRY
Belgium *	27.6	70.4
France	48.8	42.5
Germany	37.4	59.5
Greece**	57.7	21.7
Ireland	23.1	64.5
Italy	47.8	46.8
Netherlands**	44.9	51.2
Portugal	59.8	20.0
Spain**	45.7	48.1
United Kingdom	35.4	N/A

Source: OECD, EAS (STIU database), April 1994.[46]

[46] Note: Cited in STIAC (1995) Vol. 3. All figures for 1992 unless otherwise indicated. * 1990 figures ** 1991 figures

Since 1989 S&T and generating an innovation culture have taken a more central place in Irish national development plans. The National Development Plans 1989-1993, and 1994-1999 contained specific science and technology sub-programmes which focused on developing new knowledge capabilities as well as supporting innovation in firms and linkages between firms and universities. Policy shifted to a certain degree from a focus on infrastructure and fixed assets to a focus on the firm and ways of developing a firm's innovative capacities and human resources. This new prominence for science and technology was prompted by both the availability of European funds and new thinking on the importance of 'innovation' in relation to economic growth and national competitiveness. The Culliton review argued that Ireland needed to move to a higher level of economic development where innovation was a key driving force in the economy (Culliton, 1992). Drawing heavily on the work of Professor Porter and evidence from other late industrialising nations the review adopted the view that Ireland should concentrate on policies of technology transfer, education and training and develop areas where Ireland already possessed comparative advantage. It was recommended that government policies should focus on building up innovative potential in firms and encourage the establishment of industrial clusters and linkages, co-operatives and sub-supply systems.

In the same year Mjøset argued that Ireland's problematic socio-economic development could be attributed to a wide range of factors including emigration, the social structure and the weakness of the national system of innovation (Mjøset, 1992). This report concluded that a major 'task for Ireland in the 1990s...must be to stimulate an Irish system of innovation' (1992:18). Contributions from STIAC reiterated these findings (STIAC, 1995). The first ever White paper on Science and Technology (1996) called for a campaign to change the public perception of science and technology. 'There is still a general lack of awareness shown by the public in S&T issues' (OST, 1996:9).

5.2.2 Government Departments

An important aspect of the Irish political system is its relative stability and lack of ideological basis. Two of the three main parties, Fianna Fáil and Fine Gael can be classified as centre right parties and the Labour party is less significant than in other countries, with weak links to the unions.

> 'A characteristic of the Irish party system is that, mainly because of the dominance of the nationalist issue, and to a lesser extent because of the role of the Catholic Church, the system does not reflect or generate basic political conflict over the aims or direction of economic policy.'
>
> (Morrissey, 1986)

Irish politics since 1960 has been described as 'clientelist' or 'brokerage politics'. Local and populist issues have often taken precedence over national or European issues and constituency gain over national gain (Flynn, 1998b). Thus individuals, large corporations or other powerful actors have in the past influenced policies and government expenditure.

> 'There is a wealth of evidence that many Irish representatives are primarily local consumer representatives, advocates and expediters of affairs for their constituents and their localities.'
>
> (Chubb, 1964:105)

With political independence a highly centralised central administration system was established. The Devlin Report (1969) recommended radical changes in the decision-making structures with distinct policy-making groups of officials in every department and a clear division between policy formation and executive functions. Unfortunately, in the main, these recommendations were not implemented and thus the ability and efficiency of the administrative system to both formulate and administer policy, particularly in the 1960s and 1970s, was weak.[47]

> 'A serious feature of the present system is its built-in resistance to change. Utility is not scientifically measured against cost; evidence is not thrown up that a particular programme is of low priority; in fact, the full cost of programmes is not apparent. Furthermore, the vested interests of organisations and their clients ensure survival of established activities irrespective of their merits.'
>
> (Chubb, 1964)

This lack of government policy makers meant that other actors came to play an important shaping role. From the 1960s policy recommendations have largely come from committees composed of external 'experts' and consultants. During the 1980s the committee system was formalised to a greater extent. In the main these committees are composed of influential actors from business, education, the community and government. Notwithstanding their valuable contribution, a reliance on this form of policy advice without attention to the more impartial central government system does leave the government open to charges of 'corporatism'. Foreign-owned multinationals are well represented on these committees. Another forum for policy formation in recent years has been the social partnership; a tripartite structure involving government, the employers unions and the labour unions. These programmes illustrate the extent to which policy is constructed and negotiated outside the legislature.

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[47] A White Paper 'Managing the Country Better' appeared in 1985 and addressed some of the Devlin issues. A Department of Public Service was created in 1973 and was given its own Minister in 1982. An Appointment Committee was established in 1984 to make appointments based on merit. In 1979 a journal Seirbhis Phoibli was launched by the DPS. The present government is again 'looking at' the efficiency of the public service.

Today The Department of Enterprise, Trade and Employment has responsibility for overall industrial development and ST&I policy while the Department of Arts, Heritage, Gaeltacht and the Islands has responsibility for developing the media and culture industries.

Department of Enterprise, Trade and Employment and the Office of Science and Technology

A major development with regard to S&T policy was the creation of an office of Science and Technology (OST) within the Department of Enterprise and Employment (DEE) in 1989.[48] The OST received substantial funding from the first Community Support Framework (1989-1993) and effectively this provided the leverage to implement policies, which had been denied to previous science boards.

The OST is responsible for managing the National Microelectronics Application Centre (MAC), the National Microelectronics Research Centre (NMRC) and the Programmes in Advanced Technologies (PATs). This office is also responsible for co-ordinating the Community Support Framework and the national plans. The most important programme in relation to innovation and new multimedia companies in Ireland was the S&T Development Programme initiated under the auspices of OST and Eolas in 1988. This programme was based on the belief that Ireland needed to invest more in generating and applying new knowledge and technology transfer skills.

> 'The aim of this sub-programme was to develop in Ireland the level of technological capability necessary to underpin the competitiveness and more rapid development of industry. Technology is a major force in the creation of wealth and jobs.'
>
> (Government, 1989)

The S&T Development Programme became a sub-programme of the ERDF-funded Operational Programme for Industry in 1988. The S&T sub-programme for Industrial Development (1988-1993) had four measures;

- Measure 1 - The Programmes in Advanced Technologies (PATs).
- Measure 2 - Higher Education/Industry Links.
- Measure 3 - Technology Services to Firms.
- Measure 4 - Regional Infrastructure Development.

The programmes supported by the government are outlined in Figure 3. The work of the OST and the S&T sub-programmes receive almost 73 percent funding from the ERDF and between 1988 and 1993 funding for the S&T programme grew from 3.1m to 19.8m, which enabled many institutional and programme innovations.

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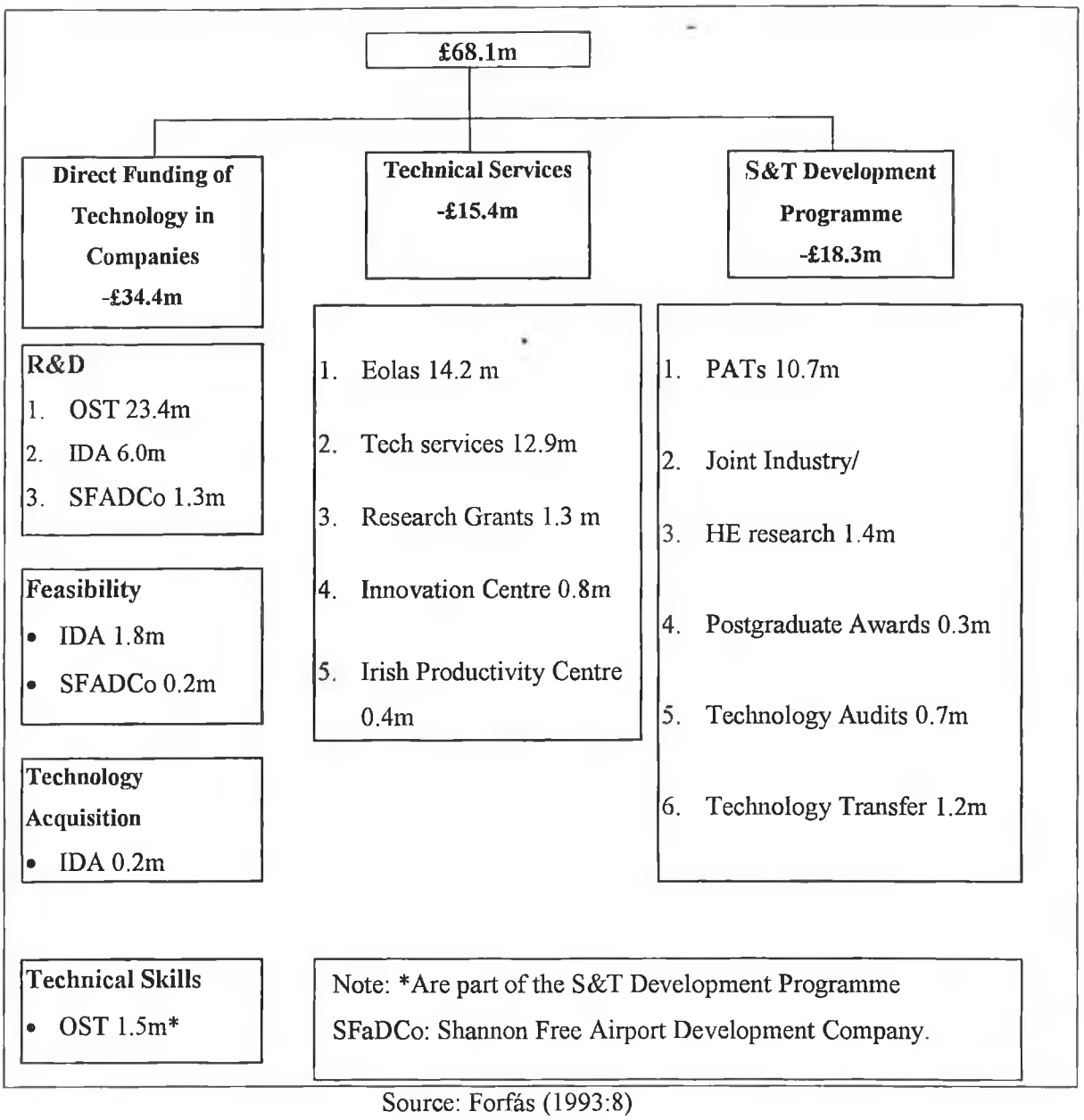
[48] Renamed the Department of Enterprise, Trade and Employment.

A significant aspect of this programme was the expansion of direct financial supports for industries. The total spent on S&T for manufacturing industries in 1993 was £89.5 million and the amount contributed by non-exchequer sources was 29 percent, an increase of 290 percent on 1980 (Forfás, 1993:8). A total of 62 percent of this sum was spent on R&D. This total greatly increased when the DEE introduced Measure Six in 1992, a grant-aid scheme which matched, pound-for-pound, large scale investments made by firms in R&D projects.[49] Together with the PATs these are the main government supported S&T schemes.[50]

[49] This scheme is in addition to the schemes which the IDA, SFADCo and Udaras na Gaeltachta operate. Companies must commit a minimum of £250,000 to match government assistance up to a maximum of £500,000

[50] The PATs will be examined in section 5.2.4 on academia.

Figure 3 Department of Enterprise and Employment Funding of S&T, 1993.



Source: Forfás (1993:8)

Table 24 R&D Performance Indicators, 1986-1991.

	1986	1988	1990	1991
Intramural Expenditure on R&D (£000)	89,992	105,495	141,983	175,908
Researchers employed in Industry	1,304	1,339	1,730	2,127
R&D performing Companies	586	872	611	671
Formal R&D Departments	243	269	331	370
Extramural R&D in Ireland (£000)	3,314	3,879	3,677	3,349
R&D Intensity (researchers per company)	2.86	2.06	2.65	4.36
R&D as a % of Sales	0.64	0.82	0.93	1.10

Source: (EC, 1994:60)

Over the period of the first S&T programme expenditures by foreign firms slightly exceeded the overall increase of 10 percent per annum spent on in-house R&D while expenditures by indigenous companies was slightly less. The numbers of researchers employed nearly doubled although that rate was twice as high in foreign owned firms than in indigenous firms. Although there was a clear improvement in the RTD system capacity (**Table 24**) evaluators estimated that the overall socio-economic impact of this CSF programme was minimal (Tsipouri, 1993). In the second CSF 1994-1999 the focus shifted more towards directly supporting R&D in firms. Within the *Operational Programme for Industrial Development* (1994-1999) the following are the priorities:

- Measure 1 - Industry R&D Initiative.
- Measure 2 - Industry/Third Level Co-operation Services.
- Measure 3 - Human Resource Development.
- Measure 4 - Research Support.

Measure 1 builds on the success of Measure Six in the first CSF programme and provides up to 50 percent of costs incurred on company led R&D projects. The measure aims to encourage the improvement of technologies used in firms, their ability to work in consortia on R&D projects and their ability to work in international programmes. The technical nature of the project, the company track record, their capacity to commercialise the project, the strategic significance to the firm and sector, and the amount of the project carried out in Ireland are the governing criteria. While initial impressions would suggest that

large high technology firms will benefit most (i.e. mainly foreign-owned) there has been an attempt to try to ensure that SMEs have equal access to this funding.

Measure Two includes a technology transfer action (licensing and intellectual property), a Graduate Skills Action and Technology Audits (which identify technology deficiencies in firms). Measure Three includes actions to develop graduate skills, enterprise development skills and research management skills. Measure Four aims to support research other than the strategic areas involved in the PATs and RTCs. This fund will support basic and experimental research, which is carried out between industry and third level and will be administered by Forbairt. Total expenditure for all four measures is forecast to be 502 MECU (£406m), with 43 and 47 percent respectively allocated for Measures 1 and 2. Interviews with policy makers however revealed that there is a real fear within administrative circles that many programmes may come to an end if adequate national resources are not found to replace structural funding from 1999 (Kerr, 1996).

A steering committee for the development of an Irish 'information society' action plan was established in 1996 by the Department of Enterprise, Trade and Employment (DETE). The lack of academic or community involvement is reflected in the technological and economic orientation of the group's findings. The recommendations of the group fell into five areas; awareness, infrastructure, learning, enterprise and government, and indicated that the government saw its role in promoting the use of ICTs, developing skills and removing barriers to the development of new information based industries. The report proposed that 'the production of multimedia content is underdeveloped, although it promises major opportunities for early entrants' (1996:v). An important objective therefore was to 'secure a strong leadership position for the Irish content industry and develop a strategic plan for the sector. This report did not indicate what actions might be taken to support such a development.

> '...a successful transition to an information society in Ireland cannot be built on the export of IT hardware and software for service development and application in other countries. For this Ireland must pay as much attention to service development and applications in Ireland - in the private, public and community sectors. These important demand-side information and communication issues remain to be developed by the Information Society Steering Committee.'
>
> (Melody, 1997:183)

Following this report an Information Society Commission (ISC) was established (May 1997) within the Department of the Taoiseach and five groups to advise on awareness, infrastructure, learning, enterprise, legal and government issues. Interestingly the only company represented on the enterprise advisory group in 1997 was from a foreign-owned multinational. The second report of the ISC (1999) indicated that a Content Advisory Group would be established to make recommendations to government on this area. Meanwhile the

main priorities for enterprises were identified as e-commerce, skill shortages and investment in R&D.

Department of Public Enterprise-

Telecommunications structures are identified by most academic and policy documents as the foundation of an information infrastructure, information economy and information society (Melody, 1997). The Minister for Public Enterprise licensed telecommunications in Ireland until an independent telecommunications regulator was established in 1996. During the 1980s the government began to view telecommunications as an additional tool for industrial development.

The Dargan Report in 1979 recommended that the monopoly telecommunications operator should become a semi-state body and that major investment was needed in the telecommunications infrastructure. Both these recommendations were implemented and a £650m Accelerated Development Programme between 1979-1984 effectively removed waiting lists for telephones and provided a digital telephone system to much of the country. By 1980 there were 483,000 exchange lines in Ireland, which had increased to 1.31 million by April 1996 (Flynn, 1998). It is generally acknowledged that this enhanced Ireland's ability to attract high technology companies and internationally traded service industries in the last ten years (TSPC, 1998). In 1984 Telecom Eireann (TE) was established as a semi-state body with sole responsibility for the public telecommunications system in Ireland.[51]

Since January 1998 Ireland has had a liberalised voice, value-added services and infrastructure market.[52] Nevertheless the market is still dominated by TE who is the incumbent operator of the nation-wide telecommunications infrastructure and the sole provider of nation-wide voice telephony services. In 1996 a partnership of KPN (the Netherlands) and Telia (Sweden) bought 35 percent of TE, 20 percent of which was transferred immediately for a sum of £183 million (Irish Times 27/6/96). TE made a profit after tax of £66m in 1995/96 although it still has a large number of employees and a sizeable debt burden (£703m). In June 1999 the government sold its share of the company in a major public share issue.

The telecommunications network in Ireland is 92 percent digital and advanced services such as ISDN are available, subject to demand, throughout the country. The trunk network consists of almost 72 percent optical fibre supplemented by wireless systems in areas of particular remoteness (Force, 1995). The Dublin area had one of the first European Metropolitan Area Networks (MANs) installed in 1992 and household penetration by 1996 was 82 per cent. A second mobile telephone licence was awarded to ESat in 1997 who went

[51] Telecom Eireann's name was changed to Eircom in September 1999.

into competition with the TE subsidiary Eircell. Both analogue and digital mobile systems are available.

Ireland is heavily cabled with 40 per cent of homes receiving television services via underground systems (MacMahon, 1995). Local, national, American and European television services are provided through these systems and by licensed cable companies. Cablelink is the largest operator offering services to 370,000 homes in Dublin, Galway and Waterford. TE owned 75 per cent of Cablelink, until 1999 when the company was sold to NTL Incorporated for £500 million. CMI (Dublin) and Cablelink have both tested interactive services including the Internet over their cable systems and according to company press releases hope to offer these services 'shortly'.

The terminal and value added services market in Ireland is completely liberalised in line with European legislation. Over the past five years there has been a considerable growth and consolidation in the number of Internet service providers in Ireland and while the number of host computers was estimated to be 10,454 in Aug 1995 a Network Wizard survey recorded 21,464 hosts (July 1996). A survey for Forbairt in October 1995 estimated that 4,800 companies were connected to the Internet and 1,800 private users, but by 1998 it was estimated that there were 50,000 Internet users in Ireland (Telecommunications Services Policy Committee, 1998,11). In 1996 the Irish government launched its own web site.

Department of Arts, Heritage, Gaeltacht and the Islands

Irish cultural content is well known internationally with the success of Riverdance- the show, international awards for literature (Joyce, Beckett, Heaney) and films (My Left Foot, In the Name of the Father). Within Ireland the culture industries were largely ignored by successive governments from 1921. This changed during the late 1980s as European Commission, international information society reports and some influential consultancy reports in Ireland highlighted the economic potential of the culture industries and some particularly motivated politicians took office.

Symptomatic of the more active approach to cultural policy was the creation of a full Ministry of Arts, Culture and the Gaeltacht in 1992 responsible for arts, culture, broadcasting and audio-visual policy in Ireland. During the ministry of Michael D. Higgins this department commissioned a number of studies which attempted to estimate the economic contribution of the broadcasting, film and music sectors and put in place structures to provide seed and venture capital for new content projects. In particular this Minister succeeded in expanding the Business Expansion Scheme to include the music industry, developed a tax investment scheme for film, and re-established the Irish Film Board. These

[52] See www.odtr.ie

measures supported both indigenous and foreign productions in Ireland and international marketing. All indications are that they have been relatively successful in terms of the numbers of productions, employment and revenue generated.[53] Higgins was also responsible for securing a higher profile for 'culture' in an amendment to the Maastricht Treaty (Article 128(4)) during the Irish presidency of the European Council.

One of the most significant and controversial developments by this department was the establishment of a Irish language television channel in 1996. This has stimulated independent production and has decentralised broadcasting away from Dublin. The continuing support for public service broadcasting in Ireland, although arguably with small financial backing, were further developed in the Green Paper *Active or Passive? Broadcasting in the future tense* and the ensuing document, *Clear Focus, the government's proposals for Broadcasting Legislation*, 1997 (Department of Arts, 1995; Department of Arts, 1997).

The Green paper noted the global pressures on Irish content industries, the purchasing power of global companies, the EU and GATT policies towards free trade, and the implications these trends might have for the trading of cultural products and the representation of minority cultures. With regard to technological developments the paper pointed out that the capacity of new digital technologies demanded a re-examination of programme formats given their ability to tailor programmes to different viewers/users. It also tried to redefine the broadcasting sector within this changing milieu as a 'mode of publication communication' recognising the threat of 'pitting profit motive against collective rights, de-territorialised imperialism against minority cultural needs' (Arts, 1995:131).

During 1999 a new Broadcasting Bill laid the legislative foundation for the development of a digital terrestrial television service in Ireland which will be undertaken by a body which includes RTE as a minority shareholder. The Minister envisaged that this distribution system will provide traditional television and radio services as well as Internet and new interactive services. The Bill also proposed that a renamed IRTC would be given the function of regulating all 'indigenous digital programme services'. While provision was made for a new digital distribution system, which would help 'create' the information society, no measures were introduced to encourage indigenous multimedia content production.

5.2.3 Industrial Development Agencies and S&T Boards

The agents of government policy making and execution in Ireland are the civil service, the state-sponsored bodies and the local authorities. The State-sponsored bodies are by far the most important in terms of policy formation and programme administration.

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[53] See www.iftn.ie/finance/table.htm [23/6/99]

In examining the development of state agencies it must be advised that the statutory role as laid down in the relevant government bills for government agencies is often not adhered to in practice. The numerous structural re-organisations are often no more than cosmetic, with the same people playing the same roles in the new structures. This apparent, rather than real reform, has in many instances added to the confusion on the part of both the client companies and the administrator. In a small economy the limited size of the human resource base also acts to inhibit the process of change.

An examination of the most important agencies for industrial development has revealed that in some instances and due to a lack of review and monitoring procedures the state agencies have often become more powerful and important than their function. In certain instances they cost much more in wages and salaries than they actually administered in grants and services. Furthermore, much monitoring and evaluation of programmes is done internally. This evidence would support the theory that institutions are an embodiment 'of power relationships in society' and that self-interests can serve to counteract change even if performance is less than optimal. The 'capacity for innovation can be stimulated or inhibited by the institutional and policy framework within countries' (NESC, 1993).

The Industrial Development Authority, Forbairt and Forfás.

During the late 1950s many of the executive functions with regard to economic policy were passed onto State run operations. The Industrial Development Authority was established in 1949 and became one of the most important institutions in relation to industrial development. Its functions included formulating and implementing industrialisation policies including the foreign direct investment policies instigated during the late 1950s. Section 5.1 illustrated how successful these policies were and the important contribution of foreign owned companies in terms of employment and output to the Irish economy. Some analysts however argue that the power of the IDA to both formulate and execute policy has diverted important resources away from indigenous companies and narrowed technological developments to a few high-risk areas.

> 'Industry and Commerce lost many of its central earlier functions as the IDA assumed increasing responsibility throughout the sixties for investment policy. The IDA played an even more prominent role in the 1970s, its authority enhanced by legislation in 1969, and a sympathetic public profile...Government effectively abdicated to the IDA responsibility for industrial policy...The IDA opted, in its 1973 plan to concentrate on the electronic and chemical sectors, two areas with high growth potential...Both industries had to be virtually completely imported.'
>
> (Lee, 1989:473)

The shift in policy focus from foreign to indigenous firms was not institutionalised until the Industrial Development Act 1993. This Act created a new policy advisory board, Forfás,

which oversees a re-defined IDA whose function was narrowed to focus solely on attracting and supporting FDI in Ireland. Forbairt meanwhile, as an agency of Forfás, was given the role of developing indigenous industry, including services, and strengthening both their technological base and their capacity to innovate.[54] Forbairt provides financial assistance for both product and process innovation and technology acquisition. The Act also specified that annual reports must be filed each year and include information on both job losses and gains.

Forfás is the industrial policy advisory board in Ireland today with particular responsibility for S&T policy formation. There are twelve members, including the Secretary of the Department of Enterprise and Employment, the General Secretary of the Irish Congress of Trade Unions, the chief executives of the IDA and one representative from Enterprise Ireland. Forfás, while effectively the overseer of both the IDA and Enterprise Ireland has members of both agencies on the board. This immediately leads to questions about the monitoring and evaluation of policy measures. Significant Forfás initiatives include an S&T awareness campaign, e-commerce, telecommunications and skills policy development and the Technology ForeSight Ireland Initiative (1999).

Additional institutional developments were instigated by The Industrial Development (Enterprise Ireland) Bill 1998 which merged Forbairt with the Irish Trade Board, (which included the National Software Directorate), and elements of FÁS to form Enterprise Ireland. This body was set up to deal with the continuing strategic weaknesses of indigenous industry including: low levels of profitability, low propensity to conduct R&D, human resource deficiencies and reliance on home and UK markets. The main aim of this new institution was to customise services to clients and develop 'sustainable competitive advantage' in companies. The new agency aimed to support R&D, design, production, marketing, human resources, finance and linkages with FDI (Harney, 1998).

Discussions between the author and employees of Enterprise Ireland one year later indicated that most of their programmes were aimed at companies involved in exporting goods and services and they had no funding available for developing education, cultural or entertainment content for multimedia artefacts aimed at an Irish audience. The International Service Programme for example provided grants to software development, technical and financial services, publishing and media recording services which exported over 50 percent of their output and where revenues were generated abroad. The organisation also provided access to Venture Capital Funds which invest between £50,000 and £250,000 in manufacturing, software and high technology service projects. The main multimedia related initiatives supported by this agency so far have been the publication of a report on the

[54] The roles of Eolas and the 'Irish Industry Division' of the IDA were effectively incorporated into the brief of Forbairt.

potential of the multimedia industry in Ireland (1997) and the establishment of a digital park to the west of Dublin (1999).

National Science and Technology Advisory Boards

A new Government Act in 1977 created the National Board of Science and Technology (NBST), four years after the Cooper-Whelan report and ten years after the establishment of the non-statutory, advisory National Science Council. The statutory articles of the NBST gave it responsibility for the development and application of S&T to both economic and social development in Ireland. This was the first statutory board to have responsibility for advising government on all aspects of S&T. However its work was hampered by numerous external and internal factors including the second oil crisis and the reform of the Common Agricultural Policy (CAP).

The next institutional reform came in 1987 with the publication of the Science and Technology Act (1987). This Act moved S&T policy making into the central administration by creating an Office of Science and Technology (OST) within the newly named Department of Enterprise and Employment and merged the NBST and the IIRS into a single agency called Eolas.[55] **Eolas** co-ordinated science policies in both the public and private spheres, acted as an information point and represented the State abroad in S&T activities. It was also assigned the task of developing a national programme for S&T, a task inherited from the NBST. The idea of a Science Budget with regular reviews was also provided for in this Act as part of the first 'Science and Technology Development Programme'.[56] This agency became part of Enterprise Ireland in the latest institutional reorganisation in July 1998. This agency is now a 'one-stop-shop' for support and advice to indigenous Irish companies including multimedia companies. The supports available to this sector however are clearly defined in relation to the sales, export and job creation potential of a project and targeted towards company start-ups and expansion overseas. At the time of writing Enterprise Ireland were attempting to re-assess their support for multimedia industries.

Following the STIAC report (1995), the Travers task force (1995) and the government White paper on S&T (1996), an **Irish Council for Science, Technology and Innovation (ICSTI)** was established as part of Forfás. This was in addition to a new cabinet committee and inter-departmental committees on ST&I. In March 1998, Minister Noel Treacy requested that the council undertake a Technology Foresight exercise. The final report from the ICT panel indicated that Ireland needed to 'increase the value-added component in our ICT products and services', considerably increase investment in research and management expertise and increase significantly venture capital availability (ICSTI, 1999:1).

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[55] Eolas is Irish for 'knowledge'.

5.2.4 Academia

Between 1983 and 1994 the numbers attending higher-level colleges rose from 29,000 to 47,706. However in difficult labour conditions the number of well-qualified graduates who were emigrating after college rose and engineering and technical graduates had a very high propensity to emigrate. Education, and within this undergraduate courses in universities, nevertheless remained an important investment priority for governments (53 percent of total S&T expenditure). Almost 40 percent of this expenditure went to engineering, architecture, medical and natural science courses while R&D in education received 14 percent of funds.

The universities supplemented this government support with external research contracts, including almost £45m from EU sources (Forfás, 1993:23). The need to supplement funding from external sources was driven by the comparatively low expenditure on Higher Education R&D (HERD) by international standards. In 1993 HERD was 0.12 of GDP in Ireland and the lowest in a selection of European countries. The STIAC report commented that state support for research in universities was 'antiquated' while the Circa report called it 'absurd' (Circa, 1994). Increasingly it meant that universities focused on applied research rather than basic research and tried to develop linkages with industry in order to attract further funding.

During the 1980s the higher education sector in Ireland became increasingly dependent on EU research programmes and commercial contracts. Between 1987 and 1991 over 1,100 contracts and £160m was awarded to Irish universities by EU Framework Programmes (STIAC, 1995:126, Vol.1). It is clear that during this period the role of universities expanded beyond education and into company incubation, industrial support and international contract researchers. A survey of outputs from universities in 1992/93 highlights the growth in their role as employment and industrial generators (Circa, 1994:149).

- Doctoral Theses - 310
- Contract Researchers - 488
- Patents - 20
- Jobs Created - 573
- Total Publications - 7510
- External Research Income - £45m
- New Companies - 77.

This new role was endorsed and supported, if not financially, at least vocally by government and development agencies given the weakness of indigenous industry and the innovation-adverse culture indicated by Telesis (1982) and (OECD, 1987).

> 'Universities and regional colleges are to assume a dynamic leadership role in the regional development of their surrounding areas, for example, through the provision of innovative research, support and training to local indigenous industry,

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[56] The notion of a science budget was discussed in a paper delivered by O'hEocha in 1969.

in harmony with European policy on regional development...'
Government, 1992 cited in (Kinsella and McBrierty, 1994:98)

The main manifestation of this change was the creation of specialist research and incubation centres based in the universities and culminating in the government/university partnership Programme in Advanced Technologies (PATs). The National Microelectronics Research Centre (NMRC) was the first specialist centre to be established in 1982, and focused on supporting the burgeoning electronics industry. A biotechnology PAT, while overtly an important priority for the NBST from 1983, was established with the support of ERDF funds in 1987. All of these centres were seen as a means of developing and keeping in Ireland local expertise, developing linkages, particularly to foreign owned industries and enhancing the technological infrastructure in the country in order to attract further FDI.

With the development of an S&T programme in 1987 the various specialist institutions were gathered together under the management structure of the OST. While overall policy and funding was co-ordinated by the OST and administered by Eolas (now Enterprise Ireland) research was conducted in a growing number of universities around the country. Each of the major programmes is closely linked therefore with central administration and government agencies. In addition to Eolas/Enterprise Ireland the IDA is represented on the boards of the major programmes and there is a close correlation between IDA development priorities and the specialist PAT areas. Indeed the Software PAT in Dublin City University (DCU) is managed directly by the IDA.

A number of weaknesses were found when the PATs were reviewed after the first CSF programme, particularly in their management and ability to balance academic and commercial tensions (Tsipouri, 1993). The second programme set more commercial objectives and stipulated that any PAT which did not reach these within the required timeframe would be terminated. During the first period some PATs were more successful than others. BioResearch, for example, earned £4.6m in research contracts by 1995 and had started to break even. An increasing proportion of this revenue, up to 32 percent in 1995, came from Irish based multinationals[57] (Hayward, 1997).

In 1991 the Software Programme in Advanced Technology was established by the National Software Directorate in the IDA to develop research and development facilities in the universities in Ireland which would contribute to increasing the competitiveness of the industry overall. It incorporates the Centre for Software Engineering in DCU, Multimedia Technologies Ltd. in the National Technological Park, associated with the University of Limerick (UL) and an Advanced Software Technologies Initiative incorporating research units at several universities. Multimedia Technologies Ltd. is a centre of expertise for

multimedia and was assigned the role of promoting, training and developing new multimedia products and services. By 1997 it had changed its name to 'Into White' to reflect the more creative writing and graphic design skills involved in multimedia developments. By 1999 it was proposed that the company would be sold to private investors. It is probable that with the demise of ERDF from 1999 many of the more commercial research centres will be sold to private investors or become more dependent on commercial contracts.

[57] 27 percent from overseas industry and 41 percent from indigenous industry.

