Chapter 1

Lecture Notes on Autonomatronics$_{TM}$: Simply, Enabling Audio-Animatronics to be Independently Responsive and Reactive to External Stimuli

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Abstract. Entertainment robots throughout theme parks are well known. In this chapter, we briefly discuss some background of automated robots and define some terms that help describe methodologies and concepts for autonomous shows within a flexible narrative. We assert by using some basic rules and concept that entertainers applied during a show, applies to autonomous interactive shows as well. We discuss our multimodal sensory setup and describe how we applied these basic rules and concepts to a show. We assert that it is uniquely important in the study of autonomous for theme park and location base entertainment.

Keywords: Autonomatronics, Entertainment, Robots, Automated, Autonomous, Flexible Narrative, Interactive, Multimodal

1. Introduction

In ancient China, a book called, Stories of Government and People (Chao Ze Qian Zai) describe tales of wooden mechanical robotic technology. One mystical tale describes how King Lang Li forms the Qi Dynasty (550–577 A.D.) build a dancing robot that when offered a drink; it would turn to the person offering the drink and bow. Five hundred years later, Leonardo da Vinci builds a self-propelled mechanical walking lion that opened his chest and presented various lilies and other flowers as homage to the new king Francis I of France in 1515. Further, in the 16th century, technology for creating autonomous robotics grew, when clock-making technology in Europe flourished. The 18th century brought `increasing precision and reliability in clock performance that allowed for more autonomous human like systems. This enabled the creation of Jaquet-Droz automata, an autonomous hominoid (Young Boy) that gave the illusion of writing letters [6]. In Asia, one set of Japanese manuscripts published in 1796 called Illustrated Machinery (Karakuri Zui) by Hanzo Kosokawa describes how to make nine karakuri dolls, including the famous tea-drinking doll. In 1962 Walt Disney premiered a show called "Great moments with Mr. Lincoln" at the World's Fair. A similar show still runs at Disneyland [16].

1.1 Autonomatronics

Autonomatronics is simply the use of sensor fusion with artificial intelligence, enabling audio-animatronics to be independently responsive and reactive to external stimuli. Abraham Lincoln was the first human Audio-Animatronics character. Today, modern entertainment robots throughout theme parks are well known to the public. Two major types of robots entertain people in theme parks. The first types of these robots are audio-animatronics, coined by Walt Disney Imagineering for robots that deliver preprogrammed animation and audio or speech dialog to support experience and story throughout a well-defined narrative. Disney is unique in that instead of developing robots to perform task, our robots perform in shows. We have to solve a set of unique challenges to make our robotic come across as believable characters with distinct personalities and whom are guest can form an emotional connection. These automated robots are design to look alive through expressive motion and audio, but they differ from other types of robots in that they do not respond to external stimuli from our guest.


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Fig. 1. Autonomatronics Hearing and Vision

Fig. 3. Autonomatronics Brain and Speech

Each of these categories has its own technical challenges. Braezeal and Fong describe the challenges in the design of interactive robots in general [5] [6] [7] [11]. One major challenge is vision tracking of multiple objects with persistence [3]. However, Donald Reid, describes a general solution to the data association problem of tracking multiple objects with the known limitations for real-time [9]. We still have to consider difficult detection for unconstrained environments [14].

Voice recognition is another formidable challenge. Word recognition is challenging with low single to noise ratio environments, prevalent in theme parks and public places. Also voice recognition for children, foreign languages, accents, limit use of such technology [12] [13].

Lastly, Brain or AI addresses only primitive needs. Role-playing games (RPG) still really on elaborate state machines or conversation trees and thus fell modal and unnatural. Characters employing such methods think more strategically and don't focus on building relationship with the person they are interacting with.


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3. Autonomatronics Play Test

The Autonomatronics Play test was design to test this flexible narrative concept with a show time boundary of six minutes [14]. We had the opportunity to play test the autonomous show at Disney's D23 conference [15]. The Show played every fifteen minutes, 8 hours a day for 5 days. The Actors consisted of two characters, the first was an Audio-Animatronics' Bird called "Glayds" (see Fig 5) and our second actor was the new Autonomatronics robot called "Otto" (see Fig 6). The show consisted of six acts that employed this flexible narrative. During the show, Otto and Gladys never relinquish control of the narative.

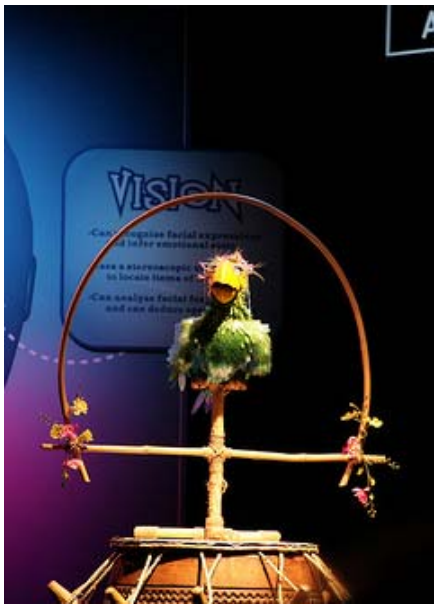

Fig. 2. Picture of Glayds

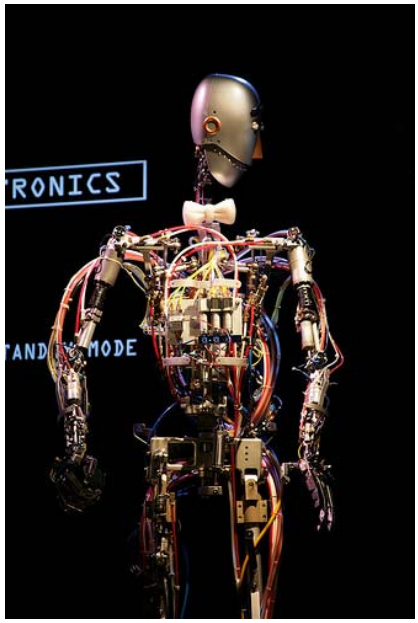

Fig. 6. Picture of Otto


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Chapter 2

ASTOR: Towards a Solution for the Administration of Conflicts in AspectJ

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Abstract. Astor is a tool that proposes mechanisms and strategies to improve the treatment of conflicts in AspectJ. These strategies are supported by means of the addition of a Conflict Manager component. This component fulfills two main functions: to detect conflicts automatically and to apply wider resolution strategies that those that AspectJ has itself, semi-automatically. The conflicts detection acts by a classification of the same ones for likeness levels and the resolution is made following the guidelines of a taxonomy that provides six resolution categories. The tool implementation is based on the AspectJ code pre-processing, being this the only requirement for its use.

Keywords: Aspect-Oriented Programming, Conflicts, Interactions, AspectJ, Crosscutting Concerns, Separations of Concerns

1 Introduction

Throughout the history of software engineering, the aim has been to organize and decompose software into primary and comprehensible components. That is to say, the encapsulation of state and behaviour by means of procedures, classes, monitors, abstract types, objects. Current methods, notations, and languages concentrate on finding and composing the functional units of an application. However, as non-functional requirements have also added to the scope and complexity of current applications, obtaining and maintaining a separation of concerns through all levels of software development is still a problem.

The Object-oriented paradigm supports the decomposition of a system through modularization by classes or objects, but despite this asset, there is always a dominant decomposition concern during software development [24]. This dominant concern is usually related to the innate functionality of an application. Consequently, the addition of non-functional features or aspects such as synchronization, tracing, error handling, persistence, and so on, often leads to invasive changes that do not align with the functional components of the system. As a result, the new feature code is scattered across multiple classes and leads to tangled code, and the desired encapsulation and separation of concerns is lost.