Table 25 A Selection of the Programmes in Advanced Technologies, 1999.

PROGRAMME NAME	LOCATION OF CENTRES	DETAILS	OBJECTIVES
National Advanced Manufacturing Technology Programme	UCG, UDC, UL, TCD	Staff - 26 (1992) 110 projects completed 1992	The transfer of manufacturing technology to SME Irish companies
Optronics Ireland	UCD, TCD, DCU, UCG, NMRC	Established 1989 Staff-45	Project areas include methane sensing, tuneable fibre lasers, neural networks, optical switches, novel laser structures
BioResearch Ireland	UCC, UCG, DCU, UCD, TCD	Established 1987	To provide an R&D biotechnology structure
Power Electronics	UCC, UCD, UL, NMRC, DCU	Established 1992 Staff - 53 (1993)	To provide a technology service to Irish Power Electronics Industry
Teltec Ireland	UCD, DCU, TCD, UL, UCC	Established 1992	To provide an R&D telecommunications structure
National Microelectronics Research Centre	UCC	Established 1982 Staff- 77	To provide infrastructural support to Irish electronics industry, education and contract research
Software PAT			
Centre for Software Engineering	DCU	Established 1991 CSE Staff – 11	To develop an R&D structure in selected areas of software technology, which will assist in competitiveness of existing industry and attract overseas industry
Into White	UL	Into White - 17	
Advanced Software Technologies Initiative	TCD, UCD, UCC, UL, UCG, Maynooth, DCU		

By 1999 universities in Ireland were seen as an important source of basic and applied knowledge for public and private clients. Each university was developing research and innovation centres based on their particular expertise, experience and local industries. Many had succeeded in spinning-off important new companies particularly in multimedia and software. Furthermore, sectoral organisations like the Irish Interactive Multimedia Association (IIMA) in DIT and Business Technology Information Service (BtiS) in UL stimulated industry/university linkages and flows of knowledge though media channels and conferences/seminars (Jones-Evans, 1995; Jones-Evans and Pandya, 1997; Kinsella and McBrierty, 1998).

5.3 Conclusions

Chapter Four and Chapter Five illustrate that between 1960 and 1993 a high technology export-orientated manufacturing and service economy developed in Ireland without significant state investment in research and development or indigenous capability building at the firm level. Furthermore, it occurred in the context of the continued emigration of highly skilled workers, high levels of unemployment and without the existence of a significant shift in final demand, at least in Ireland.

This chapter aimed to show how macro processes of socio-economic change can be shaped and negotiated at a meso level and between a number of actors including the state, intermediate agencies and firms. It demonstrated how supply–side factors have historically been important in Ireland's transition to a 'modern' high-technology economy and major exporter of computer hardware and software. The main supply factors identified were:

1. Changes in the labour supply (education, emigration, returned emigrants).
2. The restructuring of manufacturing industry and the success of policies aimed at attracting foreign-owned high technology companies.
3. The implementation of social partnerships which restrained wage levels.

A historical examination of industrial development, industrial, cultural and S&T policies in Ireland highlights how they have been biased towards the attraction of foreign owned, export orientated and high technology firms. This has also contributed to the creation of a dual structure in the Irish economy. This is characterised by a foreign owned high technology sector of companies who located only low skill assembly and localisation facilities in Ireland and imported most of their sub-supply materials. Alongside this, and operating largely in an institutional vacuum, Irish owned firms tended to be focused on the domestic market and invested little in the generation or implementation of new knowledge. The historical mode of innovation in these companies has been the application of generic technologies imported from elsewhere. Policy development in industrial, scientific and

educational agencies and expert committees until the 1980s largely focused on supporting the activities of the strong manufacturing and foreign owned firms to the detriment of indigenous start-ups and new service industries.

While Ireland, in modernisation terms, could be classified as an advanced industrial nation by the 1980s, according to advocates of 'dependency theories' the country displayed similar characteristics to countries in Latin America and Asia. These included the existence of a two-tier industrial sector, the continued importance of agriculture and the continuing high rates of unemployment (Jacobsen, 1994; O'Hearn, 1995). A number of developments, including external economic shocks and substantial structural changes internally highlighted the weakness of this mode of economic development. Numerous reports argued for a reorientation of policy towards Irish-owned firms in high technology sectors.

A substantial increase in European financial support from 1987 enabled the development of new institutional and policy supports for service industries, science and technology. In particular the main development agencies have focused their programmes on supporting export-orientated projects in both foreign and indigenous software and IT industries. Institutional developments have included the development of specialist industrial advisory directorates on software and multimedia, industrial lobby groups and centres of research and development in multimedia technologies and applications based in the universities. Particularly the incubation and research centres in universities have been found to have placed an important role in stimulating multimedia content organisations to develop. Within government industrial development agencies multimedia hardware, software and content industries have been identified as a potential growth sector and have been defined in relation to their computer and information related functions. As such institutionally they have been placed alongside the software industry and separated from other media and cultural development programmes. Clearly the influential role of hardware and software companies and the information society and modernisation discourses have combined to produce a social consensus Ireland which has institutionalised multimedia in transmission and non-semantic terms.

In the context of a small economy the public institutional focus is clearly on export and employment growth rather than societal issues, and on the creation of undifferentiated information products rather than cultural content products. It is clear that in the present institutional set-up there is little government financial support for the development of new information products aimed at the Irish market and at fostering diversity and cultural development. It remains to be seen how these institutions, policies and the wider information society discourse shape the everyday activities of innovative multimedia content organisations.

Part Three

The Case Studies

Chapter Six- Innovation strategies in multimedia organisations and the National System of Innovation.

6.0 Introduction

The previous two chapters analysed the development and distinctive characteristics of the Irish socio-economic structure and institutional system. They also highlighted important biases in the industrial development system which tended to focus on the economic potential of industries producing information hardware and software applications for export. Within this context, multimedia content and other media organisations are defined as internationally traded information services and categorised institutionally alongside software applications and specialist information service producers. There is little consideration of the need to distinguish between different types of information and little support given to indigenous service industries producing symbolic content aimed at the 'Irish' market at home or abroad. Information services are viewed purely in economic and technological terms rather than in social, cultural or semantic terms.

The national system of innovation (NSI) approach suggests that 'the historically established structure of production conditions future learning' and 'since learning is socially embedded the institutional set-up will affect its efficiency and outcome' (Lundvall, 1995a:41). The aim of this chapter is to investigate the influence of the meso and macro level structures, outlined in the previous chapters, on both the formation of multimedia content ideas and on the process by which they become prototypes. In order to guide this investigation three elements which were viewed as integral elements in a national system of innovation by Lundvall are used: the role and form of the public sector, inter-firm relationships and the internal organisation and culture of firms (Lundvall, 1992).
Sections 6.1 and 6.2 will focus on the role of the first two elements in shaping the process of innovation at a micro level in the case studies while the next chapter will analyse the third element. These elements have previously been discussed in Chapter Three. While the NSI perspective clearly informs this analysis it is also extended to take account of the social and culturally constructed sphere in which these innovations are taking place and the influence of regional and European factors.

Other researchers have noted that 'services are all too often cast in the role of technology users who do not conduct innovative activities in their own right' (Windrum and Flanagan, 1997;1). This thesis rejects this conceptualisation and aims to supplement our knowledge of innovation in the service industries by focusing on four multimedia content producers who are producing cultural content aimed at final users both in Ireland and Europe. **Table 26** provides a summary of these case studies.

Table 26 The Case Studies

1. 'Global Technology Meets Local Content and Cultures. This case study explored how '*Compuflex*', a large multinational company, sought to move from the production of task oriented software into multimedia, and from offline CD-ROMs into online service and content provision.[58]
2. *Local Ireland*: Local Communities & Culture on the Net. This case explored attempts to develop an online multimedia service called '*Local Ireland*': an information database with a website front-end. The project aimed to involve voluntary co-operatives in each county in Ireland in the creation of content and communication services.
3) 'Social Learning via Trojan Horses': *The Virtual Museum of St Colm Cille* This case examined the development and presentation/use of the *Virtual Museum of Colm Cille*, a museum installation, CD-ROM and website centred on the life and folklore of a local saint and produced by a local community arts group.
4) The Den on the Net: Global technology, traditional media & cultural content. This case study focused on how *RTÉ*, a traditional public service broadcaster, created websites in an attempt to reach a wider Irish audience, provide alternative access to their content assets and potentially develop new revenue streams.

This sub-sectoral focus is particularly timely given the surge of attention by policy makers to the 'content industries', broadly defined: 'the new market in media products ...should also generate a whole cascade of new jobs' (Commission, 1994:104). This economically motivated attention is mirrored in the Information Society Ireland report which notes that 'the production of multimedia content is .. underdeveloped, although it promises major opportunities for early entrants' (ISSC, 1996:v). The report goes on to note that there are opportunities for 'adding value' in localisation of digital services and products - not necessarily in original content generation. Both of these quotations situate the multimedia content industries within the information society discourse but they also highlight that existing definitions and conceptualisations fail to take account of the potential social and cultural role of new media. The strategy for this area is based on a continuation of traditional industrial policy instruments, e.g. FDI rather than sector specific infant industry support.

[58] *Compuflex* is a fictional name for reasons of confidentiality.

While the ISSC report notes that Ireland has competitive advantage in technological skills, i.e. in IT and software, and a more ill-defined 'creative flair' it identifies the main barrier faced by emerging multimedia organisations as their ' limited experience in exploiting new channels such as the Internet and multimedia' (1996:42). Political economists of the media would argue that there are many more capacities needed in order to get a content product to market (Garnham, 1990; Preston, 1997). This chapter will further elucidate the barriers faced by multimedia content organisations.

6.1 Background context of Multimedia Content Innovations

This section will look at the creation of multimedia content ideas in the four case studies under examination and identify the factors which 'triggered' or acted as 'brakes' to suppress their further development. In the language of Winston (1996) it will analyse the 'supervening social necessities' and the factors which acted to suppress the 'radical potential' of the new technologies which over the research time frame influenced the activities of these organisations. In addition it will highlight the interaction and influence of the wider social sphere at all stages of the circuit of 'innovation' (du Gay, Hall et al., 1997).

6.1.1 Origination/Ideation

Throughout this research project different actors and different publications provided different representations of their project origins. This illustrates the negotiations and transformations which took place in the early part of the case studies and the problems, for both researcher and researched, in accurately recounting such developments after they have occurred. Once launched it may appear that a firm had a concrete idea at the beginning which went through the development cycle with little alteration. These cases point to the interaction of numerous shaping forces, and the uncertainties involved in the innovation process for both small and large, foreign and indigenous companies.

An important characteristic of all four case studies is the relative openness and lack of structure of the original design and product concept and the fact that the product idea came from within the company or in discussions with other third parties. This is in contrast to the traditional understanding of the diffusion of innovations whereby an 'inventor' produced a 'prototype' outside the firm and the firm then brought this product into development and to the market. It is however, a standard part of the everyday in the culture industries as they constantly search for novel ideas.

In trying to establish what 'triggered' the project ideas it was clear that the falling price of generic hardware and software solutions and the growing availability of foreign produced products and services played a role. It was also clear that all of these companies had access to international magazines and publications and had established social and personal links

through conferences, travel and emigration, with multimedia hardware, software and content producers predominantly in the United States. These networks acted as information channels which offered examples of high quality work and work practices. Given the wider take-up of the internet and CD-ROMs in the US, interviewees felt that studying that market was a good indication of the likely future development of the Irish market.

In all four cases the projects started out as very rough 'ideas' based more on what was believed to be a market opportunity rather than a concrete demand. This market opportunity was based as much on 'gut feeling' as on market analysis. In one case, *Nua*, the managing director had been hired by a national agency in 1995 to survey the potential of the Internet in Ireland and this undoubtedly informed his decision to develop his *Local Ireland* 'vision'. In the *RTÉ* case one person's belief that there was a need for a website aimed at the Irish overseas was enough to secure organisational support and enable the project to get off the ground. In *The Nerve Centre* case government moves to install internet access and multimedia PCs in every school, EU programmes supporting the production of cultural heritage projects and a belief in their own ability to produce a high quality product were enough justification. Only in the case of *Compuflex* was there apparently prior and continual formal market and competitive analysis. Despite the formal analysis undertaken by the latter it can be stated that all four cases found it impossible to predict the size of their potential market, the profile of their potential user and possible future earnings. Their multimedia ideas were seen as long term and very risky investments. They were also conceived as learning opportunities.

In part this inability to develop projections of future earnings, and future business plans relates to the novelty of the products that they were producing and the wider lack of social knowledge and diffusion of multimedia in Ireland. Despite exponential Internet growth globally and high multimedia PC sales, the market for both online and offline products was still immature in Ireland by 1995 and must compete with, or compliment, well-established brands for end users' income and time. Furthermore, as noted in Chapter Four, the sales of entertainment goods, rather than services remain high in Ireland. These wider social factors had implications for the initial development of project ideas, the search for funding and the extent to which the companies had to undertake market development activities.

The three companies who were producing products solely for the Irish domestic and diasporic markets also faced considerable barriers which were beyond their control. A 1997 OECD report noted that Ireland had the highest peak time telecommunications charges in a selection of countries, which was seen as a considerable barrier to internet growth in companies, schools and libraries (TSPC, 1998:34). When the concept for *Local Ireland*, *the Virtual Museum of Colm Cille* and the *RTÉ* websites were first developed (1991-1996) there was little Internet usage outside of academia and computer societies in Ireland. Indeed a

directory of Irish and international online information service published in 1992 contained no mention of the Internet (Telecom Eireann, 1992). All three therefore 'hoped' to exploit part of the much publicised 70 million Irish diaspora created by over 100 years of emigration.

Accurate and independent figures on internet growth in Ireland between 1991 and 1998 are not available and could not have informed the concept development of *RTÉ* and *Nua*: two companies who wished to produce internet sites for Irish people. A survey of ISPs conducted in 1995 estimated that 4,800 companies in Ireland were connected to the Internet and 1,800 private users (McGovern, 1996). A survey of the top 500 companies in Ireland conducted by MIDAS-Net in association with *Nua* Ltd. in 1997 found that 74 percent of those who responded [n=210] had internet connections and 42 percent had their own website.[59]

A year later an online survey of business users by the Irish Internet Association (IIA) found that shopping online was growing with software and music products the most popular purchases. One in four users also accessed electronic news services several times a week. Indications from this survey were that the Internet was still a minority product with the majority of users characterised as ABC1, third-level graduates and primarily male, although female usage was increasing. Interestingly for this case study slow access was cited by the IIA survey as the single most critical issue facing end users. The cost of online access in Ireland was a major factor influencing the initial and subsequent design and content of both the *RTÉ* and *Local Ireland* websites. Both of these sites kept video, high resolution images and sound files to a minimum in order to keep download times fast.

To date there has been no independent survey of Internet usage in the home. Proxy measures of usage produced by the OECD, i.e. measuring Internet hosts per thousand inhabitants, place Ireland 16th out of 28 countries. The top three countries were all Scandinavian countries and those below Ireland included Belgium, Spain, Portugal and Greece (ISC, 1998). A survey by a consultancy firm in 1998 led to newspaper headlines pronouncing 'Irish Internet home users lagging behind EU average.' The report estimated that there were 300,000 people using the Internet in Ireland, but two thirds of these did so in work. Again high telecommunication charges were cited as one reason for this (Lyons, 1998).

With little guarantee of a return on investment it is clear that extra-economic factors were an important 'trigger' in terms of stimulating the innovations under consideration, particularly for those organisations producing products for the Irish market. In three of the four cases various forms of patronage were used to finance the projects, a strategy with a

[59] www.midas.ie/2ndsurvey.html

well-established history in the culture industries (Williams, 1981). Industrial innovation programmes funded none. *RTÉ, Nua* and *The Nerve Centre* justified their projects in 'public service' or cultural/nationalistic terms. For *RTÉ* their websites were an experiment to gain knowledge about new media and capture space for Irish producers in an increasingly competitive and liberalised audio-visual space. For *Nua* their online service aimed to draw upon the voluntary efforts of people all over the country to help overcome rural depopulation and archive, express and renew particular aspects of a 'threatened' traditional culture. For *The Nerve Centre* the CD-ROM project drew upon what became known as the peace 'dividend', i.e. State and EU investment in Northern Ireland to reverse the economic and cultural stagnation which had both caused, and was a result of, the civil conflict of the past thirty years.

For all of the cases the projects under study were 'flag-ship' projects. They were undertaken to simultaneously learn how to produce such projects, i.e. learning-by-doing and to demonstrate to competitors and others their capabilities. This demonstration of 'plumage' is particularly characteristic of the cultural field where 'competition often concerns the authority inherent in recognition, consecration and prestige' (Bourdieu, 1993:7). This achievement of both knowledge and recognition can also be seen as a form of symbolic capital. The degree of symbolic power is related to one's social status and recognition. In the case of a more established company like *Compuflex* this was achieved through capturing market share. In the case of *Nua* and *The Nerve Centre* they both strongly publicised awards they had achieved for artistic achievement and design work. In all cases the initial rationalisation for embarking on a multimedia content innovation project did not emphasise economic returns or profitability.

6.1.2 The Role of the Public Sector and National Context

An analysis of the gestation period of the design concepts highlights how certain institutional features and policies in the Irish context shaped, by their intervention, or lack of it, the nature and form of these new content developments. In the case of *Compuflex*, the multinational case studied here, state institutions and certain national characteristics were certainly influential in attracting them to locate in Ireland. However, it appears that they had little influence on the functions and type of innovative work which was conducted within the company once it located in Ireland. With regard to the other cases there were clear institutional and programme biases between the supports available to support innovation in the traditional media and those available to support new media innovations. Further it would appear that new media innovations aimed at the export market were more likely to receive funding than those aimed at the domestic market. Clearly while traditional media are valued for their role in national and social integration; new media are not.

Example 1

In the case of *Compuflex* the Irish government and industrial agencies were instrumental in developing incentives and infrastructures to attract such companoies to Ireland in the early 1980s. As a low wage location Ireland was an attractive proposition for a globally mobile operation. Interviews indicated that state assistance in financial and personal terms, the availability of a well skilled workforce, and access to the EU market contributed to its decision to locate in Ireland. It was also apparent that Government investment in education and the activities of certain industrial agencies like the IDA were crucial. Today the company employs over 1,000 people in Ireland in product localisation, distribution and marketing. The company employs 25,000 people worldwide and net revenue for 1997 was $11,360 million, 60 percent of which was from overseas sales. The company contributes significantly to both employment and national wealth in Ireland, the two main objectives of industrial policy (See Chapter Five).

However, if one examines more closely the activities conducted within this branch plant it becomes clear that the firm conducts no product development and relies heavily on headquarters in the US for strategic decisions and products to localise. Indeed the *Compuflex Network* (*CFN*) team had no authority to develop strategy and no budgetary autonomy to implement it. They were crucially dependent on commissions for localisation work from affiliates in Europe and work sent from the US. The nature and structure of this team meant that they could be redeployed or made redundant quickly and 'efficiently'.

The company has undergone quite fundamental transformations in its operations and sub-supply networks over the twenty years that it had been in Ireland. Even after this period of time it was not clear, despite assurances from interviewees, if the firm have become 'embedded' in the locale. Their lack of autonomy, lack of key strategic functions, dependence on headquarters and turnover of staff would suggest not. Further, there was no interaction with Irish institutions during the development of new products and services. In this global firm even the Irish content on the 'UK and Ireland' *CFN* site was developed in the UK.

Despite the apparent autonomy from the wider institutional structures the company is actively involved in shaping industrial policy through its involvement on expert policy advisory committees including the ISSC and the ICSTI. *Compuflex* have financially supported strategic projects including the distribution of free software to all schools, sponsorship of the multimedia centre for the Arts, ArtHouse, and support for alternative training and back-to-work schemes such as the 'Tramlines' project in Ballymun. Many of these activities may point less to a social conscience than to public relations initiatives and a desire to ensure that the country continues to provide an attractive environment for global capital and a plentiful supply of skilled labour. While the firm has established a considerable

network of influence in the country it is clear that the relationship is asymmetric and that the state could not influence the company's product strategies or its long term stay in the country. This case echoes the conclusions of the Telesis (1982) and Culliton (1992) reports which argued that foreign owned multinationals were not contributing as much as expected to the growth of indigenous industries or conducting much research and development in Ireland.

Given the intention to re-orientate industrial policy more towards indigenous companies and intangible assets this decade, (see Chapter Five), one would expect that national institutions would be actively seeking to support indigenous innovation. The evidence from this research project points to a clear separation in policy terms between how agencies and government treat traditional media and new media companies. Furthermore, it highlights how industrial supports are targeted at specific sectors and are functional rather than project based. Thus while there may be funding available for start-up enterprises, capital needs and research and development there is little funding available for existing companies who wish to develop a specific project, particularly one concerned with content rather than technological tools or infrastructural innovations. The lack of funding for new media content production and the lack of attention given to public service, diversity or social issues reflects the conceptualisation of multimedia as a software and internationally traded service; as an 'economic' rather than a 'cultural' entity. The impact of this conceptualisation is clear when we contrast the regulatory activities of government in relation to content production in the traditional media with their approach to content production for new media.

Example 2

Radio Telefis Éireann (RTÉ) is the national monopoly broadcaster and largest producer of audio-visual programming in Ireland (Kerr 1997). It is an example of an organisation deeply shaped by the national context in which it operates as well as subject to increasing external forces. Established initially as a radio broadcaster, 2RN, in 1926, it was imbued by government statute with public service ideals, which included a directive to develop programmes which would assist in the development of an Irish national culture. In order to ensure that specific content is produced the service is funded by a mixture of licence fee and advertising revenue.

> 'A nation cannot be made by Act of Parliament; no, not even by a Treaty. A nation is made from inside itself; it is made first of all by its language, if it has one; by its music, songs, games and customs....so while not forgetting what is best in what other countries have to offer us, we desire to especially emphasise what we have derived from out Gaelic ancestors - from one of the oldest civilisations in Europe, the heritage of the Os and Macs who still make up the bulk of our country.'
>
> (Dr. Douglas Hyde, opening 2RN, 1926) (Cited in Gorham, 1967:24)

Historically this service has distributed both imported and home produced programmes, and for some has played an important role in the modernisation of Irish society and traditional values (Lee, 1989; Gibbons, 1996). While home produced programming is popular as with other small national broadcasters the economics of the global media market dictates that over 70 percent of programming is produced abroad. Today *RTÉ* transmits three national television stations, five national radio stations and one local service in Cork. The services are provided by a terrestrial distribution system to houses throughout the Republic of Ireland with spill-over into the north of Ireland. In addition the organisation sells packages of Irish produced programmes abroad to countries with large Irish emigrant populations: the US, the UK, Australia and New Zealand. The organisation is regulated by an independent authority appointed by the Government.

Since 1989 there has been a myriad of government and consultation reports which have attempted to define the 'cultural industries' and calculate their economic value (Hazelkorn 1997). Subsequent legislation has attempted to produce a fertile seedbed for audio-visual production by both foreign and indigenous companies, and to break the monopoly of *RTÉ* by licensing competing private television and radio stations. The Radio and Television Act, (1988), established the Independent Radio and Television Commission (IRTC), whose first task was to license national, local and community radio stations.[60] Further acts forced *RTÉ* to spend an increasing proportion of their revenue on independent productions and support the new Irish language channel, Teilifis na Gaeilge (TnG). By 1997 the three main sources of funding for new audio-visual productions in Ireland were Section 481 (tax relief on investments in film) which provided over 70 percent of the total funding available, Teilifis na Gaeilge and in third place *RTÉ*. The Irish Business Employers Confederation estimated that 19,279 people were employed on film and television projects in 1997 (www.iftn.ie/finance, June 1999). Clearly policy has come to recognise the economic role of the traditional media but at the same time continues to legislate for diversity and to support the production of Irish programming.

In the light of the increasing regulation by government and competition from global media organisations like CNN, BskyB and the BBC, it is evident that there are a number of both local and global factors shaping developments in *RTÉ*. As an employer of over 2,000 people and a major funder of independent production the organisation has not adopted a defensive stand in relation to regulation. In order to influence future policy the organisation has representatives on the Information Society Commission and the Irish Council for Science, Technology and Innovation. It has also been active in formulating position papers

[60] While extensive research is not available, it has been suggested that many of the new services have not generated greater plurality and content diversity but rather have been marked by a high degree of content standardisation. (Preston, 1993)

and policy recommendations on digital television and the evolving new media environment. These have tended to take a cultural and public service perspective on the role of *RTÉ* in relation to the nation state.

> '...digital broadcasting raises questions going far beyond technology ... Most urgent among these considerations is the imperative of ensuring that the introduction and use of digital broadcasting are identified as matters for determination by, and for, this community, rather than being left to the initiative of external agencies and transfrontier forces. Issues of control and competition, regulation and monopoly are now emerging in unprecedented ways and Ireland, along with the smaller and medium sized European counties will need to address the questions affecting public interest in the digital era.' (*RTÉ* 1995:2)

RTÉ's move into online service provision must be viewed in this context and as an attempt to both support existing services and develop potentially new revenue generating services. The content and form of their service, which will be dealt with in the next chapter, clearly reflect the public service ethos of the organisation and their embeddedness in the Irish social and cultural context. The establishment of an online division in the organisation between 1996 and 1998 was funded by the organisation from profits made in other areas and triggered by increasing competition and regulation.

Both *Compuflex* and *RTÉ* are large organisations with successful portfolios of products and an established reputation in their traditional area of expertise. They were also able to invest in new service innovations drawing upon their own capital resources and therefore were more independent from, but not entirely autonomous from, the public institutional support system. Clearly the extent of innovation in Compuflex was limited given that it was a branch plant and new product development took place at the company's headquarters in the US. By contrast, the increasing liberalisation of the audio-visual sphere by government and global competition meant that *RTÉ* was forced to highlight the culturally specificity of its content and experiment with alternative forms of production and distribution. Both cases are examples of unintended outcomes of institutional support structures and policies.

6.1.3 Financing the Project - Private Capital

The extent of official policy and attention given to traditional and indigenous content production and hardware and software FDI is starkly in contrast to the policy and supports available to the two new media projects under study. These cases serve to illustrate how fragmented policy making structures are in Ireland and how the existing institutional supports are focused on manufacturing and internationally traded services (ITS). New service industries that wish to produce educational and cultural content aimed at the Irish market tend to fall between government departments, government agencies, programmes and supports. The respective histories of these case studies are replete with rejection letters

from funding agencies and protracted negotiations with potential funders. It is clear that the institutional support system and financial system act as barriers which fundamentally re-shape and slow the rate of innovation in certain sectors.

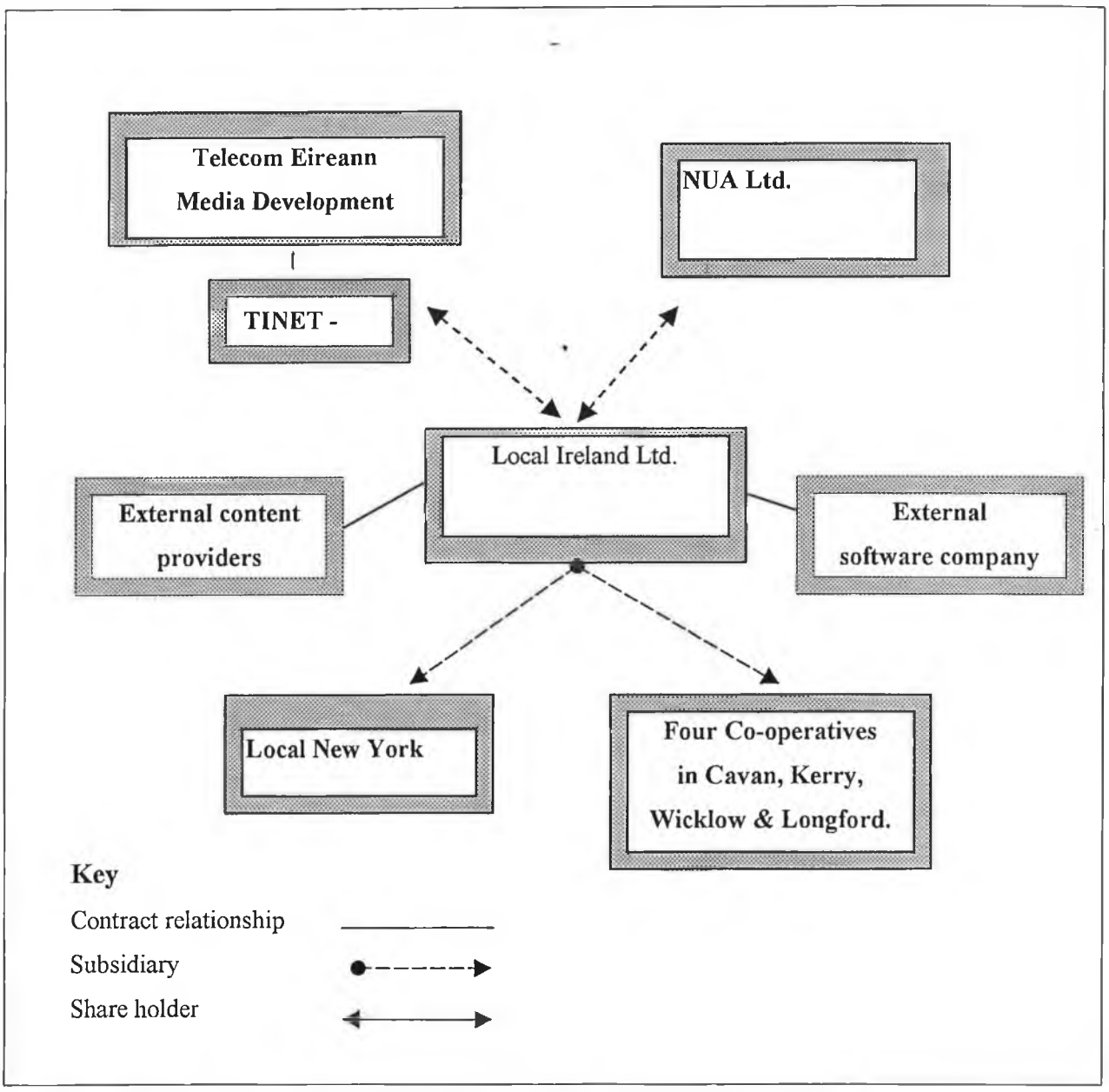
In the case of the *Local Ireland* project, negotiations for funding with a large semi-state organisation so delayed developments that in the two years during which this case was studied only a prototype information structure and four co-operatives were established. The website was thin on content and the co-operatives had little equipment or training. Furthermore, the original concept for a community based co-operative structure of content creators evolved into a county based network of information standards bodies. **Table 27** summarises how the concept for *Local Ireland* originated as 'Virtual Ireland' and emerged in writings by the company director in 1995. It evolved through informal online discussions in newsgroups and public presentations. As a community based project it was envisaged that it would only come to fruition with state support. *Nua Ltd.* an Internet consultancy firm was formed in 1995 with assistance from Forbairt and the Irish Trade Board. Over the next two years however the company moved away from public institutions and, with *Local Ireland* in particular, towards finding a substantial commercial investor. In the words of one interviewee the company just 'wanted to make money'. When asked about the possibility of getting European funding for Local Ireland the company was disparaging of the bureaucracy involved, the timescales and the need to take on board partners which would make management of the project even more difficult.

Between 1995 to 1997 there was continuous negotiation between *Local Ireland Ltd.*, *Nua Ltd.*, Telecom Eireann (TE), Information Mosaic and the co-operatives and this consensus building led to the transformation of the *Local Ireland* concept. It was clear that these negotiations exasperated the project managers, two of whom departed. While *Nua*, as an internet consultancy and website design company, expanded to employ 21 people by 1998 *Local Ireland Ltd.*, a distinct entity, still only employed three people and relied upon volunteers in the existing co-operatives. From March 1997 to Sept. 1997 the negotiations were taking place on two levels: between *Local Ireland Ltd.* and Information Mosaic on developing a usable and user friendly software interface and between Nua and TE on the development of a suitable business plan. Meanwhile Microsoft invested $75 million in a competitor called CitySearch.