Aspect-Oriented Programming (AOP) [13] is a widespread and experimented approach to the separation of concerns [5] [17] [12]. The goal of aspect-oriented software development is to provide explicit support for modularizing the crosscutting concerns of a system. In AOP these overlapping or crosscutting concerns are encapsulated in separate modules called aspects, which code is woven into the functional components of the system at predetermined join-points. Current approaches and techniques for AOP [1] [9] [10] [18] differ on many issues. Some of these issues include the way and timing for the composition of aspects with other components, whether aspects may be composed with other aspects, how to improve aspect reusability, and how conflicts among multiple competing aspects are solved.

One of the problems of Aspect-Oriented Software Development (AOSD) [15] current approaches and techniques is the lack of support for the definition and handling of conflicts among aspects. When more than one aspect is associated to the same object or components and these aspects are not totally independent, the system's behaviour may be unpredictable. In most of the AOP tools, the identification and resolution of conflicts is an absolutely manual task.


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- *pointcutexample1* composes a primitive cut *call* on the join-point *void ClassId.methodId()* that is associated to an *around* advice and *pointcutexample2* composes a primitive cut *call* on the join-point *void ClassId.methodId()* is also associated to *around* advice.

```
aspect AspectExample1   {
   pointcut pointcutexample1(): call(void ClassId.methodId());
   before(): pointcutexample1()      {...}
   }
aspect AspectExample2   {
   pointcut pointcutexample2(): call(void ClassId.methodId());
   before(): pointcutexample2()
      {...}
   }
```

Listing 1.

Similarly potential conflicting situations are generated for the primitive cuts types: execution, set, get, handler, preinicialization, inicialization, etc.

4.2 Partial Likeness Conflict

A potential conflict of partial likeness exists if two aspects define pointcuts which join-points and advice are the same (Listing 2).

```
aspect AspectExample1   {
   pointcut pointcutexample1(): call(void ClassId.methodId());
   before(): pointcutexample1()
      {...}
   }
aspect AspectExample2   {
   pointcut pointcutexample2(): execution(void ClassId.methodId());
   before(): pointcutexample2()
     {...}
  }
```

Listing 2.

In this conflict level, aspects are woven in a preset order, the aspect execution can be uncertain if these are not independent. For example, in Listing 3 *Fig.Persistence* aspect always serializes a null object, because the advice associated to the pointcut *pcicrc1* is executed after the advice of *Fig.Cleaner* aspect associated to the pointcut *pcirc2*, which sets the radio of the circle.

```
aspect Fig.Persistence  {
  pointcut pcirc1(Circle c): call(void Circle.set*(..)) && target(c);

  after(Circle c): pcirc1(c)
    {
    ObjectOutputStream out=new ObjectOuptutStream(...);
    out.writeObject(c.getRadio());
    }
  }
aspect Fig.Cleaner  {
  pointcut pcirc2(Circle c): execution(void Circle.set*(..)) && this(c);

  after(Circle c): pcirc2(c)
    {
    c.setRadio(null);
    }
}
```

Listing 3.

These situations happen when the semantics of primitive cuts indicates a different woven place or execution point. But, the aspects can be activated on the same join-points (methods or attributes) and they can manipulate the same context information (with the primitive cuts: this, target and arg). In this way, and according to aspect-oriented languages properties defined in [27], the partial likeness conflicts among aspects suppose a possible violation of the principle that denoting that the aspects should not interfere among them.

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Fig. 6. Resolution of Partial Likeness Conflict between Connection and UserLogging aspects

For example, if one chooses the optional category, the conditions must be detailed. Then, the application of the resolution on the aspect code is automatic (edition of the code source is not required). That is to say, the aspect code is modified in a transparent form for the programmer. The 'none' category, is not part of the taxonomy, has been included in case the conflict detected does not cause an undesirable execution. In this case the developer does not require a different resolution. The selection of none category serves to the conflict does not appear in future detection processes.

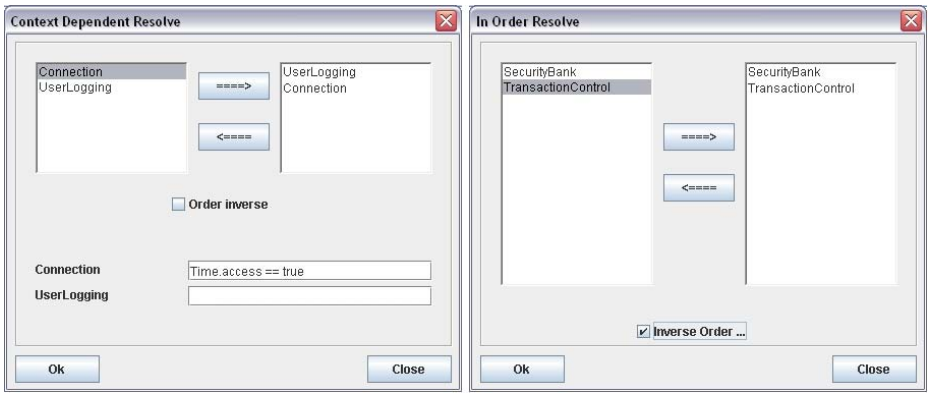

Fig. 7. Information input to apply resolution categories

The source code of the applications is manipulated alone in two situations. The first is when the 'Reader' object analyzes the classes and aspects structure and the second is when the 'ASolve' object introduces modifications in the aspects.

Once all the resolutions have been applied, the compilation and execution process of the application proceeds in the traditional way.

6 Related Work

Several works have been developed in order to detect and solve conflicts situations among aspects.

The first directly related work with the detection and resolution of conflicts seems to be [6] [7]. The authors hold that the treatment of the conflicts among aspects should be carried out in a separate form from the aspects definition. A model of three-phases is intended for the programming of multiple aspects: (i) Programming; (ii) Analysis of conflicts; (iii) Resolution of conflicts. The programmer solves the interactions using a dedicated composition language. The result of this phase can be again checked in phase (ii). The solution is based on a generic framework for AOP that is characterized by a very expressive language of crosscutting cuts, static conflicts analysis and a linguistic support for the resolution of conflicts.

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of a taxonomy that propose six resolution categories. The proposal has been implemented in a tool denominated ASTOR. It is based on pre-process of AspectJ code.

ASTOR allows one to construct aspect-oriented applications with AspectJ in a normal way. However, the developer does not have to pay attention to the conflicting situations among the aspects of the applications. The conflicts are automatically identified and a more flexible resolution can be applied. The programmer has to be concentrated on the functional components of the application and the aspects that crosscut it.