Table 27 Timeline of the Local Ireland Project

1995	*Ireland: the Digital Age the Internet* written by Gerry McGovern for Forbairt. Concept of Virtual Ireland included.
July	Virtual Ireland: a market on the global networks? Article by Gerry McGovern published in The Sunday Business Post, newspaper.
August	Managing director of Kilanaleck Information Technology Office (KITO), Cavan e-mails McGovern proposing the creation of a multimedia archive of cultural heritage products that might be marketed using the internet.
Sept.	Nua Ltd. formed.
Oct.	Community conference in Cavan. Gerry McGovern invited to speak.
1996 Jan/Feb	CavanNet launched by Kilanaleck district group in association with Nua.
April	Community conference in Longford. Gerry McGovern invited to speak. Local Longford co-operative group emerged.
	Local Ireland website developed. A project manager, programmer and editor are employed specifically for Local Ireland.
1997 Jan/Feb	Telecom Eireann invests £150,000 in project. Local Ireland Ltd. established
March	Call for tenders to develop database software.
May	Database Tender awarded to Information Mosaic.
October	First project manager leaves project and company. Project consultant takes over as project manager.
Nov.	Acceptance testing of software. Second project manager leaves project.
Dec.	New Business plan agreed between Nua and Telecom Eireann.
1998 Jan/Feb	New information management software produced in-house to replace software developed by sub-contract firm.
July	Telecom Eireann investment of £4 million announced publicly. New project manager appointed.
October	National Launch of 'Local Ireland' in County Cavan.

Figure 4 Actor-Network in the *Local Ireland* Project.



The negotiations between Nua and TE were to have a crucial impact on the overall vision and concept of *Local Ireland*. By 1997, and following the development of a major website for TE, the latter became involved in the project investing money (£1.5 million) and providing crucial access to infrastructure via its Internet service provider subsidiary, TiNet. This funding enabled the project to establish *Local Ireland* as a separate limited company and to employ more fulltime staff. In addition, the project issued a call for tenders to develop a database structure which would manage all the information accessible via the website.

TE had established TiNet in 1996 and a year later a media development division was established. This division was effectively an in-house R&D laboratory whose job was to

create content which would enable the company to test out new technologies and services.[61] By early 1998 the group had produced a music/dance website, an Irish language website, a listings site and were preparing to launch a news site.[62] These sites were attracting advertising from large companies like Guinness and had been involved in joint initiatives with entertainment venues in Dublin. The content on these sites was described by one interviewee as 'throw-away' content, and substantially different to the content which it was envisaged would be developed for the *Local Ireland* site.

The development in 1997 of online content development competencies within TE and the increasing commercialisation of the company as foreign companies became investors and managers greatly influenced the changing relationship between TE and *Local Ireland*. While initially TE had been very enthusiastic about the project a number of personnel and organisational changes meant that the original community based and largely unstructured concept was unacceptable to the company one year later.

> 'the objective is to create a single brand for Ireland and Irish things on the Internet....to achieve that through a structure which involves all the counties in Ireland and co-operatives being set up within those counties and they would be representative of all the main publishers or content providers, or county councils, or Leader groups, or historical societies or schools and that's what *Local Ireland* will do is provide the superstructure for the information....'
>
> (Gerry, managing director, *Nua*)

Many of the problems incurred during initial and subsequent development stages highlight the difficulties involved in working in partnership with, or contract with, other organisations whose concerns, agendas and interests are not necessarily compatible. Clearly, the Internet group in TE were dismayed at the lack of editorial and content controls envisaged by the original *Local Ireland* concept and the organisation was not convinced by the co-operative idea. Nua, as a multimedia start-up company was unable to persuade TE to accept their community-based vision for the online service.

While these negotiations were ongoing content developments were suspended. In the summer of 1998 it was announced that TE was to invest £4 million in the project and adapt the concept and structures to complement their existing 'Information Age Projects'. It was apparent from conversations with employees that the investment was not to go into the co-operatives but rather was to be spent on software development and marketing. The original community orientated and content orientated objectives would appear to have been subsumed by a desire to create a commercial website to exploit the 'Irish' brand name and to tap into the potentially huge emigrant Irish market.

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[61] Content developments within the company were viewed as R&D.
[62] See www.muse.ie

In late 1998 it was announced that a network of information standards bodies were to be developed in every county in Ireland and replacing the co-operatives. The *Local Ireland* project was heralded by the Minister for Science, Technology and Commerce as an 'historic initiative' which had developed a system 'based on the highest international standards of information management' and which would allow people 'easier access to information and ..make it easier for commerce' (April, 9th Government press release). E-commerce and information management had replaced the focus on content and community envisaged by the original concepts in 1995.

The 'troubled' history of this project points to the increasing dominance of an economic and technological information age discourse and the fact that new media projects are valued solely in industrial and commercial terms with little recognition of their social and cultural role. *Local Ireland* evolved from a community based rural regeneration project to a 'commercial' online service, which would commodify information and standardise it according to international information standards. While one might expect that a project which sought investment from a semi-private company would be transformed into a more commercial operation it is interesting to contrast this with a project which was funded by public money.

6.1.4 Financing the Project - Public Capital

Producing a 3D virtual reality CD-ROM is quite different from producing a reference type CD-ROM or a standard website with 'throw-away' content. The former requires a much longer development cycle, not unlike publishing a book, which once launched remains a static product. A website, by contrast, is a continually evolving product whereby upgrades and updates can be incorporated easily. The development cycle and time-to-market is much shorter and incremental changes are regular. These characteristics mean that in terms of planning, design and distribution the two are quite different. Producing a game-like interactive CD-ROM requires considerable prior investment of capital and time. *The Nerve Centre's* case is marked by a much longer concept development and pre-production period (1995-1997) as well as a longer production period (1997-1999) than the other three cases examined.

In all four cases the initial idea or concept was clearly championed by one person. However the development of this concept into a prototype was always a collective process. *'The Virtual Museum of Colm Cille'* arose from two distinct but mutually compatible needs. *The Nerve Centre*, a small arts and community centre in Derry, Northern Ireland was looking for a suitable subject in 1995 which would allow them to exploit the potential which new multimedia technologies offered and develop their capabilities in this area. The availability of EU funding for cultural heritage projects was a further influence. On the other

hand the local museum was looking for innovative new ways to get young people interested in local history. In the meeting of these two actors with distinct but compatible objectives a technology found an application. This 'application' however evolved, mutated and changed as the various actors struggled to define it.

Prior to the prototype being developed *The Nerve Centre* set about enrolling the director of the local museum, building trust and defining the role that each might play in the project. The director, an authoritative historian and author of a book about Colm Cille, admitted that before this project he had little knowledge of either computers or multimedia. Indeed he admitted to a certain fear of computer technology. After a few brainstorming sessions with *The Nerve Centre* he was convinced that the only way to help people to overcome their technophobia was to make the technology as transparent as possible and the content as engaging as possible.

> 'I was very anxious that here is a new technology that is going to be everywhere shortly, that most people, certainly of my age, are terrified of..and that if we were going to learn about it at all we need a subject, ...a subject which we were interested in .. and that would break the ice a bit for us in terms of using the technology.... young people take to it, so hopefully they would learn a bit about that part of their traditional culture, through a medium which is immediately accessible to them.'
>
> (Barry, historian, *The Tower Museum*)

The Nerve Centre initially suggested that they use these new technologies to present stories from local cultural heritage. Clearly this targeted enrolment was prompted by an awareness of European funding programmes. This would enable them to finance, not just the production, but also the necessary equipment, which could then be reused for other projects. In order to get this finance they would need both expert partners and access to archival materials. The director of *the Tower Museum* offered both. *The Tower Museum*, as an award-winning centre, offered a prestigious platform on which *The Nerve Centre* could 'piggyback' in order to present their work to both a local and international audience. A successful project here would help to build social status with local council members who controlled the dissemination of Peace and Reconciliation European funding (approx. £5 million) [63] to educational, cultural or entrepreneurial projects.

> '...in a sense you can call it colonisation..it is about us trying to colonise space and say look this is a space where people can go and see this is what *The Nerve Centre* is all about. This is the best place in town...the jewel in the Council's crown.'
>
> (Michael, director, *The Nerve Centre*)

Initial meetings involved both discussing and demonstrating the potential of multimedia technologies. Since *The Nerve Centre* had little computer equipment themselves at this stage

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[63] In *The Nerve Centre's* case all amounts of money are in pounds sterling.

they called upon colleagues in the nearby technical research centre of the local university to demonstrate existing and experimental multimedia products and services. The close relations between the university and *The Nerve Centre* were initially important in relation to obtaining access to the latest technologies but later the university provided staff with the necessary skills. Unfortunately for this area this research centre was subsequently closed due to financial and internal 'political' problems. In the main the staff emigrated to London to pursue their work in multimedia, depriving *The Nerve Centre* of an important resource.

Colm Cille as a subject was both topical, with the 1400th anniversary celebrations imminent and opportune given that the local council was looking for innovative new ways to engage young people in the celebrations. Multimedia technologies would also allow the Council to do what they had failed to do physically. For copyright, financial, ownership and logistical reasons the Council had failed in its attempts to organise a grand exhibition to coincide with the celebrations. The director of the museum had feared that this failure would mean that Colm Cille would remain an academic subject with the general public failing to appreciate his significance. Thus from the outset the project was aimed at both young and old audiences. It was conceived as both an entertaining and educational project which would be culturally familiar but technologically sophisticated and 'modern'.

Initially *The Nerve Centre* was hesitant about choosing a local religious figure as the subject for their project. Local politics, nationalism and culture being so intricately intertwined in Northern Ireland religious subject matter was bound to result in recriminations from one political community or another. The only solution it was decided was to focus on Colm Cille not as a Saint, but rather as a cultural and artistic leader. The Saint and his legacy was therefore re-conceptualised and 1400 years of cultural tradition and artistic objects provided not only rich content assets for the multimedia designers but also much 'cultural capital' for the promotion of the project with powerful local agents.

> '...the subject is fantastic..it has religion in it clearly...[but] it has iconography. it has wonderful art, ..it has fantastic literature, it has beautiful poetry, it has fantastic fairy stories, it has marvellous history... in fact not only is it the best way of showing them, it may be that the only way of actually reproducing them .. you can kind of match technology and creative possibilities to the subject.'
>
> (Barry, historian, *The Tower Museum*)

This content strategy helped to 'tame' the unfamiliar technology and begin a process of acceptance or domestication in the sense proposed by Silverstone and Morley. *The Nerve Centre* called this their 'Trojan Horse' strategy.

> 'our whole .. focus from a few years back was to go to the local cultural things and really use those as little 'Trojan Horses' and do the local institutions and the local education authority, all sorts of people who we feel should be influenced in some sort of way, the public sector in a sense, about the multimedia and its future potential

> ...take the things that they .. see as treasured part of their tradition, in Derry terms Colm Cille is the big one'
>
> (Michael, director, *The Nerve Centre*)

Enrolling the director of the local museum in the project was only a small part of the constituency building that *The Nerve Centre* needed to do in order to secure funding. Financing and equipping a company with the necessary hardware and software, hiring or training up staff, securing rights to content assets are only some of the barriers encountered by a multimedia start-up. An analysis of the search for funding for the Colm Cille project highlights the bureaucratic barriers which shaped the content and organisation of the project.

The table over-page illustrates the extent to which *The Nerve Centre* and associates went to get funding. One could argue that perhaps the project was ill defined initially and without a clear target audience it was difficult to persuade funders, either educational, economic or cultural to support it. However *The Nerve Centre* found that when they applied to the Department of Education (DoE) in Northern Ireland for money to fund the multimedia project their submission was rejected because it did not show how it would deal with disadvantaged school children. It took 13 months to receive this reply and then they were invited to reapply with a modified concept. In the meantime, production on the project began using existing resources. From Sept. 1997 at least two people (one in Derry and one in Germany) worked almost full time designing the '*Virtual Museum*'. The associate in Germany was working on the project out of 'goodwill' having worked with the centre on previous projects. Subject experts in the local museum were also writing scripts and actively researching content 'assets', i.e. images and text.

Table 28 Timeline for Developing the Virtual Museum of Colm Cille.

Summer 1995	- Initial ideation. - Approach by The Nerve Centre to the director of the Tower Museum.
Jan 1996	- Applied for funding to the Department of Education.
Summer	- Applied to local District Partnership for EU money under European Peace Fund Programme.
September	- 3-D designer in Derry started working full-time on designing the museum rooms. - 3-D designer visited associates in Germany for six months. - Multimedia programmer hired to work in *The Nerve Centre*.
November	- German designer visited Derry and taken on a tour of historic sites.
January 1997	- Informally heard they were not getting District Partnership money. - New Peace Fund launched, administered by Co-operation North, a gov. agency. - Approached by IRDL, Letterkenny and Donegal county museum.
February	- District Partnership submission turned down, officially, because it was too cultural. - Department of Education submission turned down because it did not show how they would deal with disadvantaged school children. - Applied to Co-operation North for Peace Fund money along with partners in Letterkenny and Inishowen. - New project orientation: cross-border, cross-community and more educational and commercial.
March	- Received £10,000 from Museum council and Derry City Council for project.
April	- Co-operation North submission sent to independent advisors in Dublin who made recommendations relating to costs and duration of development.
June	- Produced demo for Colm Cille Celebrations in Derry, 9-12th June. - Presentation in the Tower Museum cinema. Monday pre-booked by local primary and secondary schools. - Received £133,000 from Co-operation North to produce *The Virtual Museum of Colm Cille* and to develop an educational outreach programme.
June 1999	- Anticipated final production deadline

During the 13 month wait for a reply from DoE the centre turned to their local city council. *The Nerve Centre* was successful in obtaining £160,000 towards a new multimedia building but again the virtual museum project was rejected. This time it was seen as too 'cultural' and insufficient in its attention to local disadvantage. Again their submission did not match the selection criteria.

> 'Even though they were saying that the EU's Peace Programme was all about innovation, new thinking and new cross community things...they [local organisation] put a different inflection on it.., which was about disadvantaged neighbourhoods. they [the Council] orientated it as a real social programme...I can actually go along with that to some extent except the frustration of having worked for over a year..'
>
> (Michael, director, *The Nerve Centre*)

Another barrier was the lack of computer or multimedia knowledge generally and amongst the funding bodies. *The Nerve Centre* was faced with two considerable tasks; to help diffuse knowledge about computers and multimedia amongst powerful actors and potential funders, (teachers and councillors amongst others), and a need to build up their own reputation.

> '...we have the Western Education Library Boards, that is the local education board here, [one] adviser [on it] didn't know what a web page was. These are the educationalists who are pushing the whole educational policy...and you start to talk about interactive multimedia, ...so it is a learning thing, from that point of view it is like a mission you have got to almost proselytize people.'
>
> (Michael, director, *The Nerve Centre*)

In order to enlist these groups and overcome the barriers identified above the *The Nerve Centre* embarked upon five distinct but interrelated strategies to;[64]

a) Develop an advanced prototype and make the technology as transparent as possible.[65]
b) Use a well-known local 'hero' as the basis for the narrative.
c) Enlist teacher support through workshops and an outreach programme.
d) Enlist local councillor support by demonstrating public support, interest and use.
e) Publicise their work though high quality brochures, at exhibitions and festivals.

It became evident that the main barriers faced by this project went beyond the lack of local enterprise support structures to more widespread social reasons. There was a lack of computer literacy locally and a lack of understanding as to how relevant this product might be to people who had more immediate social problems relating to local housing and human

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[64] These are the strategies that the author has identified based on interviews and participant observations. They were not clearly demarcated and planned in this manner by *The Nerve Centre.*

[65] As with any radical new ICT innovation, which requires content to be able to demonstrate its capabilities, a prototype or demo was required in order to illustrate abstract concepts such as multimedia, interactivity, and gaming.

rights. There was also a negative perception about 'computers', 'gaming' and indeed *The Nerve Centre* given their origins in rock music and video production.

The first funding for the *Virtual Museum of Colm Cille* came from the Museum Council of NI in February of 1996 and in order to get this funding of £5,000 it had to be matched by the Derry City Council. The need for the City Council to include young people in the 1400th anniversary celebrations of Colm Cille seemed to provide enough justification for the council. This funding enabled a prototype to be developed which was presented in the local Tower Museum during the Colm Cille celebrations in 1997.

This presentation coincided with a successful bid for funding from Co-operation North. Co-operation North is a registered charity, established in 1979 to promote 'practical co-operation' between the counties of NI and the six bordering counties in the Republic. This organisation was chosen to manage and administer part of the European Union Special Support Programme for Peace and Reconciliation 1995-1999, which dealt with Cross Border business and Cultural Links. This mixture of business and culture criteria enabled the Colm Cille project to make a successful funding bid.

In order to receive this funding *The Nerve Centre* needed to acquire both cross-border and cross community partners. They also needed to develop a programme of activities which would promote mutual understanding between Republican and Unionist traditions and contribute to the establishment of sustainable networks for both business and cultural activities. Representations by *The Nerve Centre* to the county museum in Letterkenny, Co. Donegal proved successful given the prior involvement of the prestigious Tower Museum. In addition, an unsolicited representation from *Inishowen Rural Development Ltd.(IRDL)*, a company set up under the EU's Leader programme to develop IT training skills in Inishowen, provided another partner. These partners however were unable to contribute much to the development of the actual CD-ROM product given that they were chosen for their geographic location and not their multimedia capacities. The 'imposed' nature of this network caused considerable management problems for the project once in development.

6.1.5 Changing Discourses

A number of developments during the period when this research was conducted have contributed to a wider social awareness and discourse on new technologies and the 'information society' in Ireland. The focus in these developments however is firmly on the technology and an undifferentiated concept of information rather than on society, community or different types of content. The strategies for action again focus on technological solutions including the need to invest in infrastructure and skills which will attract more foreign direct investment. This discourse should be seen as Ireland's most recent attempt to promote a new 'technological vision' and achieve some sort of societal

consensus on the future. This in turn influences perceptions about the legitimacy of innovations in certain areas and not in others. It can be viewed as part of the social context which acts to shape and place boundaries around the innovations under discussion.

In relation to a wider discourse on new media the publication of Ireland's Information Society strategy in March 1997, the establishment of a full-time Information Society Commission and five advisory groups: awareness, infrastructure, learning, enterprise and government is noteworthy and provided a level of government attention to the issues involved. Perhaps a more important development in relation to generating widespread involvement and media coverage was the TE 'Information Age Town' competition in September 1997 which saw one town in the west of Ireland, Ennis, being awarded £15 million pounds worth of IT equipment, internet connections and training. In preparation for this competition 51 towns produced their own information society visions and the local committees behind these submissions provide an important entry point for the establishment of co-operatives for the *Local Ireland* project under study. As mentioned earlier, the *Local Ireland* project itself became an Information Age project for TE.

While this chapter has already noted the low level of internet usage in Ireland surveys of primary and secondary schools in Ireland (4,000) between 1994 and 1997 found that many were without the most basic level of computer facilities (August 12th 1996, The Irish Times). An Irish National Teachers Organisation (INTO) survey in 1994 found that the average number of computers per primary school was 2.7 and that 60 percent of schools had financed their computers themselves. A submission by the Department of Education to the ISSC in 1996 drew upon an extensive survey and noted that most computers in schools were not powerful enough to run multimedia applications.

These surveys resulted in the *'IT Schools 2,000'* project, a £25 million allocation of funds towards the technological upgrading of schools in the Republic and with the assistance of TE, Internet access in every school. This has allowed many schools to purchase additional hardware and software but offered little assistance towards training and supporting teachers. Furthermore, with a dearth of software developed for the Irish curriculum most of the new media content is generalist. The centre charged with developing such software in the Republic, the National Centre for Technology in Education (NCTE) has a very small budget and must rely on localising products developed elsewhere.[66]

It is apparent from this brief summary of developments that while the four case studies were trying to obtain funding for their content projects the government and some large industrial organisations have begun to promote the 'information society' concept. They have developed government programmes funded, uniquely for Ireland, by a mixture of private

[66] In conversation with the author.

and public finance, updated legislation (copyright and freedom of information bills) and tried to develop supports for enterprises developing new information related services. However, it would appear from an analysis of developments on the ground that while they have succeeded in installing equipment in schools and libraries they have done little to support training, content development and use.

A close examination of Ireland's information society vision finds that the information society is viewed primarily, and narrowly, as an economic opportunity; one which demands infrastructure and fiscal supports aimed at encouraging export orientated companies and educational changes to facilitate preparing school children with the necessary skills for these companies. An example of this policy focus has been the liberalisation of telecommunications, which has to date meant cheaper international calls but more expensive local calls. The new information society vision when unveiled reveals a government-industrial push for greater profitability and competitiveness at the expense of public service and social obligations.

It is only in the area of broadcasting where we see some government and media discussion of the need to provide an affordable and regional public service in order to balance the new commercial and digital service providers. There is little discussion outside of academia about the merits of providing local communities with Internet access points or encouraging the growth of community Internet groups or new social communities (Ó Siochrú, 1996). EU programmes, like Horizon, have supported what initiatives have taken place. However their life span tends to be limited. The prevalence of 'consumer' as opposed to 'citizen' in national policy documents is instructive in this regard. In this context the concept of a *Local Ireland* information infrastructure and co-operative access in every country in Ireland appears somewhat idealistic and utopic.

6.2 Networking and Learning

The previous section dealt with the process of concept origination, consensus building and how the local and national social and institutional structures impinged upon the innovation process. It noted how the activities of these cases were shaped in different ways by public and private institutions, conflicting interests and changes in the wider social context. It further looked at how the established routines and programmes of public institutions may impose unrealistic parameters or criteria on new innovations, perhaps in an attempt to diffuse their 'radical potential'. This led to *The Nerve Centre's* protracted search for funding and need to build a network of 'convenience' which could contribute little to the production process.

This section will examine the contribution of inter-firm relationships to learning processes and the 'national system of innovation'. It is clear from the last section that new

knowledge and innovations are not necessarily a consequence of research and development in public and private laboratories. It is also clear from this research that the time frame for institutional and social innovation is much longer than that which pertains for technological innovations. The emergence of new multimedia tools and platforms therefore poses immense challenges for education and training structures at a national level as well as staff and management within firms. All three of the cases under examination while expert in other fields were faced with the challenge of learning how to use and apply new technology platforms and tools. This section examines a number of different learning and networking strategies and their implications for Ireland's 'national system of innovation'.

6.2.1 Inter-firm relationships - Learning by Acquisition

An inherent characteristic of the cultural industries and the new media industries is the social and collective nature of the content production process (Williams, 1981). Given the novelty (in technological and content terms) of the new multimedia online services market, the pressure for reducing production development times, and the considerable initial investment (human, time and monetary) required to enter the market, companies are pursuing a number of networking and learning strategies. It is clear however that there are substantial differences between the strategies pursued by global multinationals and the strategies pursued by small indigenous companies. These strategies have significant implications for the type of learning economies created and the type of learning taking place.

Compuflex was already the world leader in desktop applications, operating software and reference type CD-ROMs before they decided to move into online service production. It is clear from an examination of the history of *the Compuflex Network (CFN)* project that while it went through a number of conceptual transformations these were shaped more by strategic business concerns than by financial resource concerns. Indeed, by 1997 the project was absorbing $220 million in losses annually.

CFN began in December 1992 when the CEO asked one of his managers to investigate online services and recommend how Compuflex could enter this market. At this stage the main online provides worldwide were America On-line (AOL) which had 350,000 subscribers in 1993, and larger still, Prodigy and CompuServe. The manager recommended that they buy one of their rival companies and save time on development, marketing and diffusion costs. However, none of these companies were open to such advances and *Compuflex* decided to develop its own proprietary online service. The opportunity to bundle this with a new release of the company's desktop operating system was seen as crucial to the decision to go ahead with the new innovation. This desktop operating system was also in development and its precursor had been a major success in sales terms.

CFN was developed to enable a computer software company to enter a new and rapidly evolving market place where there were already some major competitors with established customer bases. It was designed as part of a business strategy to expand into new markets and by so doing to find new revenue streams to supplement core business in the maturing desktop software industry. While there were some clear business and economic objectives for the service there was little conceptualisation in advance of developments as to the content or design of the service.

The decision to develop a new online service was taken in May 1993 and the team was given a free rein to develop the new service. The first task that the small development group of 10 people in the US did was to research the online service market and establish what their competitors were doing. Based on this information they decided to develop a service for the **computer-user** rather than the home consumer market. This decision meant that the content on the service would provide information on computer products and include content from other publishers like computer magazines. This content was supplemented with services developed in-house like e-mail and bulletin boards. The group also believed that this predominantly 'male' audience would be 'more forgiving' of their first online service.

> 'when they dreamed up *CFN* in 1994 they had a different vision ..the vision was more sort of a technical thing, it was more appealing to technical people, you know there'd be updates..there'd be news, it was sort of a male technical focus on the whole thing...I think that's still there, there is still *CFN* 1.3 and it's still very popular...there's people, sort of enthusiasts you know who love it..'
>
> (John, engineer, Dublin)

Over time and in response to key changes in the marketplace the organisation and nature of the service changed substantially. In particular the growth of the Internet proved influential in this story, and forced the company to abandon its own proprietary technologies. Table 29 summarises the main development phases.

Table 29 Development of Compuflex Network Service (*CFN*), 1995-1997.

	Tech & Content	Date	Subscriptions
Phase One	Proprietary Technology Content and Services developed by partners or sub-contracted. $4.95 a month flat rate	Aug. 1995	By Nov. '95 525,000 subscriptions. [AOL - 4m] Ref: Financial Times
Phase Two	Internet based technology, windows based interface, licensed technologies. In-house development of TV Style Shows and Services as well as sub-contract content production. $19.95 a month flat rate including internet access. A selection of other pricing plans for access to premium content.	Dec. 1996	By Oct. '96 1.6 million subscriptions Ref.: Sunday Business Post By 1997 1.6 million subscribers in US 2.5 million more world-wide [AOL - 9m] Ref: *Compuflex* press release

An important aspect of the *Compuflex* case is the extraordinary financial depth of the company. This enabled them to take-over companies or license new technologies rather than having to invest the time, and labour, to develop them in-house. The 'learning by acquisition' strategy meant that the company bought key browser software in 1994 so that access to the underlying code would enable the company to capitalise and incrementally innovate on the work of others. In many cases very small start-up firms had developed the new technologies that *Compuflex* purchased. This aggressive business strategy contributed to the privatisation of much new technological knowledge, limited competition and limited the learning economies which often develop around new innovations. This strategy also extended downstream in that the company would not make software codes available to end-

users. It is sharply in contrast to the public availability of new knowledge emerging from public research institutions and crucially contradicts Daniel Bell's belief that the core producers of new knowledge in post-industrial societies would be public institutions.

The trend for companies to acquire other companies or license new technologies is usually prompted by a desire to lessen the innovation risks when entering a dynamic new market and/or broaden one's distribution channels. With *Compuflex* both of these motivations apply. Indeed certain commentators have asserted that the company feared 'missing the next bend in the road' as the desktop PC market matured and new competing technologies and distribution systems emerged. Given that the development period for a software product upgrade is often only 6-8 months in order to incorporate key new technologies in product upgrades the core technology is often bought from other companies. Since the mid 1980s *Compuflex* has pursued a relentless acquisition and licensing strategy with regard to new technologies and software products as well as forming a number of alliances with key content providers and owners of distribution networks. This strategy highlights how products marketed under one brand may in fact be the work of many different and competing companies rather than the innovative efforts of one company/R&D department or individual. It also points to the importance of distribution to the new media and information based industries.

> '...between 1994 and 1996 [*Compuflex*] ...spent $1.5 billion on acquisitions. In the past year the pace has accelerated with the purchase for $425m of WebTV Networks, a digital television set-top box maker which gives access to the internet through the television screen; an investment of $1 billion and an 11.5 per cent stake in Comcast, one of the US's largest cable television operators; and injection of $30m, plus $10m of his own money in Teledisc, a company which will launch 288 satellites into orbit for high speed internet access. Last year *Compuflex* acquired key strategic technologies at the rate of one a month.'
>
> (Bedell, 1998)

It is apparent from these reports on the global operations of *Compuflex* that the company was 'fishing' in a number of different markets in order to be prepared to 'react' to the technology which would replace, or extend the scope, of the desktop PC. The company's diversification into content and into the internet/distribution is further evidence of the company's uncertainty as to future developments. The spread of these acquisitions however highlights the uncertainty underlying this company's strategy despite being considered a market leader/innovator in the high technology field.

With content, as with other key areas, the strategy of the company changed over time; often every six months. In phase one the company sought alliances with content providers, agreeing to provide them with a structure and interface for their content. One account recalls how 'in those days [1995] everyone who was anyone in the publishing business, from Wall

Street Journal to Ziff-Davis was passing through *Compuflex'* (Wallace, 1997). The second phase of *CFN*, which is of most interest to this thesis, saw the company developing its own content competencies in-house to develop TV style programming and hiring large teams of producers to produce content in-house. 'yes, we are doing media things, such as hiring writers, artists, graphic artists,' *Compuflex* Chairman cited in (Wheelwright, 1996). In part the continual development of the internet and the continued development and diffusion of multimedia computers shaped this strategy.

It is apparent that while the company had substantial research and development resources in the US *Compuflex* saved much time and effort by buying in finished products and hiring new staff. It would appear however that these knowledge acquisition strategies - while time efficient - might not have been the best strategies in terms of organisation and individual learning. As the next chapter will detail the first release of *CFN* and its set-up CDs was so problematic that a lot of negative publicity was generated for the company. When asked why the products had been released with 'bugs' interviewees replied that a deadline had been set and both marketing and the market expected the product to be delivered. Here one finds a tension between the dynamic of technological innovation, declining product life cycles, and the time needed to learn, gain experience and perfect a product.

6.2.2 Inter-Firm Relationships - Learning-by-Interacting

The financial strength and global market control of *Compuflex* is in sharp contrast to the other cases studied. Given the lack of capital available to start-up and small multimedia organisations they adopt quite different networking and innovation strategies with distinctive learning implications. These social relationships tend to generate shared knowledge and are more likely to generate 'learning economies'. Learning-by-interacting however depends upon stable relationships, 'trust' and the qualities of the organisations involved. The characteristics of the region in which they are embedded may also play a role. Given the size of Ireland one might presume that informal networking and relationship forming would be relatively easy; but the evidence points to the need for trans-national networking in the absence of a critical mass of new media companies locally.

The inter-firm networking strategies adopted by both *RTÉ* and *The Nerve Centre* in this project go beyond formal licensing contracts and acquisition to include informal 'goodwill' networks, short-term alliances and more long term non-contractual partnerships. These relationships are both inter and intra-sectoral allowing these organisations to take advantage of complementary innovations in other fields and to gain access to new markets without having to invest in substantial new knowledge generation and market creation themselves. This informal networking and interacting contributed much to their individual and organisational competencies while at the same time leaving boundaries between

organisations and sectors intact. These strategies point to continued specialisation rather than convergence; the development of distinctive and strategic capabilities rather than the extension of a firms capabilities across all relevant skill areas.

Given the relative newness and the complexity of multimedia production most companies entering the fray in 1995 and 1996 did not have all the necessary competencies in-house. This was particularly the case for organisations attempting to diversify from traditional IT and traditional media areas. In addition, there was a lack of skilled personnel and specific training courses for them; they had to learn by doing. Both *The Nerve Centre* and *RTÉ* were able to draw upon existing social and informal networks in order to gain experience with, and learn about, new technological and content options which were not available as codified information anywhere. In the case of both organisations these networks were flexible but durable, and built on trust and mutual understanding despite differing industrial backgrounds in some cases. In both cases their organisational history and reputation played an important role.

These socio-technical constellations were not always local or national. Given the concentration of new technological innovations in certain regions of the world, i.e. California, it appears that in order to gain access to new technological innovations companies in Ireland must form alliances with companies in the US. In the case of *RTÉ* their relationship with RealNetworks in the US evolved from a client relationship into a mutually beneficial promotional relationship; with the technology company using *RTÉ*'s content to promote their products and vice versa. This relationship evolved over a period of four to five years.

It would appear from the research that trans-national relationships formed when there was a lack of suitable partners in the local area and an easily identifiable regional centre of excellence elsewhere. In the case of *The Nerve Centre* and *the Institute for New Media*, Germany their relationship developed from a chance introduction facilitated by the local university. It subsequently developed into a deep mutual respect given their similar backgrounds in community based media and their location in peripheral and marginalised communities. They also found that they had a mutually beneficial set of skills and competencies. The case of *Nua*, a multimedia start-up, illustrates that without these informal networks and an established reputation a company is dependant more on contractual relations, which did not seem to have the same degree of good will, trust or benefit for an organisation.

Despite the ability of new ICTs to overcome the limitations of space and time the case studies found that they were unable to facilitate truly international collaborative work on design-intensive projects. While not a formal partner on the Colm Cille project - the funding programme would not fund partners outside of the border counties - the *Institute for New*

Media nevertheless could contribute important computer design and programming skills. However the project manager found that the Colm Cille project was not a top priority in Germany and there were significant time delays in delivery of project milestones. This was in contrast to the productivity achieved when the German designers came to Derry and worked alongside their Irish counterparts.