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References

1. Aksit, M., Bergmans L., Vural S.: An object-oriented language-database integration model: The composition filters approach. In Proc. of the European Conference on Object-Oriented Programming –ECOOP (1992)
2. Casas S., Reinaga H., Sierpe L., Vanoli V., Saldivia C., Pryor J.: Clasificación y Resolución de Conflictos entre Aspectos, VII Workshop de Investigadores en Ciencias de la Computación – WICC 2005. Río Cuarto, Argentina (2005)
3. Casas S., Marcos C., Vanoli V., Reinaga H., Sierpe L., Prior J., Saldivia C.: Administración de Conflictos entre Aspectos en AspectJ. In Proc. Sixth Argentine Symposium on Software Engineering (ASSE 2.005) in 34th JAIIO, Argentina (2005)
4. Casas, S., Marcos, C., Vanoli, V., Reinaga H., Valdivia, C., Pryor, J., Sierpe, L..: ASTOR: Un Prototipo para la Administración de Conflictos en AspectJ, XIII Encuentro Chileno de Computación, Jornadas Chilenas de Computación (JCC 05), Chile (2005)
5. Dijkstra, E.: A Discipline of Programming. Prentice Hall (1976)
6. Duoence, R., Fradet, P., Südholt, M.: A Framework for the Detection and Resolution of Aspect Interaction. In Proceeding of GPCE 2002, vol. 2487 of LNCS. Berlin: Springer-Verlag, pp 173–188 (2002)
7. Duoence R., Fradet P., Südholt M.: Detection and Resolution of Aspect Interactions, TR Nº4435, INRIA, ISSN 0249-6399, France (2002)
8. Durr P., Staijen T., Bergmans L., Aksit M.: Reasoning about semantic conflicts between aspects. In K. Gybels, M. D'Hondt, I. Nagy, and R. Douence, editors, 2nd European Interactive Workshop on Aspects in Software (EIWAS'05), September 2005
9. Homepage of AspectJ™, Xerox Palo Alto Research Center (Xerox Parc), Palo Alto, California. http://aspectj.org.
10. Homepage of Hyper/J™, IBM Thomas J. Watson Research Center. http://www.alphaworks.ibm.com/tech/hyperj.
11. ROOTS: LogicAJ – A Uniformly Generic and Interference-Aware Aspect Language. http://roots.iai.uni-bonn.de/researh/logicaj/ (2005)
12. Hursch, W., Lopes, C.: Separation of Concern. Tech. Rep. NU-CCS-95-03, Northeastern University (1995)
13. Kiczales, G., Lamping, J., Mendhekar, A., Maeda, C., Lopes, C., Loingtier, J., Irwin, J.: Aspect-Oriented Programming. In Proc. of ECOOP'97
14. Kiczales, G., Hilsdale, E., Hugunin, J., Kersten, M., Palm, J., Griswold, W.: An Overview of AspectJ. ECOOP, Hungary (2001)
15. Kiczales, G.: In Proc. 1st. International Conference on Aspect-Oriented Software Development. AOSD 2002. The Netherlands: ACM Press (2002)
16. Monga, M., Beltagui, F., Blair, L.: Investigating Feature Interactions by Exploiting Aspect Oriented Programming", Technical Report N comp-002-2.003, Lancaster University, England, (2003) http://www.com.lancs.ac.uk/computing/aop/Publications.php
17. Parnas, D.: On the criteria to be used in decomposing systems into modules. Communications of the ACM, Vol. 15 (12). pp. 1053–1058 (1972)
18. Pawlak, R., Seinturier, L., Duchien, L., Florin, G.: JAC: A Flexible Framework for AOP in Java. Reflection'01, In Proc. Third International Conference on Metalevel Architectures and Separation of Crosscutting Concerns Kyoto. September 25–28, Kyoto (2001)
19. Pawlak, R., Duchien, L., Seinturier, L.: Compar: Ensuring safe around advice composition". In Proc. FMOODS 2005, Vol. 3535 of LNCS, pp. 163–178 (2005)
20. Pryor, J., Diaz-Pace, A. Campo M.: Reflection on Separation of Concerns. RITA. Vol. 9. (1), (2002)
21. Pryor, J., Marcos, C.: Solving Conflicts in Aspect-Oriented Applications. In Proc. of the Fourth ASSE. 32 JAIIO. Argentina (2003)
22. Storzer, M., Krinkle, J.: Interference Analisys for AspectJ, FOAL: Foundations of Aspect-Oriented Languages (2003)
23. Tanter, E., Noye, J.: A Versatile Kernel for Multi-Language AOP. In Proc. of ACM SIGPLAN/SIGSOFT – Conference on Generative Programming and Component Engineering (GPCE 2005, Estonia) LNCS. Berlin: Springer-Verlag (2005)

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Chapter 3

A Trip to Rome: Physical Replicas of Historical Objects Created in a Fully Automated Way from Photos

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Abstract. The automatic generation of accurate 3D models from photos is a complex task requiring a mathematical formulation between image and object spaces. In this chapter an innovative methodology to transform 2D photos into 3D physical replicas is illustrated and discussed, with a particular attention to images taken by people who are not expert in the field of 3D reconstruction, computer vision, photogrammetry and surveying. The main idea is a procedure which can be easily managed by tourists who want to obtain 3D models during their holiday trips, by using images taken with both amateur and professional cameras, but also with mobile phones and video-cameras. Obviously, the method can be easily employed by archaeologists, curators and restorers for their technical work. Free-form objects (eg bas-reliefs, decorations, and ornaments) are analysed, with also an extension towards more complicated objects (eg building facades and architectural scenes). Results are shown using real examples, collected by the author during a trip to Rome.