Distance was a continual problem throughout this CD-ROM project and related not just to the 'out of sight, out of mind' problem but also to the difficulty in communicating design concepts at a distance. At one point the German partners delivered a 3D-entrance hall for the virtual museum which was entirely out of synchronisation with the other rooms in terms of navigation, viewpoints and colour scheme. The designer had not followed the brief and *The Nerve Centre* ended up redesigning the room entirely, which cost them one month in development time. It would also suggest that proximity and frequency of interaction is an essential feature of design-intensive production.

Funders, public institutions and private clients can also learn from interacting with production companies during production. This may be particularly important in relation to an 'infant industry' like multimedia and wider processes of social learning. 'Client knowledge' with respect to technical and content aspects was clearly a barrier in *The Nerve Centre* and contributed to the protracted negotiations with funders and the need for an advanced prototype to be made to demonstrate the project concept. The proximity of the funders to *The Nerve Centre* meant that there was a tendency for them to want frequent presentations of work in progress. Particularly in the case of *The Nerve Centre* this contributed to prolonging development times as fragmented bits of the project were assembled and presented at regular intervals. However it did mean that the funders gained an understanding of the development process and were better informed for future funding decisions.

RTÉ and *The Nerve Centre* had important complementary assets which generated mutual learning processes. As established organisations they had access to content assets, established distribution channels, and captive markets. In the case of *RTÉ* they used their television and radio channels to publicise Internet events while also integrating online services into external dance, music and sporting events. They were also in the process of digitising their archives in order to develop further hybrid services. *The Nerve Centre*, who also ran the two largest film festivals in Northern Ireland, numerous music events, training courses and internet drop-in centres had access to a large back catalogue of productions and numerous channels through which it could exploit new media content. These activities not only contributed to raising awareness of their respective products but also enabled the producers to test and experiment with their products prior to launch, gaining valuable end user knowledge and contributing to a wider process of social learning. In this they were

acting as important 'intermediaries' in terms of technological diffusion and developing channels for producer-user feedback and the incremental improvement of their innovations.

6.2.3 Learning-by-Doing

In *RTÉ*, *Nua* and *The Nerve Centre* the staff acquired their technical skills through one-day/weekend training courses, manuals, and informal media sources. They also learnt-by-playing and by-doing at home and at work. This illustrates firstly the newness of the technologies and processes of design and the lack of suitable educational courses in this area. It secondly illustrates the extent to which such skills can be learnt on the job. Indeed all the organisations indicated that a broad education in other areas, e.g. traditional design, writing and journalism, sound and vision were probably more important in relation to media design than a training in the computer aided tools. Most of the computer tools in fact were based on the epistemological roots of various traditional media. This was particularly evident in the 3D-software packages which extensively used photographic and spatial design terminology.

The ***Virtual Museum of Colm Cille*** is the first computer based interactive multimedia project that *The Nerve Centre* has been involved in. Given the centre's background in community arts the first year of the project (1996) was a year of resource building in relation to equipment and staff. *The Nerve Centre* lacked the necessary computers and software to generate high-end multimedia and the technical know-how to programme the fundamental elements of a product together. It also lacked multimedia production management experience within the centre. The project became a 'flag-ship' project and an important part of the whole organisation's evolution. New training courses, equipment and staff, were all sought with this project and potential hybrid and spin-off projects in mind. The project was also conceived in relation to an existing set of competencies in design, visual and aural production.

An important aspect of this project, and *The Nerve Centre's* approach, was the flexibility and time allowed to staff to learn-by-doing. As many of the formal educational courses were lagging behind the needs of companies like *The Nerve Centre* the provision of employee 'learning time and space', in conjunction with head hunting for staff with specific computer skills, was necessary in order to acquire the required knowledge capital. All except one of the *Colm Cille* production team had worked at *The Nerve Centre* before the project began. They had experience in graphic design, video and music production but each had worked quite separately prior to the *Colm Cille* project. In fact historically each area of expertise had grown into a separate but associated company. Thus the company's logo is a neuron; a central nucleus with a number of axons emanating from it and signifying the different production centres operating under the umbrella of *The Nerve Centre*, e.g. *Raw Nerve*

Productions which specialises in video projects. The new member of staff hired for the *Colm Cille* project was hired specifically for his competencies in computer based online and offline multimedia programming. Their relationship with the *Institute for New Media* in Germany also provided a resource of computer and design skills.

During the *Colm Cille* project some of the staff needed to apply their old skills in a new domain: that of computers. In a desire to create a 'realistic' and high 'quality' product all of the 3D and 2D design work was conducted on computers. All of the staff involved had to learn how to use new applications, new computer based tools and grapple with the design issues which this entailed. The process innovation involved much 'experimentation', 'tinkering' and 'analysis' of the software packages available but little formal training outside of one-day introductory sessions. One designer described the process thus,

> 'I expressed an interest in doing it and then we didn't really have the equipment to build the rooms properly but my idea was that maybe I'd build a couple of objects and see how it would work...I really learned to use the software then because we were trying to figure out how to do certain things'
>
> (Kevin, 3D designer, *The Nerve Centre*)

A willingness to work individually but also in a team is a requirement of the multimedia production process. In addition, given the origins of *The Nerve Centre* it is an extremely unhierarchical organisation where each member is treated the same and paid almost the same. There are no bonuses or ranking systems. At any time the staff may be called upon to assist or solve problems which arise with other staff or trainees on the various courses run at the Centre. While sometimes this is intrusive and disruptive staff feel that it is an important part of their own development in terms of technical and creative know-how. The working culture of the organisation is one of co-operation and sharing. Staff share separate offices given the layout of the old building but the doors are consistently open to students and fellow workers. The walls of the offices remind the centre of its origin and are covered in posters for film festivals, products produced by the centre and awards received.

The speed at which new technologies are developed by major companies is a double edged sword for small production companies. While new tools may allow a more realistic rendering of an object or tighter integration of different media elements, it may also prove an impediment to production work. Frequently during production work certain operations would crash a computer as the software overworked the capacities of the existing hardware. Furthermore, apart from the cost of both the software and hardware the user would have to spend time teaching themselves the new software which sometimes involved a considerable cost in terms of time. This learning by trial-and-error is supplemented by knowledge from computer magazines, websites and bulletin boards. All of the production team were avid

readers of mostly non-Irish computer, art and design publications. Programmers tended to be active in computer societies or other clubs outside work.

An intrinsic part of how *The Nerve Centre* learned how to produce multimedia content has been its ability to call upon a network of actors outside the organisation including the local university and similar types of organisations in Dublin and Rostock. These relationships are non-contract stable relationships based on communities of interest and a history of past co-operation sometimes on European research projects. Before the *Colm Cille* project received substantial funding toward equipment and staff with multimedia experience the centre drew heavily on colleagues in Rostock who were willing to input time and resources in the project, while a research centre in the local university assisted with technical questions. These non-monetary relationships involved the transfer of knowledge, skills and technologies, a process of 'learning through others' as (Teubal, 1991) states.

The production team for the Colm Cille project involved a subject expert, three designers, two programmers, a video crew, a sound crew, an educationalist and a researcher. A training specialist and two museum curators supplemented this. Given that the production team was dominated by people from traditional media it is clear that such skills were adaptable to the new media environment and illustrates an important aspect of innovation; i.e. the ability to reuse and adapt existing knowledge and skills.

> '...if you talk to a guy from a straight IT computer background yea, our conception is very different, but it is really just our starting point. I think that what we are hoping to do is arrive at the same point somewhere along the line that maybe computer people will have to arrive at in order to really have a true multimedia capability, not just a conceptual basis, or theoretical basis, but actually having the tools and all the multi-disciplinary resources that you would need...it is just that we are starting from a very strong creative base anyway.'
>
> (Michael, director *The Nerve Centre*)

In all four cases studies the inter-firm networks that were formed were between project teams rather than managements. The nature of new media production is that it often takes place in small, highly motivated teams with a project manager acting as co-ordinator. When the relationship between the company director and project manager is close it would appear that the learning which takes place may be spread more widely throughout the organisation rather than becoming trapped within the project team. Another approach was taken by *The Nerve Centre* where individuals with specialist skills were called upon when needed to work on a project rather than devoted full-time to it. This again made the learning-by-doing more diffuse, more available to subsequent innovations and more widely applied leading to more organisational learning.

It is clear that in *The Nerve Centre's* management and staff were willing to change and adapt old routines as well as learn new ones in order to facilitate the production of a new

project. In the final stages of the project the centre was involved in many locally based activities which served to raise awareness about the project but also allowed them to test the artefact and adjust it to local appropriation contexts. This highlights the dual role of indigenous companies, firstly, as companies who are providing jobs and wealth but secondly, as appropriation intermediaries, stimulating and developing local learning economies between firms, public institutions and end users.

6.3 Conclusions

The objective of this chapter was to draw upon empirical research in four organisations to show how the institutional set-up and socio-economic structures shape the process of innovation and learning in multimedia content organisations. The chapter showed how the FDI and educational policies adopted by successive Irish governments attracted *Compuflex* to Ireland but had not encouraged them to locate strategic functions or research and development facilities in Ireland. It showed how the changing regulation of the audio-visual sphere and competition from global players had forced *RTÉ* to experiment with new media. It also illustrated how procedures and routines used by public institutions to evaluate all projects may act as barriers or slow the rate of innovation with radical new ideas. Finally, it was shown how 'industrial innovation' and 'information society' discourses in Ireland have defined multimedia content production as an internationally traded information/software service rather than a potential new media and cultural form. Within this context multimedia content projects are evaluated on the basis of business plans, potential revenue earnings and export markets rather than the nature of their content and potential role in society. There is little public or private capital available for encouraging indigenous 'cultural content' innovation aimed at the domestic market.

The organisations which are producing content for new media come from a variety of industrial sectors and the overall pattern of innovation in multimedia is only emerging. This poses immense challenges for existing conceptual paradigms, institutions and policies. The pattern which emerges from this research is that multimedia production has high first copy costs, like traditional culture industries, and needs therefore a large supply of seed capital or some form of patronage to enable a project to move from concept to product development. These cases suggest that while large established companies like *Compuflex* and *RTÉ* can afford to acquire new knowledge and shortcut development time, new multimedia start-ups and SMEs clearly require more institutional support if they are to survive the initial development stages and avoid being taken-over.

Clearly the NSI in Ireland is biased towards foreign owned companies who require little institutional support once in the country, traditional media companies and indigenous software companies producing internationally traded services. Where development agencies

and financial institutions have developed venture capital and innovation programmes these are orientated towards software tools/applications and specialist producer orientated information projects. This thesis contends that this 'industrial' and 'economic' approach validates and perpetuates a system which ignores other types of content projects and reflects the established institutional distinction and fragmentation between industrial and cultural policy in Ireland. As industrial support programmes presuppose that content issues are the preserve of the 'culture agencies' and the latter does nothing, indigenous production for new media is left with little institutional support. European programmes provide a measure of support for such projects but these are dictated by agendas set outside of Ireland and place a heavy administrative burden on small companies. The case studies have shown that cross-national partnerships may also impose production problems on a design-intensive project.

It is clear from an analysis of the low levels of ICTs/information services consumption, the high telecommunications tariffs and the lack of industrial support programmes and finance for cultural content and educational projects that there are clear barriers facing companies who wish to produce multimedia artefacts for the Irish market at home and abroad. At present the state institutional system does not seem to recognise the socio-cultural role of media/cultural content industries in preserving, enhancing and extending cultural diversity. It also seems to fail to realise that as the government liberalises telecommunications and broadcast channels in Ireland it is unlikely that the market alone will provide the necessary incentives to ensure a degree of indigenous production to balance the inevitable flow of UK and US produced content. Existing political-economic structures and globalisation trends are strongly shaping multimedia developments onto a particular development path which supports FDI in IT hardware and software applications and encourages the privatisation and commodification of information for export. This strategy fails to support the generation of multimedia content innovations in indigenous public or private institutions, fails to create clusters or networks of firms/learning economies and fails to recognise the infrastructural, financial and skill barriers facing final users in Ireland.

While this chapter focussed on the interaction between the national system of innovation in Ireland and multimedia content organisations the next chapter examines in more detail organisational cultures and innovation at the level of the artefact. It explores the challenges of industrial and media convergence, the role of traditional media forms and content, producer-final user relationships and the influence that these have on the form and content of the multimedia artefacts being produced.

Chapter Seven –The Design of Multimedia Cultural Content: Technology and Content-Led Modes of Design.

7.0 Introduction

Chapter Six examined how the characteristics of the institutional setting and socio-economic structures in Ireland tends to support the creation of hardware, software (applications, tools) and localisation projects and largely ignore indigenous content projects and multimedia developments for the home market. The chapter noted how the 'ideation' process, from concept to prototype, involved negotiations between numerous actors and in some cases the fundamental transformation of the project idea in line with the dominant neo-liberal political climate and 'information', 'transmission', 'competitiveness' discourses. These discourses had little space for consideration of citizenship, public service or cultural issues.

While there has undoubtedly been an increase in information-type jobs and industries in Ireland (Chapter Four and Five) these trends do not constitute a 'significant change' in the structures, institutions and nature of Irish society any more than the changes which emerged in the USA in the late 1960s constituted a fundamental change of that society (discussed in Chapter Two). In Ireland socio-economic developments since 1958 have led to the development of an ICT based manufacturing economy and related service industries but it is not evident that these developments have led to fundamental changes in the political or non-market sphere. In part this is due to the fact that successive governments have focussed their efforts on stimulating supply for export without at the same time stimulating supply and use in the home market; in part it is due to the barriers facing both producers and consumers. In this context it is not surprising that surveys of ICT and Internet usage in homes and schools in Ireland point to a society which is not enthusiastically engaged in consuming ICT-based information goods and services.

On both empirical and theoretical grounds this thesis rejects the claim that new ICTs will lead to a fundamental transformation of our economic, political and social systems. This thesis further rejects the belief that new ICTs will 'automatically' lead to a society which is more egalitarian or that we shall witness a flourishing of new forms of communities and cultures (Jones, 1997). The pattern which emerges from the research so far points to the dominance of an economic and transmission perspective on new media communications: telecommunications infrastructures are increasingly orientated towards the transportation of credit card numbers not the exploration of alternative means of cultural expression, association and participation (Carey, 1992).

At this point one must again engage with the work of cultural and communications scholars who have critiqued the unbridled expansion of global capitalism and transmission

rather than semantic/cultural approaches to communication (See Chapter Three). These researchers argue that de-regulation and increasing globalisation and concentration in the media industries is linked to a homogenisation of content and a subsequent loss of cultural diversity and space for dissenting voices (Golding, 1997). While these debates emerged in the 1970s they are arguably equally as important with regard to the new media environment. As globalisation develops, the transnational flow of content produced 'elsewhere' will only increase, influenced by liberalised economic and technological structures and supported by national and international policies. This has particularly serious implications for minority cultures with a history of dispersal through emigration and little resources to produce their own content.

While clearly new media, particularly the Internet, have the potential to democratise communications production and maintain media diversity it is the opinion of this author that these new media, which were initially developed within the military-industrial complex, are being increasingly appropriated and privatised by large corporations. Free trade, liberalised telecommunications markets and the commodification of information are key trends in an increasingly global marketplace which threaten to undermine the democratic potential of the Internet, stratify by socio-economic status the participants on the Internet and limit the freedom of cultural expression. Are we witnessing the creation of knowledge elites and the commodification of knowledge only for those who can pay? Kevin Robins has suggested that there are tendencies towards what he calls the 'de-territorialisation of knowledge' whereby references are removed which link content with a place or source (Robins, 1999).

This chapter will focus on the development of four prototypes into meaningful cultural texts, the tensions between economic/technological and cultural imperatives and their impact on the nature and form of the content.[67] Each of these case studies are from different industrial backgrounds and were chosen in order to investigate the nature of convergence in three domains: at the level of the content, at the level of the platform/media (television, telecommunications, computers) and at the industrial level (Kellerman, 1997). They were also chosen to investigate the notion that organisational cultures, 'technological frames' and embedded knowledge guide an actor's approach to innovation and the choices embedded in it (Bijker, Hughes et al., 1987). This was identified as an important element of a national system of innovation by Lundvall (1992). This chapter identifies two contrasting modes and approaches to content design which emerged in the four case studies. Section 7.1 explores a technology-led mode of design, which draws heavily on linear software development processes, and section 7.2 explores a content-led mode of design which draws heavily upon representational strategies derived from the traditional media.

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[67] This chapter deals less with Nua than the other cases due to the delays encountered in that project.

The process by which designers embody specific choices, cultural codes and preferred readings into artefacts has variously been called 'encoding' within communications studies and 'inscription' or 'configuration' within STS studies. (Frissen, 1997a); (Hall, 1997); (Woolgar, 1991) In exploring the two modes of design this thesis aims to evaluate which was the most appropriate in relation to the particular type of 'cultural content' being developed and the concerns for diversity already expressed.

> 'It is insufficiently appreciated that successful innovation in high technology industries often is not so much a matter of invention...as it is a matter of design'
>
> (Nelson, 1993:8)

7.1 Convergence and Conflict – A Technology-Led Mode of Design

The convergence of telecommunications, computer and broadcasting industries has important implications for the creation of national technological and cultural policies as well as access to, and diversity of, content. This section will explore the diversification of a multinational software company into the production and global distribution of cultural content for multimedia. The design strategy adopted by this company was clearly technology and profit driven and this had clear implications for their content strategy.

7.1.1 Convergence and Cultures of Innovation

In all four case studies examined the production of online and offline multimedia content involved radical process and product innovation. With no history or procedures to follow each case, large and small, foreign owned and indigenous had to establish for themselves the best means of producing a high quality product and their criteria for success. As noted in the Chapter Six there were a number of external factors which shaped the project concepts as they went into production. These factors included public sector institutional biases, client agendas, funding criteria and changes in the marketplace. A further factor, which this chapter will explore, is the institutionalised history, entrenched habits and mental 'frames' of the design teams and their organisations.

Compuflex and Convergence

The *Compuflex* case examines how a large multinational company with proven competencies in computer software development tried to take advantage of advances in digitisation and the liberalisation of global telecommunications infrastructures to move into content production. The Compuflex Network (*CFN)* developed from a subscription only online service based on proprietary technologies and aimed at computer users (August 1993-September 1996) into an Internet based consumer service based on a mixed funding model

from September 1996.[68] Even during the first phase of *CFN*, when the company developed an interface and software tools to provide access to content provided by others, there were indications that end users were not happy with the performance of the service.

Media commentary and customer feedback on the first phase of *CFN* complained about the slow access and long download times caused by the complexity of the technology and the interface. 'A service that is still thin on content and sometimes slow in operation' is how Tom Foremski put it in *The Financial Times*:

> 'the service is very graphics orientated and it takes a long time to move around because of the graphics it has to download.....*Compuflex* has about 150 content providers so far and there are hundreds more planning to join.'
>
> (Aug. 28th, 1995)

Clearly in Phase One *Compuflex* sought to exploit their core competencies in software design. Their business strategy was to exploit their dominant position in the software applications market by bundling the 'set-up software' for the new online service with a new release of their operating system. Furthermore, their pricing strategy was to offer their service at half the price of their major competitor AOL. By November 1995 they had 525,000 subscribers.

Between August and December 1995 the technical and content strategy for *CFN* changed, clearly driven by technological innovations and new competitors on the market. These factors were embodied in the service as it evolved technologically and at a content level. Content developed from a narrow base which provided information on computers to a broader service aimed at a wider market of users and providing a variety of different types of information. In December 1995 *Compuflex* announced its new Internet strategy to the press. '*Compuflex* and the computer industry ..had entered a second PC Revolution - this one to be fought over the Internet' (Wallace, 1997:288). It was announced that *CFN* would be redesigned as an Internet based website and that the company was reorienting its entire business strategy away from standalone, proprietary software to networked and Internet ready products and services.

> ' ...it was a proprietary service, that was the problem...and at that time all proprietary services started to look old fashioned, so it was clear that the web had a momentum of its own ...they responded pretty quickly to it...they basically threw out the back end, migrated everything over to new *Compuflex* software...and then they said we are going to leverage *Compuflex* technology'
>
> (Darragh, senior project manager, Dublin)

The new web-strategy included both investment in browser development and a desire to 'leverage' this technology using content. The company announced that it would develop

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[68] These phases are described in more detail in Chapter Six.

inhouse content production teams to work closely with their software teams. These moves caused some commentators to claim that *Compuflex* wanted to become a media mogul and move beyond its traditional sector software. The strategy seemed to confirm the belief that multimedia technologies and digitisation were leading to the convergence of IT, software and media companies.

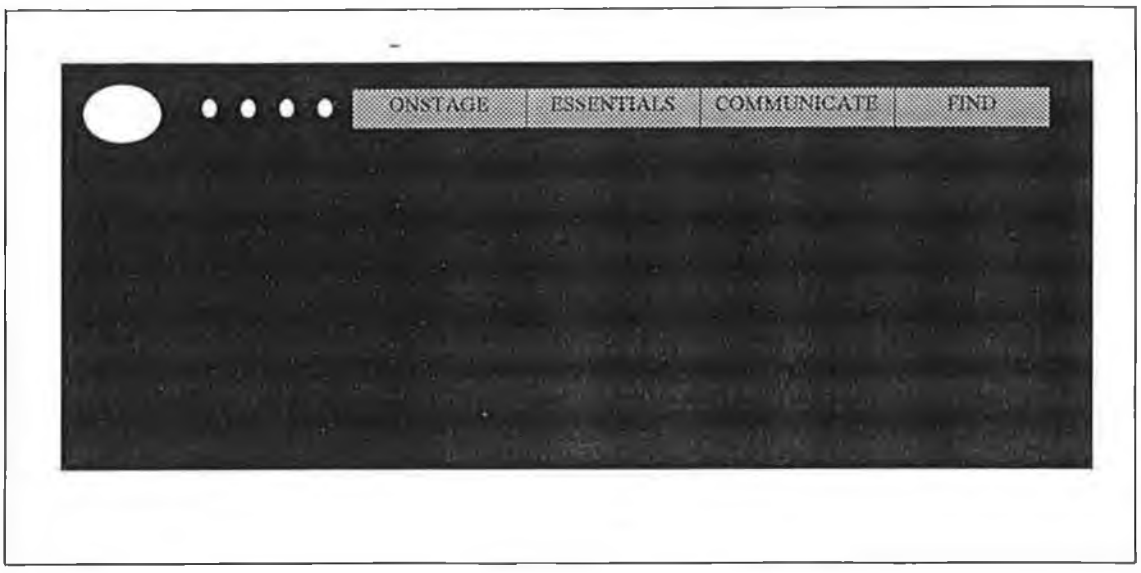
> '*Compuflex* started [out] 6 months ago to [be] the best content provider on the Internet - to be the best ISP on the Internet, and the best on the Internet...and they basically tried to walk over competitors with technology and quality and tried to create the Wow! factor that they've done with so many other products...and to be fair they were right to do it because they really pushed everyone to the limits of what the Internet was capable of doing and what it was not capable of doing.'
>
> (Harry, lead test engineer, Dublin)

> 'In its recent announcement of a vastly revamped Internet online service, software giant *Compuflex....* is describing the new service ...as a chance to 'redefine what it means to be online.' Part of the web content is available free to all Internet users, with the rest requiring the payment of a monthly fee to be a full *CFN* member. As part of the content for its members' service areas, it has introduced a new TV-style concept called 'Web-shows'. These original presentations are divided throughout six different channels and *Compuflex* promises 'they will offer a completely new Internet experience of people with different interests and life-styles.'
>
> (Financial Times, 4/12/96)

The redesigned *CFN* revolved around a browser interface, which incorporated new Internet technologies and tools like search engines and e-mail. The member's content on the service was divided into four sections: **OnStage, Essentials, Communicate** and **Find**. **Onstage** borrowed heavily from television forms and language. It contained six channels with varying types of web-shows including Men's Issues, Women Online, News, Sport, Music Central and Gaming. In addition, there were links to content provided by other publishers and joint content initiatives with global news producers. **Essentials** provided local information services on 63 cities worldwide and services which allowed one to buy cars, holidays, computers and other goods. An important part of Essentials was the facility to purchase online in certain countries.[69] **Communicate** employed new software technologies to offer e-mail, chat forums and bulletin boards. **Find** linked to a number of Internet search engines so users could find other content on the Internet.

The design of the interface was minimalist, a black background with the service logo, four navigational buttons and the four menu buttons across the top of the page. Moving the cursor over each menu button activated a drop-down box with links to numerous sub-menus. Figure 5 outlines the design of the service.

Figure 5 The *CFN* interface 1995.



Most of the marketing surrounding the second release of *CFN* emphasised the 'exciting new programming'. If a user subscribed to 'premier content' services they could access up to 14 web-shows, for example, 'Personal Trainer' and 'Underwire'; two shows aimed at women. Other shows included 'Watchfire' which looked at the subject of UFOs, 'Mama Planet', an environment show and 'Mungo Park', a travel show. In reality these shows were thematic websites with new content every two-three weeks and, as with television, re-runs. The sites provided text, images, live video, audio links and feedback via e-mail.

An examination of the *CFN* actor-network and website indicates that extent to which television metaphors, forms and content acted as a guide during this stage of development. The branch plants around the world were called 'affiliates' after the US television term while aspects of the web-site were known as programmes or shows. They also used celebrity personalities on these shows and they did re-runs of popular shows. A lot of time and effort went into developing these shows which had high production values and were technologically complex with most browser versions needing plug-ins in 1996 in order to handle the animations and streaming video and audio.

CFN publicity also highlighted the interface enhancements incorporated into the new release. These enhancements allowed members to 'personalise' the service so that once they logged on they would be presented with their e-mail messages, ongoing chats and information on other friends online. Favourite links could also be added to the set of drop-down options available. Press releases for the new service suggested that there was a 'stronger sense of community' generated by the new forums, chat rooms, and links between members.

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[69] In some countries it was not legally possible.

The second release of the *CFN* service was available for 30 days free trial to old and new users. The software was distributed on CD-ROM and bundled with the company's new operating system. Users could obtain the CD-ROM by free-phone or through a number of other channels like magazines and record shops. By 1998 the service had 1.5 million US customers and 1 million more worldwide. While for most SME companies these figures would constitute a success it is instructive to see that AOL, a major competitor, had 9 million users by this stage.

The relatively slow growth in *CFN* worldwide is partially due to the technology-led mode of design which required users to have the latest hardware and software technologies in order to access their service. It was also partially influenced by the American orientation of the content. The globalising economic logic of the organisation dictated that content produced in the US for American audiences should be distributed with little localisation to major markets around the world. The prioritisation of technological innovation over content and the lack of attention given to differences between markets is reflected not only in the lower than expected subscription figures but also in the feedback obtained via e-mails, newsgroups, market research and press coverage. It is also reflected in the everyday negotiations between staff in geographically dispersed *CFN* teams.

7.1.2 Localisation and the Entrenchment of 'Technological Frames'

The evolving technological platform/features dictated how *CFN* was defined within the organisation and indicate the organisation's approach to it. The first version of *CFN* was part of the Operating Systems Group (OSG) and was launched simultaneously with a new version of the company's operating system in August 1995. When *CFN* was re-launched as an Internet based product in 1996 and the content strategy was developed the service became part of the Interactive Media Group (IMG). This group produced products aimed at the home: either slimmed down versions of office software or game and reference-type CD-ROMs. 'It finally ended up in the interactive media group. It was an interactive product..it wasn't a software product any more as such.' (Darragh, senior project manager, Dublin)

From the perspective of the Dublin *Compuflex* branch they had little knowledge of the *CFN* product or development team prior to the decision to relaunch the service in 1996. Six months prior to the second release date the developers in the US contacted Dublin:

> '...and said can you help us do some translation work? So we said yea, sure, no problem, kind of knowing it would be much bigger than just helping *Compuflex* translate a few files and also suspecting that they didn't really have a big enough team over in the US to support what they were trying to do in terms of localising all of this stuff.'
>
> (Darragh, senior project manager, Dublin)

The *CFN* localisation team was subsequently established as a sub-group of the Interactive Media Group (IMG) in Dublin. All except one of the five full time staff in the *CFN* team had experience working on the localisation of software and interactive products in the organisation. Primarily their competencies involved computer hardware and software skills. They had little online experience and only one member of the team had experience in multimedia content design and development. This member was hired from outside the company. It is instructive that three of the five had worked abroad having emigrated from Ireland in the 1980s.

The *CFN* Team, Dublin.

- A senior project manager (36) with experience in hardware development abroad, and in *Compuflex* with systems software and stand-alone software applications.
- A lead test engineer (24) with a background in the business/IT side of a wholesaler, a hotel, a software company and in the interactive media group of Compuflex with CD-ROMs. His job with *CFN* involved developing software programmes and updating technology and tools.
- A test engineer (28) with experience in IT in a telecommunications company and within *Compuflex* with the systems group, software applications and finally in the interactive media group with CD-ROMs. His job with *CFN* involved testing software for bugs and fixing or assigning these bugs to others for fixing.
- An engineer (36) with a background in freelance computer programming abroad in the US and London, an MNE computer software firm in Dublin and within *Compuflex* working as program manager with a e-mail product and an on-line travel agent/service. His job with *CFN* involved localising software and tools for online transaction services.
- A programme manager (36) with a background abroad in video, CD-I and CD-ROM production for the training and entertainment markets, teaching foreign languages and within *Compuflex* in the *CFN* group localising entertainment shows and liasing with program managers in the affiliates companies in France and Germany.

In addition there were 10 contract 'vendors' brought in from other companies on short-term contracts. These contract staff, who could be 'let go' at a week's notice, allowed the company to remain flexible and responsive to changes in the market. Traditionally the contracts of these temporary staff were only renewed if their competencies were seen as essential to an upcoming project. With *CFN* a number of vendors had their contracts

renewed given their specialist and relatively scarce knowledge of online systems. Within the full time staff the essential employment criteria was clearly technical skills rather than design or editorial skills.

Interviewees in Dublin reported that at least 400 people were working on *CFN* in the US. The Dublin team had little interaction with the US team except via the company intranet or occasional teleconferences. Two of the team from Dublin had visited the States but their counterparts there had little time to talk with or meet them. From September 1996 to September 1997 the Dublin *CFN* team worked on localising elements of the service to deadlines and on establishing a good relationship with relevant colleagues in the US. The formal interviews with staff revealed however that this relationship was undermined by the distance and constant re-organisations within the company.

> '...the goals I set for the first six months was succeed at whatever they asked us to do, ...an opportunity to get our legs under the table..even through Ireland is a well-established centre of localisation..they don't know Dublin from a hole in the ground so when we went over to talk to them about localisation they didn't understand why we were there.'
>
> (Darragh, senior project manager, Dublin)

The other team members felt that their manager in the US and in Dublin were more interested in self-preservation and self-promotion than innovation. The project manager was visibly engaged in producing a strategy document for the group and consulting with the team while the researcher was present but interviewees indicated that team meetings were rare and strategy documents never came to anything. They believed that the presence of the researcher had prompted the manager to conduct these activities. It was also apparent that the lack of strategy and lack of management involvement in the day-to-day activities of the team meant that the group felt very isolated and powerless.

> '...the most difficult thing is trying to figure out what our objectives are, cause there's no written objective, we've never been told what the group is supposed to be doing, we're sort of defining it for ourselves. Some people end up trying to please the Americans all the time...'cos the head of the whole unit here is American.. I mean he's (senior project manager) a nice man but I don't know what he does and he doesn't know what we do – I can guarantee you that 'cos he never asks and he never sees it.'
>
> (Idel, programme manager, Dublin)

While the small team approach to projects is meant to keep the organisation flexible and motivated another feature of the company tended to undermine these objectives and the need for collaboration. Every six months personal evaluations were conducted on every member of the team and a set of criteria was applied to measure each member's progress. These criteria were clearly biased in favour of technological skills including 'passion for technology'. As the scores were distributed amongst the team not every member could do

well and indeed members went to considerable ends to promote themselves and highlight the failings of others. While management saw this system as a means of promoting 'excellence' employees said it meant they set conservative targets so that they would not be seen to have failed to achieve. This issue was particularly sensitive and the project manager went to considerable lengths to persuade the researcher that the system was good and fair. Employees had a rather different opinion.