Keywords: Three-dimensional Model, Automation, Accuracy, Matching, Photograph, Physical Replica

1. Introduction

It is normal for tourists to take holiday photos, which are then printed, organized into folders, shared on the Internet or loaded into digital frames. Digital photography has had an incredible impact on people. It has changed the way people acquire, share, modify, enhance and display images. Almost everyone has a digital camera today, as it is one of the easiest tools to capture, store and remember our special memories.

Digital images have several advantages with respect to film-based pictures, eg the possibility to acquire a great number of images without the need of developing them for simple visualization purposes (dark rooms are now a thing of the past). The storage capacity for digital images is enormous, and an image can be reviewed, edited or enhanced immediately after its acquisition. Images can be displayed without any extra cost with digital frames, monitors or projectors. Furthermore, the exchange of information is rapid and the distribution of the data on the Internet is becoming more popular. Several websites offer the possibility to share images (e.g. Facebook, Flickr, Google, …), presenting new opportunities for scientific purposes, especially in the field of reality-based 3D modelling. However, this is not a simple issue. Anyone can transform the world into an image (3D→2D) with his camera, but what about the opposite (2D/3D)? Fig. 1 shows the typical result obtainable with the implemented software and a set of images acquired with a digital camera. The final reconstruction is both automatic and accurate, meaning that manual measurements are not needed and the replica can be used not only for visualization, but also for metric purposes.

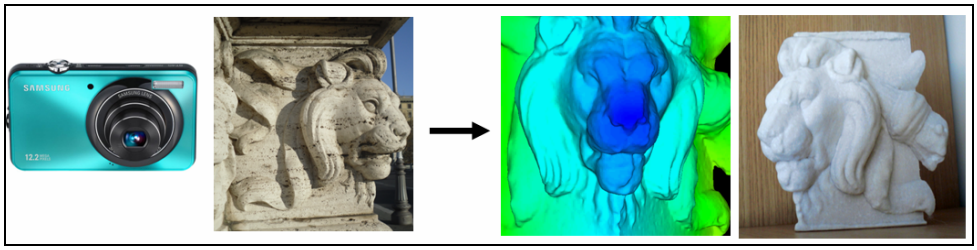

Fig. 1. The idea behind this work: a set of images is transformed into a 3D material replica

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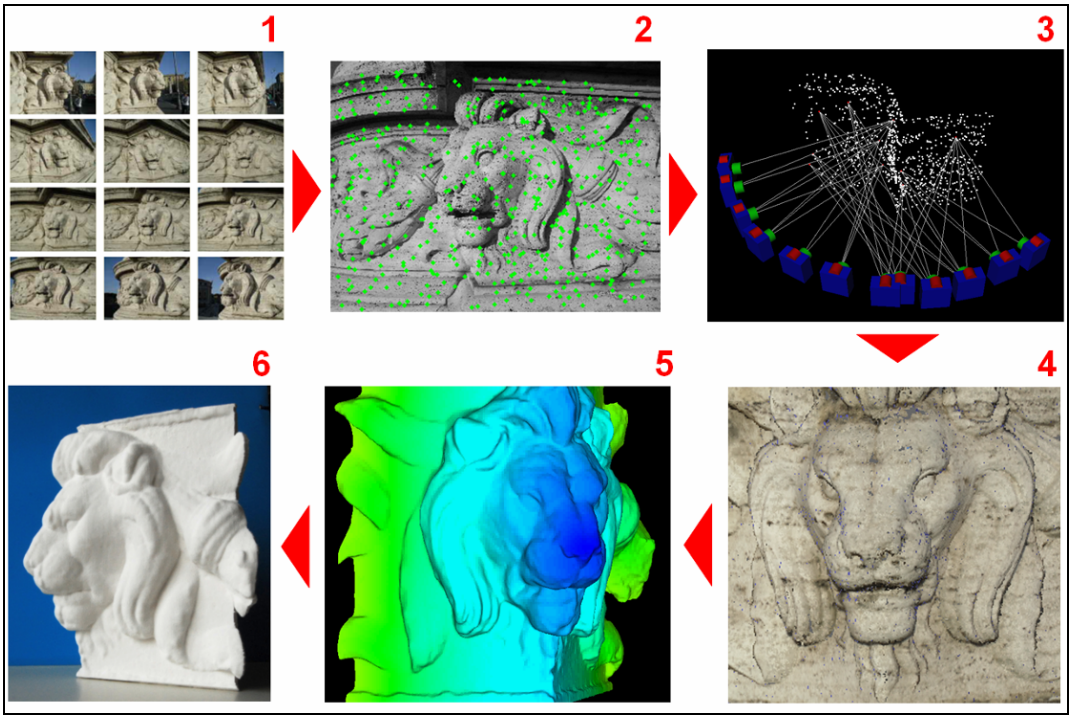

Fig. 2. The pipeline of the proposed procedure for 3D modeling and physical replica creation. It is interesting to notice that the image correspondences in 2 and 4 are automatically detected

3 The Phases of Reconstruction

As previously mentioned, the automated reconstruction of the photographed object with the proposed strategy is based on advanced techniques for image matching, wrong correspondence detection, image orientation and surface measurement. These algorithms are the current state of the art for this kind of application.

3.1 Image Acquisition and Camera Calibration

It is important to acquire good images, ie from different angle shots and with a good distribution around the objects. Basically, it is not difficult to obtain such a result. In the case of convergent images (eg when moving the camera from left to right, following a curved trajectory) all consecutive images should have a short baseline. The proposed method can work even with highly convergent images. However, low angle shots (less than 15°) are recommended to facilitate the automatic elaboration.

To improve the quality of the final 3D model, the camera should be calibrated beforehand. This is not strictly mandatory but is highly recommended. Several low-cost photogrammetric software (eg iWitness, PhotoModeler, …) can solve this task in a fully automated way. As the procedure is based on the use of PhotoModeler during the image orientation phase (see next section), camera calibration can be carried out with the special calibration polygon of the software.

In photogrammetry, a camera is termed calibrated if the *interior orientation parameters* (principal distance c and principal point position (x_0, y_0)) and distortion coefficients are known. Image distortion generates a misalignment between the perspective centre, the image point and the object point. It is quite simple to understand that the collinearity principle, which is the basis for image orientation, is no longer respected. Modelling lens distortion allows a significant reduction of this effect. A calibrated camera is a powerful measuring tool, with precisions superior to 1:20,000, as reported in vision metrology applications [26].


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(with respect to image V and W), $\mathbf{x}_1^U \leftrightarrow \mathbf{x}_2^V \leftrightarrow \mathbf{x}_3^W$ become tie points. Finally, the image points can be refined, decimated and homogenously distributed in the images [36].

This procedure has a drawback: as a generic block of n images can be considered composed of $(n^2\text{-}n)/2$ combinations of stereo-pairs, the exhaustive pair-wise matching has a quadratic computational cost. However, if images form an ordered sequence, the number of image combinations to be worked upon becomes n-2, with a significant reduction of computational time. A sequence is made up of n consecutive images. As the overlap between consecutives images is guaranteed, a fast procedure for image correspondence matching was developed. If I is a generic image, each triplet T_i is made up of the images $\{I_i, I_{i+1}, I_{i+2}\}$. Then, for each triplet T_i the pairs of images $C_i = \{I_i, I_{i+1}\}$ and $C_i''=\{I_{i+1}, I_{i+2}\}$ can be independently matched in order to determine a set of homologous features. The homologous features of the remaining pair $C_i'= \{I_i, I_{i+2}\}$ are determined from the numerical values only. In fact, as I_{i+1} is the central image of the triplet, it shares tie points with the outer images I_i and I_{i+2}.