> 'There's a real lack of creativity, and creativity in technology is certainly praised higher than any other area. It's a very disjointed team, not much communication. I like working with technical people because I don't have technical skills...my experience in *Compuflex* has been that people find it very difficult to appreciate your lack of technical knowledge...they can't even understand what you're doing here...team dynamics are quite interesting because people are pitched against each other...it's very competitive...and people will tell you things like, make sure you always set objectives that are easy to reach because you have to be seen to achieve objectives...it's taken very seriously and all goes on file, I think it's dreadful.'
>
> (Idel, programme manager, Dublin)

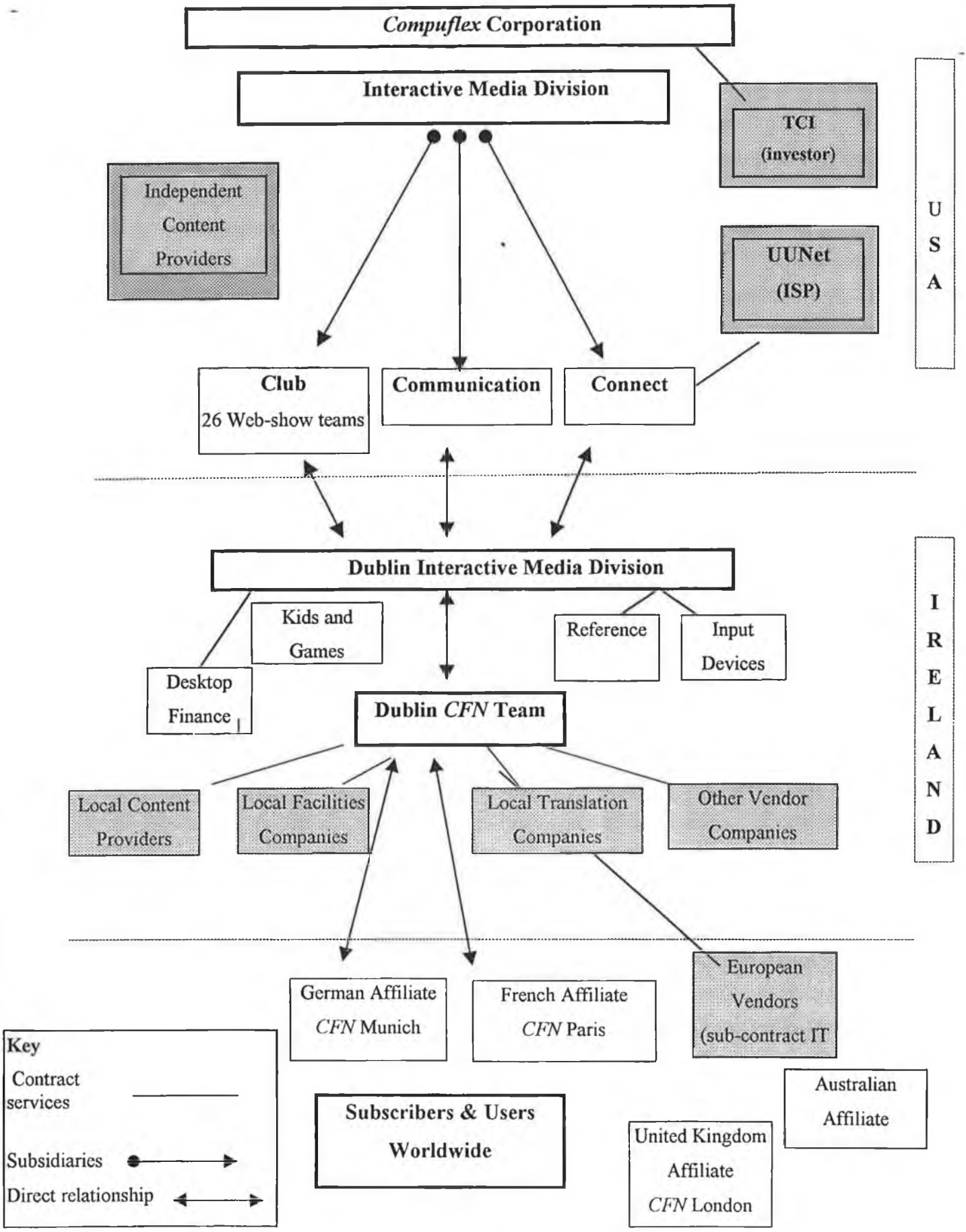
As a branch plant of a large organisation the *CFN* team have little input into strategy, design or content decisions about the projects they are working on. Interviewees indicated that the company was very centralised and the Dublin branch was dependent on the US centre for project instructions and the affiliates in Europe for localisation contracts and budgets. The *CFN* group could not localise shows unless commissioned to do so by affiliate teams in the particular markets. When asked if they could contribute to improving services or design new elements for the service interviewees indicated that they could contribute ideas but they were rarely taken on board. 'If you come up with an idea or solution..they just don't like that, ..*Compuflex* as a corporation is really centralised' (John, engineer, Dublin). In this regard *Compuflex* was similar to other global corporations which display asymmetric relationships of power with 'the global as a dominant place and the local as a dependent place' (du Gay 1997).

The Localisation Process and Institutional Bias.

Figure 6 maps the relationships between headquarters in the US and the affiliate and localisation centres worldwide during the second phase of *CFN* development. While this figure maps the network of relationships at the time of the case study research (Sept 1997) it must be noted that the actors were constantly changing in line with the constant changes in *CFN* strategy. As a result the network involved many heterogeneous actors and was constantly 'transforming' itself (Hughes, 1986). Other commentators define such networks as 'flexible systems of production' (Saxenian, 1991). *Compuflex* has distribution centres in the United States, Puerto Rico and Ireland as well as subsidiaries in 57 countries worldwide.

Software products are generally localised into 24 different languages. By contrast the global strategy for *CFN* could be described as relatively conservative given that there were only six regional versions of the service and only three in languages other than English, i.e. French, German and Japanese.

Figure 6 Actor-Network of the Compuflex Network (1997).



According to interviewees in the Dublin *CFN* team there are three different types of 'localisation'. 'Repackaging' involves changing the language and presentation of the product packaging to suit the target market, 'partial' localisation involves changing voices, names, and dates in the product but not changing the core content, while 'total' localisation involves translating and editorialising a substantial part of the content.

Prior to working on *CFN* four of the team members had worked on partial localisation of reference type CD-ROMs. With these products there was a distinctive product life cycle, not unlike book publishing, with all products aiming for release at the end of October to make the Christmas market. In retrospect localising CD-ROMs and software was regarded by the group as more easily managed than localising online services given that the products were 'fixed' entities and fully developed before the Dublin team received them. Localising a reference type CD-ROM involved separating the content from the code and translating the text. Given the type information involved this process was relatively straightforward and the language was less open to cultural misinterpretation. The translated text was then reassembled with the code, tested and the master CD burnt and copied.

The *CFN* team was established in Dublin in September 1996, six months after the second phase of the *CFN* service had been launched. During the first six months a number of problems had arisen when teams based in the US sent localised shows for different European markets to their affiliates in those markets.

> 'we had a lot of problems with editing material because they [*Compuflex*] had never used editors before and the French and German producers were turning down the localised shows which we were giving them saying that the language was unsuitable, etc. so [we needed to] set up a slightly different production process to what we would do for a regular CD-ROM'
>
> (Idel, programme manager, Dublin)

As a result the Dublin team hired a person with multimedia content production and editorial experience to bolster their team competencies. This person took responsibility for co-ordinating the development of new processes and routines for the localisation of the *CFN* shows. Their job was not made easier by the institutional bias towards technology and the lack of symbolic content and editorial experience in the company.

For the *CFN* team it slowly emerged that localising firstly an online product and secondly more symbolically laden information was quite different from localising packaged software and CD-ROM reference type products. Indeed different parts of the online service required different degrees of localisation. The transaction services, like travel and money services, were partially localised in much the same way that CD-ROMs had been with the main differences being the legal controls in each country and testing, given the complexity of the underlying network technologies. The content which accompanied these services and which

was designed to attract end users to the service however sometimes required substantial editorialising. Essentially the decision on what to localise depended on the potential cost, rather than end user reaction. In some cases Dublin and the affiliates were pushed to use American content unchanged.

> 'We'll take some of the stuff we like...some of the other content we won't-there's no point. It's not relevant to the market and would cost too much to localise it. It would be much cheaper to pay someone in the UK to develop unique UK content rather than localise. Like the world travel guide...they had this one on the UK and it was absolutely mental, a real Americanised view of the whole thing...even though it wasn't being released on the UK site...it was going out on the US site, we actually had to go in and rewrite the stuff...I worked with the UK travel manager...he read it as it was and he said it was completely bananas.'
>
> (John, engineer, Dublin)

The 'total' localisation of the web-shows involved not only translation but also editorial 'tuning' to make sure the translations were sympathetic to local cultural tastes. Despite the new intermediary working in Dublin the shows were still often returned by affiliates in France and Germany with more changes requested. In some cases they were simply rejected. Despite these difficulties only one person in the Dublin team was dealing with this area while the rest of the team were working on the technical side of the services and software. When this individual tried to explain to programme managers in the US that the content was unacceptable to the affiliates she would,

> '...get a bit of a black wall and they just say things like "just dub it out, dub it out and give it to them". It's a weird sort of situation because the Americans were trying to push the stuff the whole time to localisation, but the people who had to pay for it were the French and Germans. So my role is to evaluate a programme and give my opinion of it and that's a useful role because a lot of the time the Americans and French won't even talk to each other and the French we work with can come across as very aggressive; and they don't return e-mails to the Americans, they won't take phonecalls, people go over to meet them and they don't turn up for a meeting'
>
> (Idel, programme manager, Dublin)

Clearly there were immense difficulties negotiating between the parties in the US and affiliates as well as negotiating between different languages and cultures in relation to the content. For the *CFN* team in Dublin it became clear that all information was not the same even if it was stored in the same digital format. Employees had to change old processes and adapt new processes to cope with the online shows, but encountered considerable entrenchment and resentment given that routines were designed towards partial localisation and software rather than content.

> 'it's the nature of the content, not that it's online because the medium shouldn't make any difference. *Compuflex* aren't used to producing or localising entertainment stuff. Services, yes, more so because reference material in services are slightly closer to drawing on banks of material and databases...there are not as many problems with the

services side of *CFN* localisation, they're different types of problems...to do with the way hand-offs come in, updates....'

(Idel, programme manager, Dublin)

7.1.3 A Technology-Led Mode of Design

Based on interviews conducted with the localisation team and company documentation it became clear that the company's strategy for the *CFN* service was to 'leverage' company technologies: promote existing and new software applications and tools produced by the company. One interviewee described the company's strategy as trying to 'walk over competitors with technology and quality' and create a 'wow' factor (Harry, lead test engineer, Dublin). This strategy was evident throughout the form and content of the service. From the set-up CD to the website itself the service showcased the best and latest technology available to the company utilising high quality graphics, 360° panoramic images, animated figures, scrolling banners, video and flashing adverts.

This technology-led strategy had also led to problems with the set-up CDs for the *CFN* service. The *CFN* team in Dublin had been responsible for localising the set-up CDs that enabled end users to install the service software on their computers in Phase One. These CDs were distributed free to final users via a multitude of distribution channels: magazines, with other software products, at conferences and exhibitions, and on request. During the fieldwork for this case study the second release of the *CFN* set-up CD was being finalised, tested and bugs were being fixed. They were busy trying to rectify the mistakes made with the first CD, which was clearly not a user-friendly set-up tool.

The first set-up CD had not been successful in terms of user-experience or publicity. While technologically it had included the latest tools and software, had 'chummy' agents to guide one through the set-up process and lots of graphics and music, it was so complex that it tended to crash an average user's machine. Even if it did not crash a machine it took almost an hour to install. While these facts were known in advance by project engineers the general public had not been informed. Engineers within the Dublin team described how the US team had produced a product with lots of 'functionality' and 'features' in had probably been given no benchmarks against which to design i.e. download times on different types of modems. In the absence of such guidelines the software teams had a natural tendency to create the most technologically advanced CD-ROM possible.

One reviewer described the set-up CD as follows...

'..now that I had the software loaded...I could go online...I was soon left to a series of black screens. The old DOS black screen 'o death had been transformed into an entire online service. Sure, every once in a while you might hit some content, but frequently you wait while *CFN* loads something or other to get you to someplace you don't really want to be. Since the service is designed with a sleek, black interface, that means lots of blank, black backgrounds as you wait and wait and wait...

> ...the content is either flimsy or lousy or both. Chat rooms sit idle and reverence areas are brimming with shovelware...it's an enigma wrapped in a mystery wrapped in a big, dumb logo.' (Glaser, 1997)

In contrast the set-up CD for their main competitor, AOL, took only ten minutes to install. In Phase Two *Compuflex* decided to remove many of the audio and video files and just include the core software. Furthermore, the release was being more rigorously checked for bugs. Given the time frame and pressure from the marketing department internally and the media externally with the first CD release the team had little time to fix bugs and hence the problems for end-users. The need to release a product into the market and catch-up on competitors was the guiding imperative. It was impossible to determine in retrospect the extent to which these technical issues had impacted on subscriber numbers in Phase One of *CFN*.

> '...it crashed [during] set-up...Windows just died setting up *CFN* but the reason [for releasing it] as far as I could make out was in order to grab a foothold...in the Internet market, *Compuflex* wanted to get in there with something... it's not perfect but as we go along we'll improve it...and from that point of view it was a success'
> (Frank, test engineer, Dublin)

The strategy behind the *CFN* service which emerges from this story was clearly technology driven and this led to a number of problems for the localisation team and end users with both the set-up CD and the service.[70] Certainly the strategy of 'advancing technology' wherever possible was configuring and limiting their projected user group to 'early adopters' who were;

1) Primarily interested in the technology and the tools
2) Had a good level of computer literacy
3) Had high-speed connections, high-speed multimedia computers, and low online access charges.

This strategy was at odds with the explicit marketing of the service, which was towards the home user, and the content, which was aimed at men and women of all ages.

> '...people who are in the home with their home computers, a modem, that's the target market, maybe it's a bit broad...but I think they're trying to get everybody in there...the first CD they released...there was an opening audio-visual file on it - it had a young girl, a guy in his 20s, and an old guy and they were all trumpeting *CFN*'
> (Frank, test engineer, Dublin)

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[70] While researching this product initially [May '97] I used the first release *CFN* set-up software to connect to the *CFN* service for a month's free trial. Initially I spent 45 minutes trying to download plug-ins from various sites in the US, UK and Japan which would 'optimise' my user experience. Each time I was faced with 'fatal error' messages. Given that I had high speed access to the Internet via my university and was particularly motivated to access the site I wondered what it was like downloading software for end users who had to use a modem and pay online access charges.

This technology-led mode of design led to a very linear process of innovation which appeared to follow closely the routines established for software development: market and competitive analysis, prototype development, user involvement and product specification, development, testing and diffusion. This approach involved a highly 'uniform' conception of the end user being inscribed at an early stage in the artefact and did not allow for end user intervention once development had taken place. Crucially for the concerns of this thesis it also ignored differences between contexts and cultures of use, particularly problematic once the product was distributed beyond the US market. Indeed there was a considerable 'cultural distance' between the original producers and the final users in European markets.

The localisation team in Dublin had little information on who their end users were, how they used the service or what they thought of it. They had access to broad subscriber numbers and geographical location but no qualitative data. What they did know was anecdotal or gathered from online usergroups. As interviewees pointed out most of the team did not speak French or German and therefore could not understand the online feedback from their markets.

> '...the only thing you see is in some of the newsgroups. The stuff I see tends to be the US or the UK cause I can't understand the other news groups. You deal quite a lot with the producers in country. They're the ones who are managing the forms and stuff so they have a fair idea of the feedback'
>
> (John, engineer, Dublin)

> '...there is information, I was actually looking at some this morning, trying to get information on users, but it's all in terms of figures and stuff...but that doesn't tell you whether they like it or not..'
>
> (Idel, programme manager, Dublin)

> '...I don't know anyone who is using it, I never talked to anyone that has actually downloaded it and used it, but we do get feedback from the US team on what different people are saying about it and what different people are writing about it...I would like feedback from users to see what users experience of it has been'
>
> (Frank, test engineer, Dublin)

> '..I mean for some of the 'bleeding-edge' stuff, it's a bet I guess at the end of the day, there's no way of testing it or you cant afford to spend the time testing it'
>
> (Darragh, senior project manager, Dublin)

The lack of information on end users, the problems encountered by the content producer who tried to adjust routines to localise 'problematic' content, and the status associated with technological knowledge within the *CFN* team all highlight the dominance of technology over content or final users in the localisation of the *CFN* service. The tensions and negotiations between headquarters in the US, the Dublin team and the affiliates in France

and Germany also clearly revolved around the opposition of economic and cultural interests. Headquarters clearly wanted to produce homogenised global content while affiliates clearly felt that more locally produced content would provide higher subscription and usage rates in their own countries. It was clear that headquarters was pursuing an economically motivated agenda which involved maximising economies of scale. From a national perspective however affiliates wished to produce locally specific content.

In January 1998 *Compuflex* announced that *CFN* was to be fundamentally redesigned and repositioned for a third time. The new strategy involved removing all of the web-shows and eliminating all of their in-house content production facilities. The online service became a portal site, which provided access to content produced by well-established content producers. This marked a significant retreat from their earlier convergence based strategy. *Compuflex* decided to focus on its core competency, i.e. software design, and form alliances with global and national content producers rather than produce content themselves. This was clearly a strategy designed to overcome the gulf between the production teams and final users in specific markets and rationalise on the need to acquire culturally specific knowledge about their target markets. However, given that the changing strategy also involved the elimination of the content production teams in the US, it also signals that industrial convergence is neither an unproblematic or inevitable result of increasing digitalisation at the level of the information and the media. Within the *CFN* team in Dublin the content producer was no longer needed. This case would appear to confirm the hypothesis advanced in Chapter Three that producing content that represents ' difference' may prove more successful than producing global content for a universal user.

7.2 Specialisation and Collaboration – A Content-Led Mode of Design

This section will examine aspects of a contrasting mode of design which emerged in the other three case studies: *The Nerve Centre, RTÉ* and *Nua*. In these three cases the mode of design is clearly influenced by the strong traditional media cultures and competencies in the organisations. The content led mode of design is characterised by the prioritisation of the form and content of the innovation over the technological tools. It is also marked by the consideration given to the characteristics of, and feedback from, the end users. In all three cases the designers and the end users were from the same cultural background and this ensured that cultural 'specificities' and cultural conventions were shared by both the end users and the producers. The approach taken by these three organisations appears to focus on the semantic qualities of the content and the potential role of new media to support diversity and indigenous cultural communications. It usefully contrasts with the transmission model of communication adopted by *Compuflex* who in order to maximise economies of scale

clearly exploits new multimedia technologies to distribute de-territorialised and instrumental information.

7.2.1 New or Old Forms?

In contrast to *Compuflex* the other three case studies adopted to varying degrees a content or more communications-centred approach to content innovation. They all had access to an existing core of competencies in content creation and design and supplemented these by hiring new people with specialist technical skills. In addition they provided a supportive and flexible environment where existing staff could experiment with new hardware and software solutions, or learn by doing.

All three product innovations involved the respective organisations and their production teams in process innovation and the learning of new skills but crucially for this thesis these new innovations built upon existing skills in visual, aural, textual and spatial design. Furthermore, while all three cases were aware of global developments in multimedia technologies and content, their own innovations were clearly guided by their internal competencies, existing media forms and the cultural specificities of their end users.

In contrast to *Compuflex The Nerve Centre's* move into multimedia was not based on any capabilities in programming, CD-ROM production or on-line services but rather knowledge of traditional media and a history of award-winning productions. Their conception of multimedia does not foresee the demise of the traditional media but rather their **translation** into the digital domain; they do not see this as a 'revolution' but rather a development which offered new distribution possibilities.

> '...the concept of interactive multimedia...integrated all the separate art forms that we were involved in at that time which was working in film, and video, running a film festival, then the recording studios, running musical facilities.'
>
> (Michael, director, *The Nerve Centre*)

A recognition that multimedia involved a combination rather than a convergence of media skills is only one aspect of their conception. Based on examples of content produced in the US and the UK the centre believed that such work lacked dynamism, aesthetic appeal and engaging narratives. *The Nerve Centre* believed that,

> '...if the aesthetic side of multimedia is what makes it dynamic and makes it appealing ...it should be the people who can make good music, who can think up a good moving image, who have got good visual concepts...multimedia is about storytelling..having a good visual concept. It wasn't about computer programming.'
>
> (Michael, director, *The Nerve Centre*)

This design and content driven approach to multimedia was echoed in the discourses around European research projects like ESPRIT in the late 1980s and early 1990s and this

coalition of internal experience and external factors contributed to the development of their particular approach to multimedia production. From the beginning it was realised that multimedia required an extensive range of skills and that for particular projects additional partners would be required with technical skills, academic knowledge and content assets. The other production partner in the *Colm Cille* project, *The Institute for New Media* shares this content driven approach to multimedia. An interviewee from *The Institute* described his institute as 'unique' in that they 'cared about the content of media, not only producing multimedia as coloured pictures and technical things....the people who founded this institute don't have a computer background..they studied languages and worked in film..', (Harry, programmer). He defined multimedia in the following way. 'it's the bringing of particular content to different media, that means not only on computers. It means having the same content on printed material, on video, on CD-ROMs, on the web. [If it is] only on computers, that is for me single media'. The two production/training centres have negotiated their own meaning of multimedia based on developing content which is cross platform and content driven.

As media historians have noted, new media often borrow forms from existing social practices and media. In the case of the *Virtual Museum of Colm Cille*, the CD-ROM revolved around the metaphor of a museum. Adopting this metaphor had a number of advantages for both producers and final users. Firstly, it was something with which users were familiar and acted as a steering device, locating and immediately suggesting to end-users how they might navigate the text. Secondly, it had practical implications for the nature of the content, in that it would not have to be as detailed as a reference type product. Finally, the established procedures for creating a museum exhibition could be used as a guide when developing the virtual museum.

> '...if we were building a real museum...we would have to choose which object we would put into it, we would have to make the diplomatic contacts with donor institutions. We would have to research all that and do the proper rigorous historical stuff. Now in this case we never actually borrowed the objects but we had to in most cases negotiate getting the imagery of the object which sometimes was as complicated as getting the real thing.
>
> (Barry, historian, *The Tower Museum*)

Coming from such a traditional media background it is instructive to examine how this shaped the form of the content. In fact each of the traditional information modes were used, each recorded in their analogue form, and each subsequently digitised. The final product was a combination of documentary type video pieces, which one watched, and fictional animated tales, games and spaces that one had to navigate. The opening 'fanfare' was clearly influenced by opening sequences in films: dramatic music, scene setting, and no interactivity. The product also supplemented these traditional forms with realistic 3D

representations of artefacts, some of which existed in reality but none of which existed in the same relationship with the other artefacts. In other words the CD-ROM took a number of geographically and historically dispersed objects and established a new set of relationships between them.

> '...the objects in this museum will never be seen together in reality. Partially because of rows and politics and also because many of them you couldn't physically...because you can't do that in reality many people, except academics, don't see the connections'
> (Barry, historian, *The Tower Museum*)

Clearly the new computerised tools played a role as 'actant' in the design process. Initially the 3D designers found that their computers were not powerful enough to create 'realistic' renditions of the high crosses and precious artefacts. Designers would spend hours drawing detail and then wait for the computers to render the detail or recover from a crash. New equipment, acquired half way through the project greatly alleviated these problems but it was evident that initially the designers suffered from 'technological awe' and often overused the new tools and affects. For example too much shadowing might be used which obscured the precious objects. With increased experience and tinkering however a more reserved and content driven approach re-emerged.

What was 'new' about the form of this multimedia artefact was the 'imaginative landscape' which was created and the ability to view objects from more than one perspective. This move beyond standard monocular perspective was an obvious advantage over the more static museum experience. Interactivity was limited, as in the opening sequence when there was none, or when the video clips started. In other areas one controlled the viewpoint, zoom, navigation and depth of information by using the computer's mouse and clicking on objects. Navigation was aided by visual cues, roll-overs and lighting which guided the user to exits and objects and in many cases drew upon existing media conventions. Such devices included navigational buttons designed to look like buttons on a stereo.

While clearly creating 'realistic' artefacts, fantasy landscapes and an engaging experience were the design goals in the original concept, when funding was received from Co-operation North in June 1997 there was an additional requirement to consider educational objectives. The appointment in September 1997 of an educational officer caused one of the rooms to be transformed into an activity room. The objective of this room was to create educational devices which would allow teachers to integrate the CD-ROM into the national art, music and history curricula through special user-oriented learning tasks and conform to government approved Special Educational Needs (SEN) guidelines. Suggested exercises include map work, story/cartoon development, matching words and images, design based on

traditional manuscripts, letter/diary writing and role-plays, all of which drew upon the content in the other rooms and aimed to get the final user to reflect on their experience.

This phase of the content development had to balance the often conflicting demands of trying to make something which was both educational and entertaining without sacrificing the former to the latter. The advantage of creating an educational product lay in the guaranteed market. It also meant however that the content had to fulfil certain informational standards and adapt to national educational curricula both north and south of the border. These requirements transformed interface/navigational design, scripting and language, as much of the language had to be rewritten to suit younger age groups. A number of educational workshops in animation and multimedia techniques conducted with local school children allowed the Centre to test the product, and adjust aspects of the form and content to final users and contexts of use.

The *Virtual Museum of Colm Cille* used a number of different media forms in combination but also clearly added to them in relation to how they were presented, how they interacted with each other and how the final user experienced them. Interactivity was clearly limited in this piece to user-controlled navigation and point-and-click and there was little opportunity for the end user to engage in content altering or co-authorship.

7.2.2 Representation and Cultural Content

Within communication studies representation is the 'production of meaning through language' and language can mean images, text or sound. Each of these languages consists of signs which act through processes of signification to communicate meaning. While all texts may be read in many ways, producers still try to inscribe particular meanings in a text. However, in order for language to be meaningful there must be a shared understanding of the underlying set of codes and conventions between producer and user. This section will examine how designers in two of the case studies drew upon established representational systems to inscribe the cultural characteristics of their final users into the content of their multimedia innovations.

Example 1

The initial projected user group of the *Virtual Museum of Colm Cille* was people of all ages and both the nationalist and unionist communities in Ireland. As a result the scripting and presentation of each element in the CD-ROM had to be carefully planned. The video scripts were more-adult orientated, historical and involved local well-known personalities from both communities. The animated pieces by contrast were orientated towards children; more humorous and contemporary, full of first person speech and dramatic points. These

pieces drew heavily on Irish myths and legends, well known places and easily recognisable symbolism.

The local newspaper, *The Derry Journal*, carried a colour supplement on the 9th June 1997 to commemorate the 1400th anniversary of Colm Cille's death. Twenty pages of stories, photographs and listings informed the public of the activities organised for the June weekend. These included sailing a curragh from Derry to Iona, an island off Scotland, religious services, recitals, street theatre, a visit from the President of the Republic of Ireland Mary Robinson, and the 'unveiling to public of CD-ROM *Virtual Museum of Colm Cille*.' [sic] In a supplement laden with information on religious activities the article on the CD-ROM stood out. The headline '*Colm Cille to surf the net. Nerve Centre's exciting "Virtual Reality" project*', employed dramatic language to catch the reader's attention. It went on to describe how the local multimedia centre had produced a 'genuine cross-community vehicle for exploring a shared history of art, literature and learning, [which] will have a major cultural, educational, economic and tourism/marketing role in the future life of the city.' (Derry Journal Supplement, 1997:9).

The main emphasis in the rest of the article was on the potential of this technology to create a 'new form of literacy for the 21st century, a new way of seeing the past'. It argued that the CD-ROM could be employed to overcome local disadvantage, and generate a 'sense of inclusion' for marginalised people. Indeed it argued that a rediscovery of the ancient tradition of Colm Cille and in particular his potent symbol - the dove of peace-could have important ramifications for the Northern Ireland peace process and attempts to build a non sectarian sense of locality and cultural nationalism.

The relationship between local culture and the design of this CD-ROM operated on a number of levels. Firstly, the choice of *Colm Cille*, supposedly the founder of Derry city and whose name adorns street names, churches and schools, was a choice which was already strongly coded in cultural terms, and therefore emotive, specific and meaningful for both final users in all parts of Ireland and the designers of the project as citizens of that culture. Secondly, given that the designers were local people they could construct a clear concept of their final users by acting as 'reflexive users' and by drawing upon their own cultural sensibility to encode aspects of local culture in the text. One had only to analysis the music, language, images and designs to find particular Celtic, Gaelic, Anglo-Saxon and 'traditional' motifs.

Thirdly, the gathering together, interpretation and translation of this cultural material into the digital domain in some way was seen as an attempt to highlight the commonality between different traditional cultures after years of conflict and hostility in the local area. The CD-ROM attempts to associate cultural identity not with the land or the island of Ireland as many brands of cultural nationalism have, but rather with a cultural era when such

boundaries and religious divides did not exist. This search for a re-appraisal of cultural tradition points to the particular role that cultural content can play in local cultural regeneration and wider political processes.

Finally, the designers of the *Virtual Museum of Colm Cille* were acting as 'cultural intermediaries' in Bourdieu's use of the term by taking an aspect of local culture, which forms an integral part of local geography, history and collective memory and reworking it into modern forms for modern media. This allowed them to place local traditional culture, often viewed as old-fashioned and conservative, alongside popular culture from other countries. This in turn both validated and empowered the former.

> '...you know you see a local story which might...entertain somebody for two seconds in a pub with four pints being turned into as good, as, if not better than a Disney cartoon. ...to me that could have a tremendous cultural affect...that will make people more sophisticated in their appreciation of their own culture. Because if they are seeing the representations of their culture on the back of an old photocopy, you know as compared to Hollywood representations of that culture you know costing $50 billion dollars, obviously that must create a loss of cultural identity and a loss of culture.'
>
> (Barry, historian, *The Tower Museum*)

Example 2

Another example of determined cultural inscription for an 'Irish' user is found in the *RTÉ* case. Here the designer's vision of the Irish user and their context of use clearly shaped the form and content of the websites and how they evolved over time. The process of design was experimental and open, reflected in the changes implemented between the first and second web designs. Furthermore, the website was built with the organisation's public service broadcasting and cultural development ethos to the forefront.

An online department was established in January 1996 in *RTÉ* and initially employed just one employee who was formerly a journalist with the *RTÉ* teletext service. The job brief 'involved creating and setting up and deciding what ..a website was' (Jim, content editor). Shortly afterwards a technical director was employed who had experience in theatre, television production and doing live television 'netcasts' on the Internet. These two staff developed the first official *RTÉ* website, a primarily text based service but one whose main aim was to provide information on the organisation to Irish people at home and abroad and link directly into Aertel, the station's teletext service, to provide breaking news. There was no video or animated graphics. The site provided a description of *RTÉ*, information on services and tuning frequencies at home and abroad, contact information and policy documents (on digital broadcasting, public service obligations, and information society

initiative). Audio digests were also provided of news bulletins.[71] The style and content of the site was guided by the official corporate identity.

While the corporate information pages were easily produced the integration of the Aertel television teletext system with the website posed more complex technical and content problems. The aim of the Online group was that the television and the web systems should integrate automatically and in real time. Given that the Aertel system is a highly stylised system developed to piggyback on an analogue television signal there were considerable limitations imposed in terms of the size and style of the text: 120 words in each story, no paragraph longer than four lines, courier font, etc. The problems encountered are a good example of technology as 'actant' and how old technologies can place limitations on the form of new content developments.

The interviewees pointed out that this part of the website was the most popular according to their automatically generated 'hit information'. 'You can gauge the hits that come to the site page by page. If you look at the news index last Friday, which is page 103. Not a particularly strong news day. The day after the by-election. A standard kind of news day got 22,000 hits on its own. So that's just one page of headlines' (Larry, designer). When Sinn Féin were thrown out of the Northern Ireland peace talks in early 1998 the server technology 'fell-over' with the number of people trying to access the Aertel service. The Internet would appear from this example to be particularly well suited to providing breaking news; the CNN/Sky news model of immediate information diffusion. In comparison websites, which are tied into newspapers, tend to be restricted to a 24-hour news cycle.

> '*RTÉ*, how do they compete? Well...over the last few days, our breaking news out of the North...that's the wonderful things about the Internet, you can have a small company yet have a big, a very big presence on the web. I don't think anyone competes on the Internet, everybody just produces for it and tries to identify an audience and tries to attract them. '
>
> (David, technical director)

The initial aims of the *RTÉ* website were to provide a public service to the Irish diaspora and to test the available hardware and software technologies. Until April 1998 the official *RTÉ* website was a low key 'research and application' site. The site used the muted corporate colours of green, blue and white with few graphics and no flashing icons. While 2FM, the station's second radio station, carried some advertising, the *RTÉ* official website did not. By early 1998 the site was getting 80-125,000 hits a day rising to 1 million for events. *RTÉ* reported that 60-70 percent of these users were from outside Ireland: the US followed by Australia, UK, Japan and Germany.

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[71] Irish emigrants had already set up links with Irish universities and companies to record RTÉ radio news bulletins in Irish and English and send them abroad using mirror sites in the UK, the US and Australia.

Clearly the use of the Internet had increasing dramatically during 1997 in Ireland and abroad. This was confirmed by a Midas-Net survey of the top 500 businesses in Ireland in 1997 which found that Internet use had grown from 38 percent to 64 percent in eighteen months. [72] In total the survey found that in 18 months there had been a 41 percent increase in the total number of companies who reported having Internet connections. That year the Irish Internet Association in an online survey of Internet use in Ireland established that people were using the Internet for information on commercial products, research, news and entertainment. What these surveys indicate, albeit in the business world, is that the number of users online in Ireland grew significantly during 1996/7. The main barriers to growth identified by these surveys were slow access (30 percent), security (19 percent) and unsavoury material (19 percent).[73]

> '...there's greater awareness within Ireland of it. There's a need for *RTÉ* to address that. We've...always concentrated on people outside Ireland. Doing our promotions stuff out there, trying to bring people back into Ireland. But now we have a growing market here in Ireland to serve as well. There's more and more people online in Ireland that want *RTÉ* information...and if they've been able to get it we want to make them more comfortable in getting it. So we need to talk to them.'
>
> (David, technical director)

In response to the growth of the Internet in Ireland, *RTÉ* Online launched a number of special websites in 1997, which were clearly more orientated to an audience located in Ireland. Furthermore, the design of these sites went far beyond the *RTÉ* corporate look and feel due to the arrival of a graphic designer who was trained in multimedia design. Some of the sites had a trans-European audience in mind, e.g. *the Eurovision Song Contest site*, while others were clearly aimed at an audience interested in Irish cultural events, e.g. the *Sam and Liam* site which followed the annual Gaelic Athletic Association's hurling and football competitions. These sites began to experiment with new audio and video webcasting technologies as well as online polls, voting and other means of interacting with final users.

E-mail posted by Lawlor, A. on 21 Sept. 1994, on the soc.culture.celtic newsgroup.
[72] www.midas.ie/2ndsurvey.html#2RTFToC9
[73] www.iia.ie/newsurvey/surveyresults.html

Table 30 Archived RTÉ Event Sites, 1997-1998.

When you create a website for a specific event, it's always annoying to have to trash all the work when the event is over.
So if you simply have to check out that "Zero Pointe" Norwegian entry, that All-Ireland Football Final preview, or that infamous Dustin interview, you still can, here at the Website Archive.
Budget '98
RTÉ Online present a special website to report on this year's budget, including video and audio of the Minister's Speech
The Race to the Park
The Presidential Election, complete with candidate profiles, audio & video broadcasts
Eurodance '97
RTÉ ONLINE in association with EBU presented a night to remember involving
24 national radio stations across Europe.
Sam & Liam
This year's GAA championship brought to you in association with RTÉ Sport.
Election '97
Coverage of the 1997 Irish General Election.
Eurovision '97
The official website for the Eurovision Song Contest 1997.
Produced by RTÉ Online @ http://archive.RTÉ.ie

In the context of the growing number of users in Ireland and the increasing experience within the Online department the official *RTÉ* site was redesigned and relaunched in April 1998. This was part of a broader corporate Internet strategy, which launched an integrated Internet strategy across all divisions of the organisation. All television programmes would now promote the *RTÉ* website and each programme, where possible, would develop their own website in conjunction with the *RTÉ* online department and after a period of training. While the site would still attend to the Irish abroad, rebroadcasting programmes that were not accessible by traditional means, it also now acknowledged and addressed a local audience.

> 'Well the existing remit was to serve news and information to people outside Ireland that were beyond the terrestrial reach or the reach of our terrestrial transmitters. ...the new remit will be to integrate tighter with *RTÉ*'s operations in every aspect. Also with radio and television you never saw the URL or the address of the website come up. Once the new site launches that'll be everywhere...It'll be much more tightly

integrated with *RTÉ*...It's succinct, it's clear and also functional. It does what it is supposed to do. You are not...waiting for this page to download, you're not gonna click ten times to get to something. We're really trying to improve our navigation at the moment. It's four clicks to anywhere on the site. We want to bring that down to two.'

(David, technical director)

In redesigning the website the designer and content editor were conscious that they wanted to keep the *RTÉ* corporate look and exploit *RTÉ*'s reputation for quality news. Technically they wanted to keep an open systems policy whereby as many people as possible, no matter what type of computer system they used, would be able to access the content on the site. They were also conscious that the information on the new site should be kept up-to-date and dynamic

'...we set ourselves some fairly strict guidelines about technologies ...we didn't want to use frames because historically there have been problems with navigation attached to frames...I was gonna rely on tables, which has been around for a while now. Most browsers can support it...apart from that the sites gonna be as much as possible text and small graphics. We tried to set ourselves limits of 30k a page. These considerations always steer you towards mono or very plain colour graphics, flat colour.'

(Larry, designer)

The representation strategies adopted by *RTÉ* did not attempt to characterise 'Irishness' and Irish culture. The website covered 'events' from other cultures but importantly these 'events' were always secondary to home events. The strategy was clearly to exploit the specificity of *RTÉ* rather than compete with global media companies like CNN and the BBC. A visit to the website on the week that President Clinton admitted to having 'relations' with Monica Lewinsky and the bombings in Afghanistan and Sudan found that the main headlines were the Omagh bombings and a link to the *Sam and Liam* GAA pages.

In addition to news and general information the new website aimed to develop potentially revenue-generating services. These services included exploiting 'push technology' whereby final users would sign up for an e-mail service and get several bulletins of Irish news a day. These services were also seen as developing closer user/producer relationships. Interviewees foresaw that the department would have to start earning income within two to three years, either through services or advertising. However they still conceptualised the website within the corporation's broader public service remit and therefore certain information was always going to be free.

'It is a functional site. If you are sitting in Hong Kong and you go "I just heard about a bomb in Ireland, I'll go to *RTÉ* cos I know I can get into it in two clicks...That's important because you know to use that powerful cliché, users are number one. That's who the whole thing was designed for.'

(David, technical director)

In terms of the influence of traditional media structures and values it was evident that the group were driven by the need to present timely and up to date news to Irish people at home and abroad rather than a need to use the latest technologies and design features. This media influence extended to their job titles, which were content editor, technical director and graphic designer. The content editor had changed his title from webmaster because he felt that people within a broadcasting organisation would better understand what that role entailed. The group's design strategy was driven by content and national/local issues rather than the technology. In fact the name '*RTÉ* Online' indicates the continuing primacy of the traditional media and content from/of Ireland.[74]

> 'at the end of the day it's an *RTÉ* product. You know we are *RTÉ*. We're not changing our spots..we're been better integrated with television and radio. Before it was kind of this gimmick factor. Now it's a real product. A real part of shows. Get those details on the website..this is our way of sharing information.'
>
> (David, technical director)

It is clear from this brief analysis that the *RTÉ* website and *The Nerve Centre's* CD-ROM tried to represent their final users in their choice of content, language, images and sounds and account for their contexts of use (small page sizes because of high online telecommunications costs in Ireland). Their mode of design was clearly aimed at inscribing in the text what was considered to be specific about Irish identity and contexts of use while making the technology as transparent as possible.

7.3 End-Users as a Source of Innovation.

Clearly if the end user, or the cultures with which they identify, are well represented in the content of an artefact, organisations can improve the diffusion and use of their products in their target markets. Another means by which a content innovation can be improved is by gaining access to 'learning economies', which take place outside the formal economy, and after the diffusion of an artefact. Chapters One and Three of this thesis proposed that traditional innovation theories tended to ignore this stage of the innovation process. However more recent STS and learning economy research has proposed that final users are an important source of ideas for innovation. Communications researchers also propose that the production/consumption junction is an important site in relation to social and cultural innovation. The role of the informal economy in relation to socio-economic innovation has already been examined at a macro level in Ireland in Chapter Four. This section of Chapter Seven will investigate various

[74] Translates into Radio, Television, Ireland.

mechanisms by which end users implicitly or explicitly influence the process of service innovation in new media in the formal economy.

All the case studies indicate that the end user played a role in the process of content innovation but that this role was often indirect, anecdotal or based on the experience and cultural capital of the producers themselves. Three strategies emerge from the research. The first, the 'reflexive user' approach, was clearly adopted in the early stages of the design process in all cases as the designers formed a 'mental representation' of the end user which either consciously or unconsciously guided the design process. This cognitive strategy played a role in *Compuflex*, *RTÉ*, *Nua* and *The Nerve Centre* and has been detailed in the last two sections. A second strategy was adopted by all the cases after the artefacts were launched and involved informal feedback via e-mail, letters and peer reviews which subsequently informed incremental innovations. A third strategy was used by *The Nerve Centre* for its CD-ROM project and this involved workshops, demonstrations and 'hand's on' sessions with 'socially relevant groups' prior to the official launch of the product. The next two sections will look at how two of the cases used information gathered via informal and formal feedback mechanisms to improve their content innovation.

7.3.1 User/Producer Relations – Informal Mechanisms

Research conducted in *RTÉ* suggests that while the organisation had conducted no surveys or market research as to their potential users, the projected user of its websites in 1996 was an Irish male, 25-35, well educated, earning £30,000 approximately and technically literate. Initially it was also presumed that the final user was located abroad, given the low level of Internet usage in Ireland, and probably working in a computer or engineering related industry given the traditionally high levels of emigration from Ireland in those disciplines and their work-related usage of the Internet.

> '...if you look at the audience groupings in general...I think we probably match it reasonably closely. We haven't done a demographic study in terms of male/female age groups or whatever. We are far more interested in location and type of operating system people use. You know, the limitations that they're viewing our site with and the speed of access they have to the site and their comments about our download speed.'
>
> (Jim, content editor)

Final user response to the *RTÉ* official web service was generally positive according to online feedback from a number of informal channels. As indicated earlier Internet surveys indicated that Internet use was increasing in Ireland during 1996/1997. This was reflected in the amount and type of feedback received by the organisation. Interviewees indicated that feedback had become more critical over time as the official site remained

unchanged, in terms of design. This points to increasing social learning and use as the market became more familiar with new technologies and demanded better and higher quality services. Thus what was acceptable and innovative in early 1996 was 'outdated' and 'boring' by late 1997.

> 'There's a form on the page and there's a reference to it at the bottom of every page throughout the site just saying let us know what you think...and they rate the site from brilliant to terrible, certainly in the last six months we've noticed that people who used to say very good are now saying good...There is a higher expectation on the web that sites will look glitzier and glamorous. And I think we are going to respond to that with the new site. Having said that I noticed, when was it, 18th February [1998] we launched Radio One live on the website and since then everything that used to say good has gone to very good again. You introduce a new service and people do respect that.'
>
> (Jim, content designer)

The relaunched *RTÉ* website in 1998 was an attempt to respond to the wider diffusion of the Internet in Ireland and the increasing literacy of the users. This response was based solely on online user feedback and informal knowledge. For example, the producers had noticed that they were getting less e-mails asking them to explain how to download plug-ins. In part this was due to the increasing standardisation of this technology in the latest browsers and in part due to the increasing social diffusion of this knowledge. It was the content editor's job meanwhile to monitor the 200 e-mails and 40 questionnaires that were submitted electronically each day. In August 1998 *RTÉ* advertised for three new online 'journalists' and assistants who would be responsible for keeping the content up-to-date, archiving old content and responding to e-mails.

It was apparent that the designers treated feedback via e-mail seriously and were determined to develop new tools for interacting with their audiences and users.

> '...you can give people within Ireland, license fee payers, information about the organisation far more than we had done. Give them access to program schedules in a far more structured way...using e-mail...we need to respond more to the Irish audience profile and start generating websites for programmes that people are interested in, the web community are interested in'
>
> (Jim, content editor)

7.3.2 User/Producer Relationships –Formal Mechanisms

In the case of *The Nerve Centre* there was constant interaction with relevant social groups who were potential consumers of the *Colm Cille* CD-ROM product. Given that the producers were also trainers on a number of courses aimed at children and adults they were constantly in touch with potential final users. However much of this interaction was diffuse and not directed towards particular learning goals. A more important channel for learning were the workshops, events and demonstrations organised specifically as part of

the *Colm Cille* project. These interactions were useful sources of know-how and know-who as well as important in terms of raising awareness about the product.

In June 1997, and as part of the festival organised to celebrate the 1400th anniversary of Colm Cille's death, *The Nerve Centre* arranged a demonstration of their CD-ROM in the small 60 seat cinema of the local museum. The publicity in the local Derry Journal has already been described and in addition the local radio station announced free hourly demonstrations of the CD-ROM. The demonstrations were open to the general public on Saturday and Sunday and Monday was reserved for local schools. Prior to the weekend Monday had been entirely booked up by schools. The media attention, measured in terms of newspaper columns, radio and television minutes, was impressive.

As these demonstrations were of work in progress, a member of *The Nerve Centre* staff introduced the presentation and then using a projector the work was viewed on the cinema screen. This translation of the information from new media to old involved some loss of image and sound quality and meant that the experience was non-interactive for the audience. Despite these limitations the reaction from the general public and the school children as gauged by feedback sheets were generally positive.

Almost 80 percent of those who responded to randomly distributed questionnaires after these presentations felt that they had learned something new about Colm Cille [n=36]. Interestingly 21 of those 27 who answered positively were from Derry. Females were generally more positive than males indicating that multimedia forms may be helping to redefine computer/gender relations away from their more 'masculine' and technical origins. While some respondents indicated that they liked all of the presentation [nearly 14 percent] others had a favourite room [just over 11 percent]. Analysed by age it would appear that of those who expressed a preference it was young people [circa 12 years] in particular who expressed an appreciation of the 'game-like' cinema room which contained the animated stories. By far the most popular aspect of the demonstration was the animation followed by the music and 3D objects.

Lower ratings were indicated for video, interactivity and voice-overs. The response in terms of interactivity is hardly surprising given the mode of presentation and the translation from computer to cinema screen also meant that the video clips lost a lot of quality. Other areas which people indicated might be changed were the speed at which the computer responded to choices made by the end user, the balance between sections aimed at children and sections aimed at adults and the depth of content. Older people in general were less engaged by the animated Colm Cille figure and were in favour of more voice-overs and narration. Overall people of all ages reacted positively to the notion that something was being made about a local and familiar character.

At the same time more intensive hands-on sessions were conducted with a boy, a girl (10 and 16 years respectively) and a teacher from each of a Catholic and Protestant school. These sessions were conducted in *The Nerve Centre* and videod to get a more realistic impression of how young people engage with, and use, an interactive CD-ROM. Three of the children had also been to the demonstrations in the Tower Museum although they indicated that the experience was much better when used individually on a computer.

In discussions with the teachers it emerged that their was a lack of computer facilities and appropriate software in their schools which was preventing them getting more involved in the *Colm Cille* educational outreach programme. In their schools, for example, there were only a couple of multimedia CD-ROMs and they had no Internet connections. As a result there was little experience of multimedia either amongst teachers or children. What experience the users in this session had was gained from computer use at home or collaborations with friends. This computer usage mainly involved computer games. These patterns of use point to the importance of informal social networks in the diffusion of new knowledge.

In the first session the 10-year-old children found the content 'good' and enjoyed when they recognised local places, names and people. They also found the animations amusing and interesting. Their teacher felt that the content was very good even if certain things needed refining; including the navigation and the speed at which the animations moved. Some of the issues which emerged were;

- Some of the language was too difficult for the younger age group. For example terms like virtual and multimedia had to be explained to the children. Producing a CD-ROM potentially for all age groups raised interesting questions about the complexity of language to be used and led to discussions with designers about the inclusion of glossaries and pronunciation guides.

- The younger children were engaged by the animations but found the more serious 'documentary style' video elements rather tedious.

- Sometimes the technology/interface proved to be a barrier to navigation to the extent that the user could not proceed. For example, the younger children found that the Colm Cille icon 'wouldn't go' at certain times. In fact their co-ordination of the mouse and the icon on screen was limited as they often moved the mouse so fast that they lost sight of the icon.

- There was no escape option and when the children could not find an exit they got frustrated. The teachers pointed out that an 'average child would have given up long before.' Furthermore even after a number of 'journeys' through the rooms they found it difficult to recognise doors and were frustrated when they kept entering the same room.

- These children had difficulty filling out a worksheet with some basic questions on the text. It would appear that their lack of computer experience and inability to navigate successfully was impeding their ability to learn about the subject.

In the session with the two 16 year olds it was discovered that all except one of the stories were new to them and they felt the stories went into more detail than they would normally do in school. Their teacher felt the CD-ROM would be useful in relation to the history, art and music curricula; prior to this children were only taught about Colm Cille in religion class.[75] The teacher also felt that the range of content on the CD-ROM would allow her to learn new things also. The teacher and pupils both felt that learning via the CD-ROM was in places quite similar to traditional learning from books or videos. However in other places the visuals, animation, music and searching activities together produced a different/new form of self-directed learning. Rather than having to listen and learn, or learn by rote, the CD-ROM was seen to be educating while entertaining.

The 16 year old children were able to answer all of the questions relating to the content indicating that their greater level of computer literacy compared to the younger users and their active engagement in the text. The older pupils happily spent over two hours exploring the content; twice as long as a normal class period. Some of the issues which emerged were;

- The older age group found it 'strange' but 'nice' to see their locality on a computer screen. This reflects the lack of locally produced content on this platform.

- They expressed delight at the little animated icon of Colm Cille and their ability to control his movements using the computer's mouse.

[75] The aim of the project to redefine *Colm Cille* as more than a religious character would appear to have been successful given these reactions.

- They found navigating around certain rooms difficult. They found the doors confusing and even after several visits they could not tell the difference between them.

- In terms of content the most popular aspect was the animated stories. The children liked the different animation styles used in each story, [Asterix, mosaic etc.] the sound effects and the music. The music ranged from traditional to modern dance and they felt that the music was well matched to the content of each room.

It emerged from both user sessions that the technical competency of these final users did not match the 'projected' user image as used by the designers to guide content development. This was particularly evident in relation to navigation where it would appear that more directional aids were needed if people were to negotiate the content and continue to be engaged in the self-directed nature of the experience. Despite the familiarity of the museum metaphor the technology was still not intuitive for the end user.

What is evident from these sessions is that the children found using the CD-ROM/computer pleasurable and even if they had little experience with computers they were willing to 'give it a go'. What computer knowledge they had acquired was mainly from using computers at home and gaming consoles like Playstation. However this meant that they were familiar with the interface, the 3D environment and using a mouse. Despite this, navigation was far from easy and at a certain stage the end user's frustrated negotiation of the interface reduced the pleasure of the experience. In addition it was clearly evident that much of the content was new to the end users even though the stories were ostensibly part of their local culture and heritage.

These findings were discussed with the production team and used to both refine the interface and navigational structures of the CD-ROM as well as the content and scripts. In addition the funding from Co-operation North meant that the product had to be altered to suit a teenage audience. This removed some of the problems with regard to the complexity of the language and the mismatch between serious and humorous elements. Some key alterations to the original concept included altering the language of the scripts, a decision to turn one room into an activity room which teachers could use to gauge if the children were learning from the content of the CD-ROM, improved navigational cues including differentiating between the doors into each museum room, inserting a map to show the user where they were in the museum and the development of a navigational bar to aid forward and backward movements.

A criterion of the funding provided by Co-operation North was that *The Nerve Centre* should run an educational programme alongside the production of the CD-ROM. A full time educationalist was hired to implement an outreach programme with schools on both sides of the border and to organise workshops in animation, video and sound techniques as well as other activities. During the school-based workshops the children learnt clay animation techniques and these were then filmed and shown during the local film festival. A follow-up to these activities took place in *The Nerve Centre* where 11 children aged between 10 and 11 years were introduced to the stories and myths of Colm Cille already produced for the CD-ROM. Then the children were allowed to take some of the designs and alter and manipulate them using Adobe PhotoShop.

A final example of outreach activities and how they integrated into the production of the Colm Cille CD-ROM was the residential workshops, one of which took place during Northern Ireland's film festival in Derry. This two day residential for children from Derry and Letterkenny, (across the border), involved the children in the creation of storyboards based on the life of *Colm Cille* and then the exploration of different techniques to animate these stories, both traditional and computer based. Assistance on this workshop was given by the centre's animator, already well known for his award winning animations for BBC NI, and the Wright brothers, best known for their work on the Wallace and Grommit cartoons. The quality of the animations produced meant that a selection of them were included in the activity room of the final *Colm Cille* CD-ROM. Clearly the end users were intervening in a very direct manner in the content innovation process.

7.4 Conclusions

This chapter provides evidence which contradicts the claim that industrial convergence is an inevitable process and that all information industries can be conflated for the purposes of theory or policy making. The case studies presented in this chapter highlight the continuing salience of cultural differences, the rigidity of organisational cultures and routinised habits and the important role they play in determining the process, form and content of an innovation. In particular the cases indicate that there are different modes of content design which stem from these different organisational cultures and the primacy of economic or cultural values in these organisations. These factors crucially influence the form and content of the innovations and ultimately final user reaction to them.

These empirical studies highlight the negotiated and contextual nature of the process of innovation. It was evident that the orientation and value systems of the organisation, the history and skill set of the design team, the cultural and cognitive distance between

the designers and their end users and various feedback mechanisms played a role in shaping the form and content of the innovations. Furthermore, it was apparent that the new media borrowed heavily from older media in relation to both form and content. In part this was to keep production costs low but also it was a means of coming to terms with the potential of the new technologies. Thus the teletext news service, documentary video inserts, television like web-shows and animated cartoons appear in various guises. This search for new ways of combining old and new media can be seen as a kind of 'intertextual bricolage' and undermines any claims that such innovations are radically new or revolutionary.

There were clear differences between the technology-led mode of design and the content-led mode of design. The technology-led mode of design followed closely established routines for software development and thus once user needs had been specified these were encoded in the design and the procedure continued in a linear fashion. This process became problematic when the product was subsequently localised for different markets and cultures of use. Furthermore, it was apparent that the content was only a means of leveraging the latest technological innovation and the overriding strategy in localisation was to 'de-territorialise' information from its cultural and meaning context. This evidence supports the claim by some political economists of the media that global media companies in their search for economies of scale produce content which is less culturally and market specific and that this has implications for the diversity of sources and types of content.

The cases which adopted the content-led mode of design tended to approach innovation as a more open process of experimentation and mutual learning between designers and end users. Throughout the design cycle, and in the early diffusion phase of the online projects, it was difficult to draw boundaries between development and diffusion as the form and content continued to change. In addition designers were attentive to the need to situate and contextualise the content. In many respects the cases tried to make the technology as transparent as possible and the content as engaging and meaningful as possible to their target users. Thus the process of design was informed by specific contextual and end user issues which entered into the content creation process via informal and formal mechanisms. These representational strategies were refined over time as the design teams became aware of changes in the marketplace.

These examples point to the locally embedded and socially shaped nature of innovation. They further point to the numerous barriers and limiting factors which act to slow the dynamic of technological innovation including the need to learn how to use the technologies, both within firms and in the wider context, the need to experiment with different forms and types of content and the need to stimulate wider social learning and appropriation processes. It would appear that in relation to the creation of 'cultural content' development strategies

which can adequately represent 'cultural difference' and 'cultures of use' within their texts and develop useful user/producer channels have a better chance of gaining acceptance with final users.

Chapter Eight–Conclusions

8.0 Introduction

At the outset this thesis critically examined theories of social change which suggested that technological innovation was the key driver of socio-economic change. Chapter Two reviewed those theories which suggested that the increased application of ICTs and the increased production of information in certain societies in the last thirty years was leading to a more advanced and democratic stage of development, which all societies would eventually achieve. The most utopic of these theories infused this new stage of development with the revolutionary ideals of progress, freedom, creativity and affluence as in Masuda's 'Computopia' (Masuda, 1990). Despite the weaknesses identified in the 'information society' concept it has become an organising metaphor and paradigmatic idea in economic, political and academic circles in the 1990s. The production of government sponsored 'information society visions' in many countries, including Ireland, both validates and invites an empirically grounded investigation into the nature and extent of post-industrial and information society trends.

Having critically examined technologically determinist accounts of socio-technical change Chapter Three outlined the interdisciplinary perspectives which informed the research framework adopted by this thesis. These perspectives were used as a basis for developing a research framework based on a social shaping perspective which could be applied at a macro, meso and micro level of analysis. The approach proposed that new ICTs, multimedia artefacts and information-based industries are not neutral drivers of socio-economic change but are crucially shaped by the social sphere and social structures in which they are developed. Drawing upon recent research and perspectives from history, communications, social shaping and institutional economics it was proposed that in order to account for particular instances of multimedia content innovations one must be attentive to broad historical, political, cultural and institutional factors. One must also be attentive to the specificities of the sector under study. The development of multimedia content industries is viewed in this thesis as a process of social adjustment as technological potential is shaped and in turn shapes the social sphere. It was also viewed as a process of cultural production which both draws from, but in turn contributes to, the cultural renewal process.

Anthony Giddens proposes that in order to identify significant change one needs to show 'to what degree' there has been a significant alteration in the basic institutions of a society and to what extent things have remained the same (Tucker, 1998). Part Two of this thesis aimed to further critique information society theories and contribute to our understanding of social change through an empirical analysis of socio-economic trends in Ireland and a number of European countries over a period of almost forty years. This was followed by an

examination of the evolution of public institutions, policies and mental concepts at a meso level and drawing upon the national systems of innovation approach. Part Three drew upon social shaping, industrial innovation studies and communications theories to analyse the negotiation and transformation of organisations, people and artefacts at a micro level.

This ambitious multi-level approach allows this thesis to account for the emergence of multimedia content innovations with reference to organisational, sectoral, societal, national and international trends. A multi-level approach also overcomes the limitations of a purely structural or a purely artefact/agent-centred approach and enhances our understanding of the processes by which socio-technical ensembles are shaped and in turn actively shape particular contexts. In this approach the case studies were used to illuminate certain economic and social aspects of these complex social processes.[76] By highlighting the 'flexibility' and 'openness' of the innovation process the case studies and this thesis challenges traditional technologically determinist and linear models of technological and social innovation. They also open the way for political, local and final user interventions at all stages of the innovation process and increase the possibility that a social, as well as an economic, dividend may be produced by innovative activities in this sector.

An important comment must be added at this point and with the benefit of hindsight. The analysis of the institutional and historical context of innovation in Ireland was conducted in 1995 and 1996 using available resources and knowledge. At that time the economic recovery of the Irish economy was only beginning to reveal itself and therefore this project must be read with reference to its historical timeframe. The dynamic and emergent nature of the field under study also contributes to the time and sectoral specificity of these findings.

8.1 Findings

This section reviews the main theoretical and empirical findings of this thesis and relates these back to the initial theoretical claims outlined in Chapter One:

1. Existing information society theories are based on an inadequate theory of social change and an inaccurate belief in the revolutionary potential of new ICTs.
2. Existing models of industrial innovation and technological diffusion are inadequate to describe the media content innovation process.
3. Multimedia artefacts should be conceptualised as both material and symbolic goods.
4. A framework drawing upon social shaping, national systems of innovation, communications and media studies provides a more adequate framework for analysing multimedia content innovations at various levels and the implications for social and cultural change.

The overall aims outlined in Chapter One were:

1. To enhance our understanding of the innovation process by applying a multi-level and interdisciplinary approach to an empirical examination of the development of multimedia content innovations in Ireland.
2. To contribute to policy by elucidating aspects of the 'information society', innovation processes and the economics of local cultural content production in a global information economy.

The main hypotheses advanced at that stage were:

1. That Ireland has established capabilities in software programming and content design, which could provide the basis for a strong multimedia content production industry.
2. That without institutional and conceptual reform existing socio-economic structures were insufficient to ensure the creation of a sustainable multimedia content production industry creating products for the domestic as well as the international market.
3. That the extent to which a message employs culturally specific signifying systems influences both the diffusion pattern and transportability of the final artefact.

8.1.1 Inadequacy of Information Society Theories as Theories of Social Change

The second chapter highlighted how classical theorists were careful to distinguish between industrialisation processes and industrial society. For these theorists industrial society emerged slowly but involved fundamental changes like urbanisation, population growth, secularisation and the increasing specialisation and rationalisation of labour. It was noted that the 'founding fathers of sociology' Weber, Marx and Durkheim had all attended to various aspects of this change process. A brief overview of industrial society theories was sufficient to lay the foundations for a critique of Daniel Bell's information society theory. This thesis proposed that Bell's conceptualisation and theorisation of social change is conservative and his evidence inadequate to support a theory of social change. The most fundamental flaw identified was the focus on only one sphere of society, the social structure, and the extrapolation from trends within this sector to society as a whole; something the classical theorists were careful not to do.

Bell's post-industrial society theory is based on the assertion that increased rationalisation and restructuring in the primary and manufacturing sector is stimulating increased employment in the 'unproductive' service sector and leading to the emergence of service economies. By proposing that the development of societies can be analysed along an axis of technology from pre-industrial to industrial and finally post-industrial society Bell is

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[76] This thesis did not attempt to generalise from these findings in any positivistic manner. However these findings

following in the footsteps of those who advanced the 'modernisation' and early development theories. These theories have been dismissed as technologically determinist, historicist, teleological and ethnocentric by numerous critics (Kirby, 1997). Indeed the development programmes they spawned in many third world countries failed due to the fact that they advocated technology transfer without regard for the particular, local and contingent set of relations into which the technology was to be introduced. These programmes tended to deepen dependencies and inequalities between nations rather than encourage local social and economic development.

Bell's theory drew on rather 'short-term' data provided by information economists like Machlup (1962); (1980) and Porat (1977) on the growth of white-collar work and the increasing contribution of certain information producing industries to national wealth in the US. Shifting trends along four dimensions: from goods to services; from manual to white collar and information based work; from trial and error to theoretically based R&D and from old bureaucratic forms of management to new 'intellectual technologies' were sufficient for Bell to propose that society in the early 1970s was qualitatively different from what went before. Bell later elaborated on his theorisation with more specific reference to developments in ICTs and asserted that advances in science and technology and computers were increasing productivity in some sectors and driving the socio-economic trends already espoused.

A closer examination of attempts by Machlup and Porat to measure and map the information economy highlights important weaknesses in the work. Chapter Two discussed how the authors disregarded the semantic value of information, failed to capture 'hidden labour groups' and could only estimate non-market transactions. They focus entirely on quantity rather than quality of information and inputs rather than outputs. Indeed Machlup intimated that his findings were at best incomplete and warned that they should not be taken out of context.

Empirical research by Miles and Gershuny (1983) provided a broader and more socially based account of the same trends and their work clearly interrogated the classificatory and production focussed approach of Machlup and Porat. Miles and Gershuny proposed that defining an 'information activity' as distinct from other activities was at best a 'handy slogan' rather than a concept with 'any real explanatory power' (Miles and Gershuny, 1986:23). Furthermore, their empirical analysis of European countries indicated that while some service sectors were growing others were contracting and the factors influencing these trends were much wider and more varied than information society theorists suggested. Miles and Gershuny proposed that government policy contributed to the expansion of public

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do sustain some general claims about the specificity of the culture industries (see section 3.4)

services and service growth in the 1970s and the shifts in final demand towards self-servicing influenced the continued importance of manufacturing and the growth of intermediate services. Technological change was not, they argued, the main or only driver behind these patterns of socio-economic change.

The second major flaw in Bell's theorisation is his adoption of a linear and technologically determinist account of social change. Bell in his publications tends to ignore the role of final users and other social groups in actively shaping and negotiating the direction of socio-technical change. Both automation and more latterly ICTs are seen as neutral drivers of social change. Such a perspective has been thoroughly refuted by insights from the SCOT and STS fields about the socially constructed nature of technologies and the conflictual and political nature of socio-technical change. Historical studies have also highlighted how societal discourses and structures can be inscribed within technological innovations (see Chapter Three).

A third feature of Bell's theorisation which this thesis challenges is his assertion that innovations in post-industrial societies are driven by codified theories which are increasingly subject to comprehensive testing using computerised technologies. He asserts that 'the axial principle of the post-industrial society...is the centrality of theoretical knowledge and its new role, when codified, as the director of social change' (Bell, 1980:501). This approach values codified forms of knowledge over all other forms and seems to suggest that developments in basic S&T are the sources of innovation in society. By contrast studies of innovation in economics and the case studies conducted by this thesis point to the importance of other forms of knowledge, the bounded rationality of the firm and the uncertain and risky nature of the innovation process. Indeed the notion that an innovation can proceed through its lifecycle unchanged has been thoroughly refuted by empirical work in STS, sociology and evolutionary economics (See Chapter Three). Similarly communications and cultural studies point to the role that other forms of experiential and cultural knowledge play in the design, marketing, appropriation and domestication of innovations. Bell's prioritisation of codified knowledge is reductive and reveals a fundamental misunderstanding of processes of technological and social innovation.

Perhaps the most fundamental weakness in Bell's work is his belief that the rise of human and professional services, and in particular scientific and knowledge elites, will drive a new type of society and a revolution in class and social relations. This society will be based upon human values and will be more meritocratic than previous societies. He argues that professional values, rather than the desire for profit, will drive this new society and governments will act to prioritise goals and redistribute scarce resources for the wider social good.

With the benefit of hindsight it can be shown that there has been no revolution in class relations in most advanced western societies and profit accumulation still drives most of the economic exploits of national and global companies. Chapter Five has shown that the new scientific and technological elites are increasingly located within private enterprises and subject to the bureaucratic controls of those organisations rather than more altruistic or professional values. Indeed Bell's assertion that new knowledge production would increasingly become the preserve of publicly funded institutions given its public good attributes has clearly not materialised; information is increasingly privatised and commodified in order to protect those individuals who decided to invest in its production. While governments play an important role in both legislating and promoting this changing environment they are increasingly lobbied by particular interest groups, which are largely aligned with corporate rather than social interests. Empirical evidence suggests that the gap between the wealthy and the poor in most advanced western nations is widening rather than narrowing while governments are increasingly prioritising the same techno-economic principles as large corporations. Bell's venture in social forecasting can, at the very least, be said to have been inaccurate. Nevertheless, given the prevalence of the information society concept in recent policy documents this thesis went on to empirically interrogate socio-economic changes in a selection of European countries in the years since Bell conducted his analysis.

8.1.2 Ireland in the Global Information Economy

It was shown in Chapter Four that by 1961 the largest sector of employment in Ireland was the tertiary sector. This fact placed Ireland alongside the US and other advanced European economies, which had reached this stage somewhat earlier. An analysis of occupational trends also found that Ireland had experienced a shift from manual to white collar occupations. For Bell (1973) these industrial and occupational shifts would suggest that the Irish economy was becoming post-industrial.

This thesis argues however that these trends do not constitute sufficient evidence to indicate that Ireland is either becoming post-industrial or is transforming into an information society. They also do not provide an adequate historical or social explanation for the emergence of consumer information services in Ireland, one of the main aims of this thesis (see section 1.1). In line with the critiques of Webster (1995) and Miles and Gershuny, this thesis went beyond the crude macro statistics to investigate in more detail the socio-economic trends in Ireland and the factors influencing them. At a macro level it found that in Ireland industry was not in decline and indeed that industrial employment as a percentage of the total remained relatively stable between 1971 and 1996. It was also apparent that the larger than average primary sector in Ireland had a significant structural effect on the

economy and was an important factor influencing the share of employment in services and manufacturing, as well as the nature and extent of both unemployment and emigration.

Within the broad category of services it was established that there had been significant shifts between different types of service employment between 1961 and 1993. The classification systems of Miles and Gershuny and Singlemann allowed one to disaggregate the service sector category more clearly into distribution, producer, personal and social services. An analysis of data for Ireland for these years found that distributive and social and personal services had expanded slowly and employed 24.9 percent each. Meanwhile from 1963 producer services had begun to expand rapidly and employed almost 10 percent by 1993. These trends were broadly in line with a selection of other European countries. More detailed investigations of service categories found that there were significant shifts between personal and social services. In particular, the expansion of government funded social services in the 1970s contributed significantly to the growth in this area. The dramatic reversal of this policy during the 1980s was camouflaged by renewed expansion in personal services, in part-time work and in producer services. Intermediate programme and content producers, the focus of this thesis, are to be found within both the producer and personal services categories.

An analysis of European figures on occupational growth and distribution noted that while Ireland conformed to international trends in the shift from manual to white collar occupations this trend occurred at a later stage in Ireland. This delay was significantly influenced by the continuing importance of agricultural occupations, which by 1986 still employed a larger share of employment than professional, technical and related workers. In addition it was apparent that production related workers remained the most significant employer while clerical employment was expanding rapidly. It would appear that Bell's 'technical elite of knowledge workers' was constituted more by clerical workers than scientists and engineers in the case of Ireland.

Trends in the distribution of employment in Ireland were significantly influenced by shifts in emigration, unemployment, government policies and both the internal and external economic environment. During the economic difficulties of the 1980s emigration increased rapidly and many highly skilled young workers left Ireland. Such social and political factors are largely ignored by information society and information economists in their analysis of socio-economic change. However it is argued in this thesis that these factors play an important role in shaping the direction and rate at which the Irish economy and society developed between 1958 and 1995. Emigration has also provided an important 'potential' market for Irish goods and services around the world.

Miles and Gershuny proposed in their work that one could begin to account for the growth in service industries not with reference to technological change and shifts in

employment but in relation to their theory of social innovation. This theory states that if productivity is lower in services than in manufacturing and if wages remain stable then, over time, the price of services will tend to rise. In turn, this stimulates consumers/end users to look for new ways of providing these services. In their analysis of a selection of European countries between 1970 and 1979 they found that final expenditures by households on basic functions were declining as a proportion of the total and that there was a shift within many of the different functions away from services and towards goods. This, they argued, helped to explain the continuing importance of manufacturing industries and the growth of intermediate producer services. This thesis updated the Miles and Gershuny analysis for the years 1985 to 1992 and found a clear trend whereby household expenditures in a selection of European countries were continuing to shift away from basic functions and increasingly being spent on functions like entertainment. It also found that within the entertainment function there was a clear shift in all countries examined towards the purchase of goods and intermediate services. This trend had clear implications for the growth in intermediate content and entertainment related industries.

Miles and Gershuny found that productivity in both marketed and non-marketed services was indeed lower than in manufacturing and that this was a factor in employment growth in these sectors. They also found by examining value added by sector compared with consumption by sector that intermediate demand rather than final demand was contributing most to the growth in marketed services. This thesis found that while Ireland largely conformed to these trends they were significantly influenced by the structural characteristics of the manufacturing sector and the extremely high productivity rates achieved by this sector between 1979 and 1989. These tended to deflate the share of productivity of the services sector, which was declining by the 1990s. By comparing data on value added by sector to consumption by sector the thesis found that the growth in marketed services in the last decade in Ireland was being driven by intermediate rather than final demand. This reflects the strong manufacturing sector in Ireland and an apparent growth in out-sourcing of services. The trends identified by Miles and Gershuny during the 1960s and 1970s either continued, or emerged, in this selection of European countries during the 1980s and 1990s.

This examination of Ireland in comparison with other European economies indicated that Ireland experienced significant structural transformations at a later date than the other countries examined, and that the patterns were marked by particular structural characteristics. The evidence presented in this thesis suggests that, in contrast to the information society theories, not all economies develop at the same pace or arrive at the same destination. It also supports the argument that service industries have been developing due to a decline in agricultural employment, government investment in social services and slower than average productivity growth in services. More latterly in Ireland industrial

growth, the trend towards 'buying-in' services in combination with the growth in consumer expenditure on certain types of goods have contributed to the growth in intermediate producer services. Theories which suggest that services are 'unproductive' seem to be ignoring the important interdependencies and links between manufacturing and both non-marketed and marketed services. The evidence indicates that within the global economy there are significant structural and temporal variations between 'service economies'. They also indicate the inadequacy of theories which suggest that technology is the main driver of socio-economic change.

8.1.3 The National System of Innovation

In order to establish the reasons for the structural variations between Ireland and other societies between 1960 and 1997 Chapter Five adopted a historical, national and institutional perspective. In accordance with the contention that the national system of innovation may effect both the rate and direction of innovation in firms (see section 1.1) Chapter Five set out to map aspects of this system and focussed in particular on the public institutional set-up in Ireland.[77] This investigation included an examination of the historical development of the economy, the culture of innovation, the government and relevant industrial development agencies, the S&T System and the academic system. This chapter further investigated Bell's proposition that theoretical knowledge would play an enhanced role in social and economic development in post-industrial societies.

> '...[in] the post-industrial society...the sources of innovation are increasingly derivative from research and development (and more directly, there is a new relation between science and technology because of the centrality of theoretical knowledge.'
> (Bell, 1976:212)

Ireland did not experience an industrial revolution like the UK, Germany and the US. Certain political and geographical features contributed to this and the economy of the Irish Free State by 1921 was characterised by small-scale cottage industries focused on the domestic market and agricultural production for export. This structure was galvanised by policy attempts to attain self-sufficiency and import substitution in the 1930s and the 'emergency' during WWII. By the 1950s the Irish economy experienced severe balance of payment difficulties and possessed neither the personnel nor the capabilities to improve its situation. The rates of emigration and unemployment respectively serve to indicate the severity of the difficulties.

The *Programme for Economic Expansion* (1959) signalled a fundamental change in government thinking which was reflected in all subsequent actions, reports and strategies. A

number of measures implemented in the 1960s were to have a fundamental impact on the structure of Irish industry and lay the foundations for a recovery of the macro economic environment. They also created significant weaknesses in the national system of innovation including: significant biases in policy and agencies towards high technology FDI, a failure to invest in R&D or S&T structures, a failure to develop mechanisms to assist indigenous industries and a failure to develop adequate internal (to Ireland) policy formation and evaluation structures. These weaknesses were reflected in the dualism of the Irish manufacturing sector, the low levels of investment, by international standards, in R&D, the dependence of universities on funding from abroad and industry, and the extraordinary levels of emigration and unemployment until 1993. According to Irish economic historians these weaknesses were amplified by the 'conservatism' of Irish institutions and the resistance of the workforce to new working methods (Cullen, 1976).

Despite these weaknesses macro economic measures indicated that by 1994 the Irish economy had developed into a strong export-orientated high technology economy. Industrial exports constituted over 90 percent of GDP (1998) and amongst the most rapidly expanding sectors were the computer hardware and software sectors (see Chapter Five). In addition, sectoral surveys of the multimedia and culture industries highlighted the growing contributions of these areas to both employment and wealth (see pg.146). It would appear from these measures that the Irish economy had established strong capabilities in programming and content production which could provide the basis for a strong and diverse multimedia production industry. This confirms the first hypothesis of this thesis contained in Chapter One.

Nevertheless the existence of certain capabilities may not be sufficient to ensure that a vibrant production industry emerges given the institutional and economic weaknesses already identified. A further weakness identified in the national system of innovation contradicts Bell's proposition that theoretical knowledge plays an enhanced role in the development of post-industrial economies. In the Irish case there has historically been a lack of investment generally in new knowledge and little appreciation at a macro or micro level of the need to innovate. Numerous reports from 1970 to the present, both external and internal, highlight the lack of innovation in Ireland and the absence of entrepreneurship.

What these reports fail to identify is the role of public institutional set-up and successive governments in creating an environment which stifled investment, taxed profits and did not support indigenous innovators. They also fail to appreciate the association between science and class, particularly the Anglo-Irish Ascendancy in the 19th Century (Yearly, 1989). This

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[77] The literature on national systems of innovation has expanded considerably since the start of this research project and there is a growing literature on sectoral and regional systems of innovation. For reasons of time and space this literature could not be attended to in this document.

colonial legacy neither encouraged Irish people to enter the field nor successive Irish governments to foster the field. As funding for science institutions and programmes was successively cut during the 1980s Irish scientists and technologists who wished to remain in the public domain became dependent on EC or external funding sources and their work was increasingly defined by criteria set outside the country. A reliance on actors outside the local had implications for the economic and social relevance of the projects conducted to the local situation. Indeed while the output of scientific papers from Ireland is relatively high it has not born much relationship to the level of national wealth and economic growth (Circa, 1994); (Kerr, 1996); (Kinsella and McBrierty, 1994). Yearley proposes that science in post-partition Ireland was removed from the socio-economic everyday needs of the fledging state (1989:326).

The Cooper-Whelan report (1973) identified the curious situation whereby the Irish manufacturing sector was becoming a high technology export sector without significant government or industrial investment in the production of new knowledge. An analysis of manufacturing exports by nationality of ownership indicates why: by 1986 branch plants of overseas companies were responsible for over 75 percent of exports. This not only meant that the economy was benefiting from knowledge generated outside of the country, it also meant that the total spent by either government or industry on R&D was, and remains, very low by international standards. This fact also contributed to the emigration of scientists and engineers with a third level education who had to emigrate or take employment in jobs for which they were overqualified. The emigration figures suggest that the former strategy was the most popular. Indeed while the largest proportion of government spending on S&T by 1993 was on education and manpower it would appear that without stimulating the wider environment this was an investment which other countries capitalised upon.

Bell's conception of theoretical knowledge and its role in relation to socio-economic development is therefore unhelpful when applied to socio-economic developments in Ireland. He clearly fails to appreciate the role of other factors and other forms of knowledge and learning in the innovation process. According to the national system of innovation approach a set of institutions and their 'interactions' or 'relationships' can determine the innovative performance of firms. It is clear from an historical examination of the public institutional set-up that from 1958 until 1989 that Irish economic, educational, social and cultural institutions acted independently of each other and without any clear long-term strategy for action. The failure of these institutions to interact with each other and the failure of any agency which attempted to work in a horizontal fashion across all government departments points to both organisational and cognitive barriers which acted to undermine policy formation and implementation. Thus while industrial policy stimulated sector-specific FDI investment in Ireland educational policy educated scientist and engineers who could not

find work in the country. Indeed until the STIAC report in 1995 there had not been an evaluation of the national S&T system by internal experts (STIAC, 1995). 'Experts' from abroad had conducted all of the evaluations. In addition, numerous innovation reports have established that there was little point in trying to encourage innovation if neither the government nor the financial system supplied venture or seed capital. While some funds have been established as joint ventures between the government and financial institutions in the past five years it is evident that government support is dependent on EC structural funds and the funds are clearly orientated towards internationally traded IT, software and telecommunications projects. In addition EC funds are likely to be significantly curtailed by the end of 1999.

Where it would appear that innovative and productive institutional linkages and programmes have been developed are in the universities. The Programme in Advanced Technologies (PATS) which emerged in the mid-1980s and encourages the creation of centres of excellence in certain technological areas points to the creation of distributed knowledge networks throughout the country. The success of some of these centres in terms of patents, contracts and profits points to the possibilities of this paradigm. They are clearly important resources not only for branch plants of multinationals but also for indigenous SMEs. Where incubation centres and industrial parks have been established around these centres it appears that new indigenous companies, including a number of multimedia production companies, are being created and various forms of knowledge are indeed being shared between actors. The involvement of the IDA, Enterprise Ireland, the HEA and the universities in these institutional experiments would suggest that there are benefits to be garnered from such co-operative work.

Another more recent institutional development, which has clear implications for the development of micro and locally based enterprises, including new multimedia organisations, are the Area-Based Partnerships and the Leader groups from 1991 (Sabel, 1996). These institutional innovations emerged from the national social partnership agreement in the late 1980s but were developed to address more spatially embedded and local social and economic problems. With regard to this research project these initiatives have had a minor influence given that they only received formal EC funding from 1994. Where some influence emerged was in the Local Ireland case study where the Leader initiative was found to have created locally based committees from which two county based co-operatives for Local Ireland emerged. However these local groups were found to lack resources, skills and long-term strategy and it is uncertain what will happen to these local partnerships in the next round of European funding post-1999.

While vertical relationships might be developing in some domains it is clear that horizontal relationships between government institutions with established frames of

reference remain distant. This appears to be particularly true of the relationship between the influential Department of Enterprise, Trade and Employment and the smaller Department of Arts, Heritage, the Gaeltacht and the Islands. While the former is concerned with developing foreign and indigenous industries and its agencies–especially the IDA-have developed numerous programmes aimed at assisting industries in IT, biotechnology and software, the latter has primarily been involved in regulating the traditional culture industries. Where the former is concerned with employment and the growth of exports the latter is concerned with employment and the development of a diverse range of content products for both domestic and foreign markets. This institutional fragmentation and separation of industrial and cultural policy has significant implications, it is argued here, for the development of multimedia content organisations and projects in Ireland. The evidence provided by an analysis of the public institutional set-up and the case studies would appear to confirm the hypothesis proposed in Chapter One; that without institutional and conceptual reform existing socio-economic structures and markets will not be adequate to support the generation of symbolically laden multimedia content for the domestic market.

While this thesis may define multimedia content producers as 'cultural industries', recognise the semantic element of their artefacts and value their social and cultural role in society this is not a position which has been taken by the relevant development institutions in Ireland. Multimedia is defined in industrial development institutions as a software or internationally traded service industry and as such its development and regulation are defined in relation to existing 'institutions' for the software industry and other specialist producer information services. This means that the production of particular types of content aimed at a domestic or diasporic market is valued less that the creation of instrumental, specialist and highly transportable information products for export. Employment and export earning potential are the key criteria of value. The Internet and CD-ROMs are seen as distribution platforms which will assist Ireland to overcome the geographical and mental peripherality of the past and reduce the cost of trade. Information is defined in relation to information theory and as undifferentiated bits. This approach drains the content level of the artefact of any semantic content. Final consumers are viewed as undifferentiated users rather than participants or citizens of particular cultural communities. This approach to defining and valuing information strongly echoes the approach of certain information society theorists and information economists critiqued in Part One of this thesis.

It would appear that a techno-economic logic pervades the institutional approach to multimedia in Ireland and is closing down alternative discourses, definitions and potential avenues of innovation, particularly in non-commercial areas. This is reflected in the current construction of an Irish 'information society' which merely repackages the established FDI and industrialisation policies while failing to address, for example, very real shortages of

technology and content emerging in all levels of the education sector (Wickham, 1998). This document is clearly advocating market opportunities abroad without even pretending to advocate political and social opportunities at home. This total reliance on the 'market' as provider must have serious implications for basic equality in society and the provision of goods and services to minority groups and cultures. Like an old photograph Bell's assumption that a post-industrial society would be more equal and meritocractic is fading with time. There appears to be little consideration of the need to maintain diversity within the new media domain or the need to support local indigenous cultural production within an increasingly global media space.

It is hard to contradict Mjøset when he concluded that Ireland's problematic socio-economic development until 1994 can be attributed in part to the weakness and conservatism of the Irish institutional set-up (Mjøset, 1992). A cultural and political history of the Irish institutional set-up can be seen to value the individual over the social and works within a limited rather than a long-term integrated strategy. The findings of the various investigative tribunals taking place in Dublin at the moment only hint at the extent of the 'clientalist' and 'brokerage' politics, which existed in Ireland throughout the 1970s and 1980s. One can argue that the emergence of a 'committee' based system of 'external' policy advisers at least makes the process of identifying influential actors and specific agendas easier. It does not however augur well for a more integrated social, cultural and economic strategy for the development of multimedia content innovations in Ireland. Indeed recent institutional innovations at national and local level, while welcome, are subject to an uncertain future and cannot be said to have had a marketed effect on multimedia content innovations during the life of this research project. Similarly, the remarkable growth evidenced by the Irish economy since 1994 does not appear to have stimulated an indigenous multimedia content industry producing multimedia artefacts for final consumers, at home or abroad.

8.1.4 Multimedia Content Firms in the National System of Innovation.

This thesis views the innovation process as a continuous process of transformation and negotiation between a number of actors in a particular context. Innovation in firms is viewed broadly as the processes and activities involved in getting a new product or service to market. In accordance with the multi-level approach adopted by this thesis and mindful of the national system of innovation approach and sectoral specificities Chapter Six examined the initial stages of the content innovation process in four multimedia content producers. These cases studies aimed to further illuminate and explore the influence of public institutions, national discourses, the national context and inter-firm relationships on the actions of multimedia content organisations, both foreign owned and indigenous, both small

and large, and on the set of innovation possibilities perceived by individuals within these organisations.

All of these organisations felt, at roughly the same time in 1994/5, that there was a market opportunity for cultural content products created for new multimedia platforms. These organisations could be described as 'early movers' given the small size of the multimedia industry in Ireland, the small domestic market size and the low levels of new media consumption. However, at least three of these organisations justified their ideas on the basis that there was an opportunity to package and commodify Irish 'culture' for the globally distributed emigrant market of almost 70 million. They also felt that the rural and peripheral communities might be regenerated if somehow rural culture and people were harnessed to create new forms of digitised information. Despite the academic critique of the information revolution rhetoric clearly these project ideas were based on notions that new media could empower, protect and transform local communities. Another important influence was the national and international discourse on the importance of content developments for new media.

Other socio-economic factors, or 'supervening social necessities' Winston (1998) influenced the development of these ideas. An analysis of changing structures in Irish society highlights the increase in service industries, flexible and part-time work. These features have implications for traditional media industries, which were largely structured around fixed programming units and a fixed industrial working day. Shift-work, overtime and increasing mobility mean that the media need to be available at all times if they are to support these increasingly dispersed lifestyles. In addition, the fact that telecommunications costs are high, that Irish people largely access online and new media from work, or that schools are likely to have very few computers also shaped the form and content of new services. Finally, while the Internet is continuing to diffuse in Ireland it is clear that new media have stiff competition from traditional media. Over the past few years Ireland has seen the establishment of two new national television channels, two new national radio channels, a new Sunday newspaper and a burgeoning local media scene. Indeed many of these media operations have established multimedia operations as part of their portfolio of products.

Contrary to the 'innovation surveys' documented in Chapter Five the evidence from this research suggests that these organisations are aware of, and appreciate, the need to constantly innovate. Indeed these findings support the contention that the culture industries are driven by a need to continually experiment with form and content (Garnham, 1990); (Hayward, 1990). New technologies are viewed as enablers in this process, facilitating the production of a range of products along a dimension from conventional to original. All four cases are examples of market orientated 'research and development' projects which took

place outside the realm of formal research laboratories. They were driven by a belief that you are 'only as good as your last production' and a need to keep staff challenged so that they would not leave, attracted by higher salaries elsewhere.[78] These organisations also needed to continually be in production in order to justify their investments in human and capital resources.

This thesis contended in Chapter Three, and in line with the social shaping approach, that despite the technological potential of new technologies the social sphere and the public institutional context in which a firm operates can have a significant influence on the innovation process. The case studies examined in this thesis indicate that this contention needs to be modified to take account of the differences between foreign owned branch plants and indigenous companies. It was clearly apparent that while government policies, agencies, incentives and the availability of a skilled labour force crucially influenced the decision of *Compuflex* to locate in Ireland, once established the branch plant had little use for, or interaction with, the public institutional set-up except on policy formation committees. The local institutional set-up had no influence on the content or form of the information products they produced. The main networking that the organisation did was internal or involved sub-contracting translation and media services. Networks were designed to be 'flexible' and involved the acquisition of knowledge or services rather than the creation of wider learning economies. Clearly this has implications for the wider economy in which this organisation is embedded and this example would suggest that even today the linkages between foreign owned multinationals and local suppliers in this sector are weak.

Within Compuflex it was clear that only limited forms of learning and knowledge creation were taking place. While new software programmes were invented to improve the process of innovation the branch plant was under-utilising the hardware, software and content skills of their employees. Clearly the location of strategic functions in the US meant that the branch plant operated as a downstream operations centre. The feeling expressed by interviewees was that there was little room to influence product or service innovations. This lack of involvement contributed to the need to keep people moving between product teams so that they would not get bored. The findings of this particular case reiterate many of the concerns expressed in the Telesis (1982) and Culliton (1992) reviews of industrial policy and by political economists (see Chapter Three). They also prompt one to question the promotion of FDI in the government's information society report (ISSC, 1996) as a mechanism for developing information content industries in Ireland.

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[78] This was a constant worry. It occurred in the case of the university research centre in Derry which closed and whose staff all emigrated to London. It was also evident in the awareness that staff, particularly programmers, had of higher salaries in Dublin, London and California.

By contrast it was apparent that the national context, vertical and horizontal relationships and the public institutional set-up had an important role to play with regard to content innovations in indigenous organisations. This was particularly the case in relation to the traditional media operator, *RTÉ*, whose activities and products were externally regulated. The legislation established to regulate this broadcaster specified that it had a role with regard to fostering national and cultural identity, and supporting diversity and indigenous production. This public service ethos clearly informed both their traditional and new media productions. In addition, the advent of digital television, cable and satellite technologies meant that the corporation was subject to competition from global media companies. It responded by attempting to foster innovation, using and reusing content assets and developing relationships with suppliers, other broadcasting firms and final users. It was within this context that a small Online department was established and the staff given a free rein to experiment with on-line content and forms. The ability to draw upon not just client relationships but also deeper social relationships clearly informed their innovation process and contributed to wider organisational and social 'learning economies'. Their location in Ireland and their targeting of an Irish user at home and abroad also clearly influenced the form and content of their project ideas.

With regard to the other two cases examined the public institutional set-up played a direct role in influencing the process and content of their innovations. It was clear from both the *Local Ireland* and *The Virtual Museum of Colm Cille* case studies that the reaction of funding and development bodies in the North and South of Ireland to these project ideas was strongly influenced by entrenched IT and traditional media paradigms. Reflecting the findings at the meso level of analysis in this project these firms found that there was little support available for cultural and educational multimedia content innovations aimed at the final consumer in the domestic market. The difficulties encountered by both *Local Ireland Ltd.* and *The Nerve Centre* in obtaining private and public funding reflected the inability of these organisations to develop adequate business plans for this emergent sector, the prioritisation of economic over socio-cultural goals by the funding institutions, the lack of social awareness and understanding of what constituted multimedia and the lack of institutional support for content innovations in new media. These factors constitute social brakes or the "law" by which society suppresses the radical potential of new artefacts (Winston, 1998).

These findings have important policy and social implications. They demonstrate that small indigenous multimedia content firms are undercapitalised and have little access to capital venture funds in Ireland. In addition three of the indigenous case studies lacked market research capabilities and in one case there was a clear lack of marketing and customer support capabilities. Despite nearly two decades of a much publicised public

policy orientation towards indigenous companies and the focus in numerous reports on the potential of the content industries indigenous content organisations still find it extremely difficult to obtain financial and other support. This forced the Nerve Centre for example to find trans-national partners and source funding from EC programmes. In turn this meant that the original concepts and networks were transformed according to criteria set outside the organisation. These influences had important implications for the length of production time and the complexity of project management of this project.

While public funding bodies tended to evaluate a project idea in relation to employment and industrial development criteria these case studies illustrate that the involvement of a private partner transformed the *Local Ireland* concept into a technology and commercially driven project. None of these examples augur well for the creation of locally relevant cultural content and for the maintenance of diversity (of information sources and content) with regard to new media. Indeed they point to real barriers facing indigenous production companies and the constraining role that institutions and their conceptions of multimedia can have on the transformation of ideas into prototypes. The recent institutional reforms and information society report (see Chapter Five) in Ireland suggest that little public support will be given to indigenous content producers who aim to produce multimedia content for an Irish audience. This report and these case studies indicate that industrial development agencies in Ireland fail to evaluate multimedia content ideas in relation to the social and cultural dividend of the project and the meaning that end users might attach to it.

The ISSC report proposes that Ireland is 'a unique community, rich in culture, learning and creativity' but crucially for this thesis it fails to specify by what means the country will foster the development of that culture and creativity and assist in the development of both multimedia content industries and broader processes of social learning about multimedia (ISSC, 1996). As in the post-industrial/information society theories examined in Part One policy makers in Ireland seem to assume that new technologies and telecommunications infrastructures will automatically lead to the emergence of more democractic and culturally diverse societies. The most influential industrial development agencies and policies in Ireland however remain divorced from social and cultural concerns. In Ireland neo-liberal ideas and market driven development priorities are continuing to flourish and the information society rhetoric is easily assimilated within these discourses. These findings confirm the hypothesis expressed in Chapter One that public institutional and conceptual reform are needed if Ireland is to increase domestic consumption of new media and achieve her potential as a location for multimedia content innovations aimed at both domestic and international markets. They also confirm the critique advanced in Part One that we are not living in, or entering into, a fundamentally different social formation.

8.1.5 Modes of Design and Representation.

Crucially, all four organisations studied in depth by this thesis were from different industrial backgrounds and were producing symbolically laden content which aimed to produce meaningful and significant texts for particular cultural markets. These features meant that there was scope to analyse how the organisational culture, economic/cultural tensions, local/global struggles and convergence issues might influence the content innovation process (see sections 1.3.5 and 3.4). It was proposed in Chapter Three that political-economic and structural factors play an important role in shaping the form and content of traditional media texts. For some digitalisation, globalisation and convergence are leading to a homogenisation of content and threatening the diversity of media sources and the needs of minority cultures (Garnham, 1980); (Schiller, 1981); (Mattelart, 1994); (Webster, 1995); (Murdock, 1997). For others, audiences may still reject or negotiate such texts and new media provide for innovative alternative modes of communication (Morley and Robins, 1995); (Jankowski, 1996). Chapter Seven set out to explore the relevance of these perspectives for new media content developments in Ireland.

In analysing the development of multimedia content artefacts this thesis has argued for the need to specify the fundamental difference between these cultural content artefacts and other information goods and services like ICT tools and specialist producer information services (Preston, 1997). Section 3.4 also proposed that the programmes and texts produced by the culture industries, within which one found the multimedia content industries, played an important social and cultural role in society as well as an economic role. Unfortunately most information society, innovation and STS studies continue to focus on the input rather than the output side of production and tend to ignore the content level of the artefact. This thesis proposed in Chapter One that the signifying processes contained in the content level of an artefact were crucial to understanding the diffusion and appropriation of that artefact. It also proposed that the organisational culture and 'technological frame', defined according to Bijker (1987), may also crucially shape the form of the content innovation.

The four case studies conducted by this research project support the thesis that an organisation's culture may crucially influence the process and nature of a multimedia content innovation.[79] Two significantly different modes of design emerged in this research project and these modes were driven by different organisational values, priorities and competencies. The different modes of design also had significant implications for how the end user was represented and inscribed in the text. The first mode of design was driven by upstream technological innovations, heavily influenced by traditional software design processes which paid little attention to representational strategies and their strategies were

justified in relation to profits and economies of scale. This mode tended to inscribe the final user into the artefact at an early stage of the process and this inscription was only altered where it was economically justifiable. An alternative approach was the content-led approach, which was driven by a narrative or visual concept, was influenced by representational strategies in the traditional media and justified in relation to a mix of artistic, social, cultural and economic values. While a projected image of the final user was inscribed into the artefact initially, this was continually altered in accordance with both formal and informal feedback.

The case of *Compuflex* is illustrative of a technology-led mode of design and provides an interesting case study of convergence given that the company was attempting to diversify from software applications production into content production. The relative 'failure' of this diversification strategy was clearly influenced by the technological culture in the organisation and the dominating influence of competencies in hardware and software design (see pg.211). In relation to *CFN* it is clear that the company saw an opportunity to capture market share by leveraging existing technologies using content. Throughout the development of the *CFN* service the availability of new technological tools and software applications rather than end users dictated the shape, form and content of the service. From the set-up CD to the content, end users and the media complained about the slow access and cumbersome technology which lessened the end user's motivation to engage with the content.

In addition, the organisational culture and the primacy of economic values strongly influenced the extent to which *CFN* content was localised for different cultural and linguistic markets. Having inscribed the (American) end user in the content at an early stage it was clear that any attempt to alter this specification at a later stage in the process was resisted by both management and the development team in the US. This is despite the rejection of certain forms and types of content by particular markets. It was clear that profit margins and economies of scale dominated the company's agenda.

By January 1998 *CFN* was redesigned and repositioned for a third time. External factors such as the slow development of advanced telecommunications networks in different countries, varying pricing systems and legal controls clearly influenced the rate at which this service could diffuse. Feedback from international affiliates and the slow growth of international subscriptions also strongly influenced this change in strategy. It would appear that the process by which the service was developed and localised was proving too expensive and problematic. In part this was due to the fact that the US development team were clearly inscribing an American user in the form and content of the shows which proved

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[79] The four cases represented computer software, traditional media and community/arts sectors as well as new

difficult to remove at a later stage in the process and limited the service's 'transportability'. In addition, their reliance on state-of-the-art technology and graphics also tended to limit the projected user group to those with high-end computers and the latest browsers. *Compuflex* after two years of considerable financial losses and experimentation decided to disband its content teams and focus instead on its core competencies in software development. The *CFN* site became a portal site offering access to content created by traditional and new content producers, usually located within the target market, and transaction and e-commerce tools for more generic information. The service was also stripped of some of its memory hungry multimedia effects. Interestingly it was the simple communications tools, like free e-mail, which became the promotional highlights in Phase Three. Such services are clearly more accessible to a wider range of users in diverse cultural contexts.

This case clearly points to the range of external and internal social and organisational barriers which act to shape the radical potential of new technologies. The two main lessons emerging from this case are that all information types, e.g. instrumental services, news, web-shows, are not the same and that industrial convergence can be a problematic process. These two findings challenge tendencies in the dominant discourses and policy documents to conflate all forms of information together and the notion that digitisation will eventually lead to the convergence of different industries. While this thesis does not deny that many forms of information can now be digitised and distributed with relative ease it would contend, on the basis of the cases examined here, that content creation is still a costly and time consuming process and that different information types require different production and design strategies. In addition it would contend that one can only understand the content innovation process with reference to the form and nature of the content and the use and meanings that end users in different cultural contexts attach to it.

The *Compuflex* case indicates that organisations draw upon a cumulatively acquired stock of knowledge and a bounded knowledge of innovation possibilities in developing innovations. The case again highlights the inadequacy of linear theories of innovation and Bell's assertion that theoretical knowledge is the main driver of innovation in post-industrial societies. *Compuflex*, as an organisation with a background in hardware and software applications found it difficult to move into content production given its entrenchment in a particular technological 'frame'. This case illustrates that the company could not get beyond this frame without a fundamental transformation of its conceptual and organisational structures. The organisation also clearly failed to anticipate the implications of diversification into content production and the range of cultural complexities involved in localising semantic products for diverse markets. A strategy of 'learning-by-acquisition'

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multimedia companies.

may save on research and development time but in the light of the *Compuflex* case is clearly insufficient to enable an organisation to move into a new field outside its core competency.

Alternatively *RTE*, *The Nerve Centre* and *Nua* were all driven by a more diverse set of artistic, political and economic imperatives and their content innovations were driven by a visual and narrative concept which clearly aimed to harness culturally distinct signifying processes in order to target particular cultural markets. These three cases had varying industrial backgrounds but were strongly influenced by design and textual competencies formed through experience in numerous forms of traditional media. As a result their 'technological frame' was very different to that which operated in Compuflex. All three saw multimedia as a new form of distribution and communication, which drew upon existing media forms and skills while also requiring new skills.

Both *RTE* and *The Nerve Centre* acquired these new skills through 'doing' as well as collaborations with other actors in collaborative and supportive networks. This 'learning-by-interaction' approach tended to reinforce the trend towards specialisation rather than convergence between organisations. These 'social relationships' centred upon the sharing of information and the joint creation of new knowledge. For all three cases their multimedia projects were seen as experiments which would enable the organisations to learn how to produce multimedia content, learn how to inscribe and include end users in the innovation process and enable the exploitation of culturally specific codes and content. They were also fundamentally involved in wider processes of learning involving other firms, public institutions and the general public.

The *CFN* case clearly illustrated how a computer literate and American construction of the end user was inscribed in both the form and content of the web-shows at an early stage of the development process. The development process was clearly linear and as much was invested at an early stage there was considerable pressure on the product to generate income in a short time frame. This approach served to limit the end user group - in the initial target market as well as in subsequent markets-and pushed producers to generate revenue and economies of scale, a trend highlighted by critical political economists in Chapter Three. It would also appear that the highly centralised management of the organisation removed or under-utilised the potential for information flow between producers and end users, something which institutional economists argue is vital to the incremental innovation process. It was also apparent that the producers and designers of the content were geographically and culturally removed from their end users and that this 'cultural distance' had an important and problematic influence on the process and content of the innovation. This case would support the theory that globalisation processes do not necessarily imply a homogenisation of cultures, and a convergence of nation states, in development terms, as early cultural imperialists and modernisation theorists contended (see Chapter Two).

The other three cases also inscribed a particular end user in the form and content of their artefacts but they went on to promote cultural specificity as a fundamental characteristic of their artefacts rather than trying to mask or remove it. They also crucially adopted a more open systems approach and rather than investing everything in expensive content creation up-front they adopted a more incremental approach to development. This approach allowed space for change throughout the process of development of both online and offline content and allowed producers to take into account information coming from early adopters and testers in the marketplace. In both the *RTE* and *The Nerve Centre* a dual process of 'self-reflection' in the early stage of development combined with market feedback in later stages helped to inform the process of content innovation. In the case of *Local Ireland,* while the initial development stages involved producers in a process of 'self-reflection', the later development stages were much delayed by the search for funding and the establishment of networks and relationships. As a multimedia start-up this company had to spend time building up a reputation and trust with prospective partners and other relevant actors. For all these organisations an open systems design meant that upstream technological innovations did not drive the development of the content for their products. Instead technological innovations were mainly used to provide better processes of production and increased access and speed to end-users.

The form and content of the *RTE* official website and *The Nerve Centre's* CD-ROM also drew upon existing forms and content from traditional media and exploited the core competencies of the organisations involved. Crucially however existing assets and skills were adapted to the limitations and potential of the new media and the specificities of the cultural market. Thus the *RTE* site provided a short, easy to download 24-hour Irish news service which end users would access at any time. They were clearly adding value to their core services while providing something unique to a dispersed cultural market. *The Nerve Centre's* CD-ROM and website offered a new interactive space, which gathered together a diverse range of artefacts, real and fictitious. In providing these on a modern platform and supporting the experience with workshops they were offering something culturally specific but unique. Interestingly both quasi and real 'interactivity' were provided not just within the artefact but also in physical face-to-face situations. The attention and time given by these two cases to various forms of feedback indicates that they were clearly drawing upon this information to inform incremental innovations as well as contributing to a wider process of cultural and technological learning downstream. The producers and end users were also relatively close, in geographical and cultural terms in these cases and this contributed to their mutual understanding and co-shaping of the multimedia content. Quality of service and content were clearly the overriding imperatives.

While both the *RTE* and *The Nerve Centre* projects provided symbolically laden content for an Irish market they also acted as intermediaries providing a range of mechanisms which encouraged 'community-building' and horizontal communications between Irish people in dispersed locals[80]. These mechanisms were supplemented by offline activities recognising that for many people the Internet and computers are unknown and intimidating. This approach would appear to extend the belief, widely associated with traditional media, that new media can play an important role in supporting and developing cultural and national identities. It would also appear to be responding to the dispersed nature of many cultures and the increased mobility of modern lifestyles. It appears that symbolically laden content and communication tools can provide a useful tool for dispersed emigrant cultures like the Irish to maintain cultural rituals and interests. This was evident from the geographical spread of users identified by the *RTE* website.

This more cultural and communications based approach adopted by *RTÉ* and *The Nerve Centre* is in contrast to the more transmission and broadcast model adopted in the *CFN* case when *Compuflex* tried to transmit Americanised programming to its end users around the world. These two approaches echo Carey's distinction between a ritual and a transmission view of communications (see pg.84). The Compuflex approach tried to minimise the cultural differences between end users in different geographical and cultural locations and contributed little, either offline or online, to particular cultural and national identities. During this research project the *CFN* service was clearly informed by an 'individualised' view of personal media consumption which ignored social or communal identities outside the virtual community of *CFN* users. Thus the service allowed end users to personalise the site while providing tools (e.g. bulletin boards, chat forums) to enable communication between the 'on-line community of users'. They were clearly trying to develop a sense of 'community' between those involved in the on-line culture as opposed to building commonality based upon 'real communities' and existing cultural fellowship. Crucially, in relation to producing symbolic content, this approach ignored the fact that both producers and end users bring to media a variety of competencies and characteristics within a particular context, including their own cultural background. It also seems to ignore the fact that building a loyal 'community' involves more than occasional visits to a bulletin board and a client relationship. Such a community lacks the sense of attachment generated by a shared history, and the rituals and codes of a 'real' community.

It would appear from these case studies that structural factors have an important influence on the creation of content for new media and can lead to attempts to produce global and homogenised content. Paradoxically the globalisation of telecommunications and companies

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[80] This approaches the concept of Social Learning developed within the SLIM network (Sørensen, 1996).

in conjunction with the increasingly sophisticated involvement of end users in communications processes may also lead to a recognition of the importance of representational strategies which take account of the continuing salience of nationally and culturally constituted identities. These findings would appear to confirm the third hypothesis of this thesis which suggested that the extent to which a message employs culturally specific signifying systems may crucially influence its diffusion and appropriation. It also supports the assertion made in Chapter One that in order to understand the content innovation process and the historical development of consumer information services one must go beyond organisational and economic factors to attend to the symbolic and representational aspects of the process.

8.2 Coda

In the introduction to this thesis a number of theories of social and technological change from different disciplines were introduced and this thesis argued for a more inter-disciplinary and multi-level approach to the study of multimedia content innovations. The thesis also suggested that it is important to attend to both the economic and cultural role of new media industries, given the 'doubly symbolic' nature of media artefacts, and to take account of economic, institutional and socio-cultural factors when analysing processes of socio-technical change.

The thesis adopted a broad social shaping approach to analysing content innovations and addressed particular concerns about the process of content innovation for new media in different types of organisations and the factors influencing the form and content produced. The sectoral differences between these organisations were clearly evident in the tensions between economic and cultural imperatives. In the *Compuflex* case economic and technological imperatives dominated and in *The Nerve Centre, Local Ireland* and *RTÉ* cases quality, artistic and local development values were prioritised. The struggle between the economic and cultural priorities were found to have an important influence on the mode of design and both the form and content of the artefacts produced. While one cannot make generalisations from these findings to all sectors some general claims about the specificities of the culture industries are largely sustained by this analysis (see Chapter Three).

The difficulties faced by *The Nerve Centre* and *Nua* in convincing public institutions of the value of their cultural artefacts re-introduced the meso level of analysis. While the pertinent public institutions for these case studies operated largely on a national level, for particular historical and political reasons they also extended to European and international institutions also. These cases support the original contention of this thesis that technological developments are crucially influenced by, and in turn influence, the social sphere. Innovation processes were found to be complex, risky and uncertain involving a dynamic

process of consensus building, negotiations and transformations. For indigenous companies the pace and direction of innovation was strongly influenced by the public institutional set-up, vertical and horizontal relationships, economic and social history and the cultural specificities of the producers and end users.

The meso level of analysis and the interaction of the case studies with the public institutional set-up connected the concerns of this thesis with current industrial innovation and cultural/media policies. The research findings highlight the lack of public and private support for multimedia organisations producing cultural content for an Irish audience in spite of the clear market failures faced by these organisations. This lack of support was clearly articulated by an analysis of public institutions and interviewees in small indigenous organisations. Where support was available it tended to try to re-shape the original cultural concept into a commercially orientated product or force a project to adopt untenable objectives. This institutional approach to multimedia 'cultural content' development was clearly shaped by a combination of industrial development priorities and marketing campaigns which defined multimedia from within an industrial and technology perspective, ignoring the content level and the social role of such products. Public institutional strategies indicated a fundamental division between how traditional media and new media were both conceived and supported. The content of traditional media was regulated with regard to its cultural and social role in Irish society while new media were seen as conduits for exporting generic and undifferentiated information. Clearly a more even balance is needed between economic and cultural development objectives and between international and domestic projects.

The implications of this research are that little content aimed specifically at an Irish domestic market will be produced by small indigenous cultural organisations if they are not supported in some way. It would also appear from the case studies that global media organisations will also not provide new media content for a small market like Ireland, although they may be prompted in some cases to form joint-ventures with locally based content providers. Given the public institutional conception and approach to multimedia and the barriers faced by multimedia content organisations it is highly probable that 'de-territorialised' and increasingly privatised sources of multimedia information will become more and more prevalent in Ireland. One can only conclude that while Ireland will remain an important producer and localiser of specialist producer information goods for export, in educational, social and cultural terms the society will become dependent on imported information goods or the production of goods from large traditional media organisations. On the basis of this analysis while Ireland might be defined as an information economy in macro economic terms it cannot be described as an information society.

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Appendix A

COMTEC group - Revised Questions
MM, Content and the Culture Industries
Sept. 1997

This note is based on;

1. The original SLIM proposal and Dr. P. Preston's reading of it (See Attachment 1)
2. PP's note on concepts and concerns within communications studies
(See Attachment 2, circulated in Lausanne, Sept. 96)
3. The first draft methodology paper (Circulated in Dublin, Jan. 97 and on web site)
4. Various mailings/responses to the theoretical papers and early deliverables
(e-mails to Knut and Robin, June-Nov 96)
5. SLIM Research Hypotheses and Issues, Nov. 1996, - arising from the national reports (see web site)

There are two sets of questions below which should guide our research and the writing of our case studies;

A) General SLIM questions
B) Specific Research Questions - MM, Content and the Culture Industries

****

A) General SLIM questions;

A1) What are the key social learning processes?

	Intermediate user Producer/Publisher	Final User
International		
National		
Regional		
Other		

A2) In what way does national setting influence developments?

- size and location of country [scale, core/periphery, island]
- linguistic groupings
- ethnic and other identities
- particular historical and cultural heritage
- demographics
- distribution of population
- geography
- climate

A3) How has the structure and orientation of MM constituencies influenced developments?

- role of policy and standards at various levels
- power and role of old and new actors

****

B) Specific Research Questions - MM, Content and the Culture Industries;

B1) To what extent do MM producers and final users conceive of new mm content products as similar to, or different from, **older media and popular cultural forms and content**?

a) In what ways do people discuss and define mm, mm forms and mm content?
b) What skills and lessons are taken from older media and utilised in the context of mm?
c) In what ways are mm forms and content seen as being distinct from older media.?
d) How are different types of content defined?
e) Are issues of quality articulated as important?

B2) To what extent is mm an **international** product or tied to more **local identities and markets**?

a) For intermediate and final users to what extent is MM seen as contributing to the expression and renewal of particular socio-political or cultural communities and identities?
b) If so, what kinds of identities or communities are identified as important?
[national, regional, or class and gender specific identities]
c) In what ways are these conceptions expressed in the design strategies of the products?
d) To what extent do technical factors limit and shape the range and forms of mm content?;
how do they enhance or constrain the mm forms and the diversity of content aimed at different groups
e) To what extent are economic or political/policy factors seen to be shaping mm forms and content.
f) To what extent does MM negate certain identities and undermine cultural diversity.

3) To what extent does the individual/organisational **history and competencies** shape the mm form and content produced?

a) to what extent does the strategic positioning and self-definition of the organisation [as computer, media, multimedia, voluntary/community] influence their creation of mm content?
b) to what extent are the organisations involved in competence building and learning internally; i.e. adapting old skills or acquiring new ones?
c) to what extent and how are individuals or teams important to the creation of mm content?
d) to what extent and how are networks of actors important to the upstream creation and later re-creation of mm content and its downstream distribution?

4) What role do mm organisations play in the broader **social learning** about mm?

a) How and to what extent are the organisations involved in educating others with regard to mm? [advertising, demonstrations, trials, alliances, training, conferences, books, etc.]

5) In specific **sites of development and use** what are the key issues?

a) how does one define producer and user in the context of mm?
b) how do users vary with culture, age, class and gender?
c) How do users respond to MM forms and content?
d) How important is locally produced and/or targeted content?
e) How important and in what ways do users relate to more global content?
f) How do these actions and responses relate to the concept of the final user as held by the developer?
g) How do users learn to interact and use new MM products?
h) How important is context to these learning processes?

6) To what extent and how do the visions of an information society relate to the development of mm forms and content?

a) what are the interviewees conceptions of the information society
b) how do these relate to official policy documents at national, regional and transnational level

7) What parallels and differences can be drawn with developments in both the education and public service organisational studies?

****

Note 1

1) We are contracted to assess the effectiveness of commercial pilots and social experiments
2) To suggest options for MM development
3) To examine how MM can be better linked to social and economic development

29/7/97

Re: Social Learning in Multimedia project and research visit of Ms. A. Kerr, research officer, to *Compuflex* Ireland.

To whom it may concern;

Compuflex is one of four cases chosen as a case study for the SLIM project based on a number of criteria and on a 6 month review conducted by this researcher of developments in multimedia in Ireland. The other cases are a voluntary/community organisation, a new multimedia company and an established media company. *Compuflex* was chosen as an example of a diversifying computer company who is producing content for multimedia technologies.

The study is particularly interested in the production of content which is of symbolic and cultural importance. In accordance with this research interest the MSN network and its targeting of different cultural communities fulfils our research brief.

During initial discussions with Ms. A. Kerr three main issues were raised which we hope to dispel with this letter/memo;
A) Confidentiality and what type of outputs are to be expected
B) What form of research methods are to be expected
C) What would *Compuflex* get from its participation.

A1) Confidentiality, if required, can be assured to *Compuflex* and employees participating in the research project. The company would then be identified in documents as either a number or letter; e.g. Case 1/A and individuals as either numbers or pseudonyms.

A2) The outputs from this project will be; case studies and reports for the EC which will later be made available on the SLIM web site [approx. Oct. 1998], papers and other publications which will be circulated in the academic community and the research will form part of a PhD thesis at Dublin City University for Ms. A. Kerr. [1998/99]

B1) It is hoped to spend two weeks, either in one entire block or spread out over a number of weeks depending on the project timetable, in the Sandyford Business Centre, or whatever other centres/organisations are necessary. Further contacts by telephone or in person at a later date may be necessary.

B2) The researcher will be involved in participant observation, asking questions and participating in informal discussions and will arrange more formal interviews at the convenience of the employees.

C1) It is envisaged that the *Compuflex* research group might benefit from an outsider's view of their development/localisation process although it is important to remember that this study is primarily interested in how organisations contribute to broader social and technical changes and learning at a societal level. The final case study will be made available to *Compuflex* and comments will be welcomed.

C2) In addition, the SLIM network includes both existing and potential *Compuflex* markets. For example a national study on Germany and France will be available in the next few months on the SLIM web site. Findings from similar content development case studies, and cases in education and public service organisations from across Europe will engage with transnational but also culturally specific processes may also be of interest.

C3) In terms of contacts and networking the COMTEC centre at DCU and the other research centres around Europe are a rich resource of information and knowledge which *Compuflex* might wish to be associated with.

COMTEC
Dublin City University,
Glasnevin, Dublin 9.

Tel: 353.1.704 5672
fax: 353.1.704 5447
e-mail: aphra.kerr@ccmail.dcu.ie

September 14, 1999

Mr. Martin Melarkey
The Nerve Centre
2nd Floor Northern Counties,
Custom House St.,
Derry. BT48 6AE

Dear Mr. Melarkey,

Further to our telephone conversation today I am writing to confirm your participation in the Social Learning in Multimedia, or SLIM, project.

As already stated the aim of this project is to establish the factors which are shaping the development of the multimedia industry and products in Ireland. This project seeks to investigate how a new media form and content is developed; what are the conceptions of the final users and markets which are informing these developments, and what are the most important social, political and economic factors which are influencing this process.

I am particularly pleased that I will have an opportunity to experience both the production process and user reaction to your Colm Cille products.

Just to confirm therefore that I will arrive on May 26th and shall meet with Mr. Melarkey at 10.30 pm. This meeting will set the stage, establish names of people etc. From then on I can contact people directly to arrange semi-structured interviews. The rest of the time I shall merely observe developments.

I look forward to a fruitful and interesting study. Many thanks in advance for your co-operation.

Yours sincerely

Ms. Aphra Kerr

Research Officer

Note: The SLIM home-page can be found at http://www.ed.ac.uk/~rcss/SLIM/SLIMhome.html

Key Questions/First Draft

1) The main empirical focus of this thesis will examine how **information technologies**, in particular **multimedia technologies**, are shaped/ appropriated by society.

2) The underlying substantive question behind this focus is how the re-definition of multimedia as media and will examine the role which **multimedia and its content** does, and could potentially, play in social change in a particular context, i.e Ireland. This is informed in part by the recognition that 'the production of images and discourses is an important facet of activity that has to be analysed as part and parcel of the reproduction and transformation of any social order.' (Harvey, D. (1993) pg.
3) It is also provoked by the rhetoric which presents IT as new democratic media with important, mainly positive, political, economic and cultural consequences.

3) More specifically the thesis sets out to examine how multimedia content production and consumption interacts with what is conceptually understood as constituting an Irish national, cultural and ethnic identity; and what role do such activities of representation play in the reconstruction of these imagined spaces/places/territories/ communities. [see morley and robins..1995]

4) Finally the thesis shall look at the implications of the empirical findings and theoretical conclusions at both the non-governmental and policy level? What stratagies can people enact to improve economic, social and cultural wellbeing.

Hypothesis

The key hypotheses underpinning this thesis is;

1) That 'Ireland' has a rich and particular cultural, economic, and political history/heritage, which offers hypothetically enormous potential for the development of multimedia technologies and content.

2) That multimedia is potentially a powerful new medium of communication and information which if explored may offer important new possibilites for innovation and improving many spheres of life.

3) That in order for this positive potential to be harnessed important policy decisions will need to be made.

Methods and Approach

The thesis will use ethnographic methods to map the stratagies used by particular actors and netoworks of actors to harness and exploit Irish heritage and it will look at the implications of such stratagies.

It will seek to situate these findings in a socio-historical framework which will try to identify certain practical and theoretical factors which may influence the emergence of a mm content industry

1.1 Size, island mentality and geographical peripherality
1.2 Size, economically and demographically
1.3 The ebb and flow of emigration, the concept of brain-drain or leakage.
1.4 Concepts such as postcolonialism and dependency, what do they mean in an era of increasing globalisation; for a small nation state
1.5 The notion that an industrial and technological logic informs policy making and that there is a tension between on the one hand liberal market ideology and the drive for economic growth and on the other hand the need for cultural diversity and pluralism.

1.6 The notion that culture is something which is lived; what does that mean in an era of increasing commodification of culture and the re-interpretation and re-presentation of culture and heritage.

1.7 The concepts of content, information and knowledge; what they mean and how they are used.

Specific Questions

At the level of the Product

What preconceptions of the users does the supplier hold
(Collinson, 1993, prefiguring, constructing the user)

To what extent are technical problems shaping the product content. At the level of hardware, or software, something else..
(Tech. determinism, tech. trajectory..see Wijbe Bijker)

What delivery platform has been chosen. Why?
(See network externalities, Dutton 1995)

Do the multimedia products being produced?
A) Provide an innovative new media form or simply reproduce existing media forms
B) Innovative new content

Are the multimedia products more;
A) Interactive than present media products
B) More 'multimedia-ness'...maybe use the term hybrid,
C) More tailored/personal or more mass, more inter-presonal than mass, more local or global,
(ABT on bespoke or commercial,)

To what extent can it be said that the local be said to exist in the products produced?

Is it possible to characterise anything as essentially Irish within the products produced?

At the level of the firm/ At the level of user

What background/learning has the firm in this area..technical or creative...how does it shape their present developments. (path dependencies/trajectories)

Could these firms be termed intermediate users?

What market reserach was undertaken by the firm to assess user demand. Who are the target market? (gender, class, generation, location and social dynamics/moral economy of [work, home, other], Silverstone, (various) Berg Aune, 1994)

What are their aims with this product.

Have appropriate distribution and marketing mechanisms been put in place.

What are the underlying perceptions of the user which inform the development of the product.

What form, in any, do supplier/user interactions take.

What mechanisms are in place to ensure continued user feedback on the product (what iteration between supplier and user..or innofusion)

What training/education of existing staff has taken place with regard to MM.

What other communicative stratagies are firms taking in order to find out about the market, evolving technicla devleopments and evolving creative development? (Conferences, user associations and firm associations, trade publications etc.)

At the level of the nation state

What is the guiding philosophy of state support in this area.

What state supports are available to assist in the development of mm.

What definitions are used by authoriatative actors.

To what extent are these firms interacting through state agencies or are self-proactive.

What role does the state have;
Industrial..
Sectoral support, financial and consultancy supports,
Telecommunications
Education and training
Culture and Heritage

At the level of Culture (Another revival/renaissance of culture)

To what extent can it be said that the local be said to exist in the products produced?

Is it possible to characterise anything as essentially Irish within the products produced?

What aspects of culture are being presented within these products?
Anglo-Irish, Celtic, Gaelic, some hybrid...the diaspora (new romanticism)
Form - Language, music, text/writing, visual language,
Content - traditional content repackaged, new content especially developed for these products

Appendix B

Appendix B: Household Expenditure by Function, 1985-1992

Ireland

	1985		1990		1992		1985-1992
	proportion	MECU constant 1985 prices	proportion	MECU constant 1985 prices	proportion	MECU constant 1985 prices	
a. Food	40	1,697	34	1,894	34	1,944	-6.46
b. Shelter, clothing	21	879	22	1,213	22	1,255	1.00
c. Domestic	7	285	7	398	7	413	0.43
d. Entertainment	9	358	11	586	11	615	2.22
e. Transport	13	549	15	805	14	801	0.92
f. Education	3	110	2	136	2	140	-0.17
g. Medicine	3	122	3	173	3	181	0.26
h. Other goods and services	5	192	6	341	6	365	1.81
Total	100	4,192	100	5,546	100	5,714	

Note 1:
Values in millions of ECUs and at 1985 constant prices and exchange rates for 1985, 1990 and 1992.
Proportions, own calculations.

Sources:
EuroStat, 1992, National Accounts ESA, Detailed by Branch, 1984-1989, Luxembourg.
EuroStat, 1994, National Accounts ESA, Detailed by Branch, 1987-1992, Luxembourg.
Table 5

Appendix B: Household Expenditure by Function, 1985-1992.

Italy

	1985		1990		1992		
	proportion	MECU constant 1985 prices	proportion	MECU constant 1985 prices	proportion	MECU constant 1985 prices	1985-1992
a. food	25.04	1,541	21.55	1,565	20.50	1,565	-4.53
b. shelter, clothing	27.57	1,697	26.57	1,930	27.70	2,114	0.12
c. domestic	8.43	519	9.39	682	9.49	724	1.05
d. entertainment	16.83	1,036	17.24	1,252	16.64	1,270	-0.19
e. transport	12.45	766	13.09	951	13.04	995	0.59
f. education	0.67	41	0.70	51	0.69	53	0.03
g. medicine	5.46	336	6.43	467	6.58	502	1.12
h. other goods and services	3.56	219	5.03	365	5.37	410	1.81
Total	100	6,155	100	7,263	100	7,633	

Note 1.
Values in millions of ECUs at 1985 prices and exchange rates for 1985, 1990 and 1992.
Proportions, own calculations.

EuroStat, National Accounts, ESA, Detailed by Branch, 1984-1989, 1987-1992.
Final consumption of Households by purpose, table 5.

Appendix B: Household Expenditure by Function, 1985-1992

France

	1985		1990		1992		1985-1992
	proportion	MECU constant 1985 prices	proportion	MECU constant 1985 prices	proportion	MECU constant 1985 prices	
a. Food	21	1,580	19	1,680	19.07	1,702	-1.93
b. Shelter, clothing	26	2,120	24	2,290	26.64	2,378	0.64
c. Domestic	8	637	8	693	7.65	683	-0.35
d. Entertainment	7	1,005	7	1,193	13.26	1,184	6.26
e. Transport	17	1,287	17	1,519	16.85	1,504	-0.15
f. Education	0	35	1	48	0.56	50	0.56
g. Medicine	9	658	10	951	10.77	961	1.77
h. Other goods and services	13	384	13	448	5.20	464	-7.80
Total	100	7,706	100	8,822	100	8,926	

Note 1.
Values in millions at ECUs and 1985 constant prices and exchange rates for 1985,1990,1992.
Proportions, own calculations.

Eurostat, National Accounts ESA, Detailed by Branch, 1984-1989, 1987-1992
Final Consumption of Households by Purpose, Table 5.

Appendix B: Household Expenditure by Function, 1985-1992.

United Kingdom

	1985		1990		1992		1985-1992
	proportion	MECU constant 1985 prices	proportion	MECU constant 1985 prices	proportion	MECU constant 1985 prices	
a. Food	24.55	1,567	21.28	1,667	21.46	1,630	-3.09
b. Shelter, clothing	29.08	1,856	26.49	2,075	27.34	2,077	-1.74
c. Domestic	6.67	426	6.82	534	6.99	531	0.32
d. Entertainment	15.60	996	17.76	1391	17.39	1,321	1.78
e. Transport	16.68	1,065	18.13	1,420	17.24	1,310	0.56
f. Education	0.77	49	0.78	61	1.00	76	0.23
g. Medicine	1.25	80	1.34	105	1.46	111	0.21
h. Other goods and services	5.39	344	7.39	579	7.12	541	1.73
Total	100	6,383	100	7,832	100	7,597	

Note 1:
Values in millions of ECUs and at 1985 constant prices and exchange rates for 1985, 1990 and 1992.
Proportions, own calculations.

EuroStat, National Accounts ESA, Detailed by Branch, 1984-1989, 1987-1992
Final Consumption of Households by Purpose, Table 5.

Appendix C

STIAC Recommendations (1995)

A Science, Technology and Innovation Advisory Council was established in 1994 following a two year campaign by academic and industrial interest groups. The council produced a draft White Paper in March 1995 which became known as the STIAC, or Tierney report and was based on the submissions of 156 individuals and groups from all sectors of the Irish economy. This report noted the continuation of certain problems in the Irish socio-economic system including unemployment, emigration and the weakness of indigenous industry and strongly criticised the 'passive approach' adopted by Irish governments to technical change. In total the report made 160 recommendations addressed at business, government and the higher education sector.

> 'This is our last chance. Government has paid lip service in the past, now it must make a serious commitment. Otherwise we'll die a slow death - nothing more than a base for multinational industry. I just hope it's not too late'
>
> Dan Tierney - chairman.[Science, 1995 #125]

Table 1 'Making Knowledge Work for Us'. Recommendations of the Science, Technology and Innovation Advisory Council 1995.

Business Sector

1. Double by 1999 the amount of R&D carried out by business.
2. Exchequer funding share should be maintained at 13% (1993 level).
3. Introduce tax measures to stimulate business R&D.
4. Establish an Irish inter-firm Co-operation Programme to bring small enterprises together to co-operate on joint activities including R&D.
5. New funds for food, marine and timber based R&D.
6. Improvement in the venture capital environment.
7. FÁS should allocate at least £50 million to support training for the employed.
8. All programmes should emphasis innovation.

Third-level Sector

1. Basic funding should be increased to £6m
2. A five year programme of investment in equipment across the public sector.
3. Each PhD scholarship should be funded at not less than £3,000 a year.
4. A research charter should be adopted by third level.

State Sector

1. A single entity should oversee both the PATs and the NMRC.
2. Expenditure on agricultural research should received additional support from producers.
3. The level of funding in other natural resource based sectors needs to be increased.
4. Social sciences should be part of the S&T system.

Source: (STIAC, 1995 #121)[1]

The STIAC report acknowledged that international technology transfer is critical for a small country and argued that government agencies and universities had an important role to

play as an informational interface in this process. Practical proposals included: a Forbairt National Technology Brokerage Activity, a third level/industry charter to improve the linkages between industry and universities and a 'state-of the art' communications network.

This report was also concerned with the wider perception of innovation in Ireland and its place in Irish culture. They recommended a separate STI budget of £1m to assist in the promotion of ST&I which should be spent on annual innovation conferences, demonstrations and lectures. Furthermore, attention should to be focused on assuring that the national curriculum at primary and secondary level included relevant S&T subjects. The report emphasised the need for transparency and co-ordination in government agencies, including greater accountability for spending and horizontal co-ordination of policy.

Even before the STIAC report was published the publicity generated by the initiative had influenced government decisions on S&T, including the development of a specific Research and Development sub-programme within the second CSF 1994-99 (see section 5.2.2).Recent government initiatives include tax deductions of 400 percent for incremental R&D expenditure in firms already eligible for the 10 percent corporation tax rate (1 June 1995 for a trial period of three years), an increase in basic research expenditure from £1-1.5 million in 1995, increased funding for a number of technology services (Techstart) and the launch of an STI Awareness Programme with a budget of £100,000 in 1995. Under this programme a national Innovation Lecture was given by the Executive Vice President of Philips on 'Entrepreneurship, Technology and Multimedia' and an innovation conference titled 'Success through Industrial Innovation - a new focus for Firms and Government in Ireland' took place.

[1] PATs - Programmes in Advanced Technology. NMRC - National Microelectronics Research Centre