In this case it is possible to transfer tie points from at least three images. After the single image triplet matching, the coordinates of points of consecutive triplets are compared in order to determine correspondences in the whole sequence. The triplet T_i and the next one $T_{i+1}= \{I_{i+1}, I_{i+2}, I_{i+3}\}$ share two images and tie points can be transferred with a simple comparison based on the value of the image coordinates. This method has a linear computational cost O(n) with respect to the number of images.

3.3 Decimation of Image Pairs and Image Points

The use of feature-based operators like SIFT and SURF for the detection of image points allows the elaboration of complex close-range blocks. A large variety of deformities, for instance scale variations, radiometric changes, convergent angle views, and wide baselines, can be analyzed in order to obtain a good set of image points.

Normally, the image points detected in a fully automated way are more than sufficient for an estimation of the exterior orientation parameters. However, two opposite situations could occur:

- a great number of image points is the final result of the feature-based matching;
- the image block is composed of tens of images, which must be progressively elaborated.

The former, which seems a good result, has a significant drawback: if too many points are used during the bundle adjustment, it is impossible to obtain a solution due to the computational cost of the elaboration. This is the usual case of well-textured bodies with images having the typical configuration of aerial photogrammetric blocks. Here, the camera is translated and rotated around its optical axis during the acquisition of the images. SIFT and SURF are completely invariant to these effects and often provide too many points, more than those strictly necessary for a more traditional manual orientation. These problems are also increased by the use of high resolution images, elaborated without any preliminary geometric image compression.

To overcome this drawback an ad-hoc procedure for tie point decimation was implemented. After matching all image pair combinations, points can be reduced according to their multiplicity (ie. the number of images in which the same point can be matched). A regular grid is projected onto each image, and for each cell only the point with the highest multiplicity is stored. Obviously, the same point must be kept for the remaining images.

The size of the cell depends on the geometric resolution of the images (eg for a 12 megapixel image, 4000×3000, a good choice is 200×150 pixels). This should be set manually.

It is important to apply this method after the concatenation of all image pair combinations. Indeed, this procedure cannot be used during the matching of the single image pairs. The method is also quite simple to implement and does not require a long elaboration time.

The second limit here listed is related to the number of images. For blocks made up of several tens of photos the elaboration time can significantly increase. In fact, for a block of n images $(n^2\text{-}n)/2$ image pair combinations must be analyzed, with a consequent elaboration time proportional to the global number of combinations.

However, only a limited number of pairs share tie points, therefore the remaining ones should be removed from the elaboration. The method used to discard these useless couple of images is a *visibility map*, which must be estimated at the beginning of the elaboration.

The visibility map contains the connections between all image pairs sharing tie points, and can be estimated with a simple procedure: if high-resolution images are employed, a preliminary elaboration with compressed images (e.g. less than 2 megapixels) is rapidly performed. This provides the image


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$$\mathbf{P} = \begin{bmatrix} 1/p & 0 & w/2p \\ 0 & -1/p & h/2p \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1/c \end{bmatrix} \mathbf{R} \begin{bmatrix} 1 & 0 & 0 & -X_0 \\ 0 & 1 & 0 & -Y_0 \\ 0 & 0 & 1 & -Z_0 \end{bmatrix} \quad \textbf{(1)}$$

For each image a **P**-matrix must be estimated, then PMVS can automatically detect homologous points to create a dense point cloud.

The patches extracted with PMVS can be triangulated to obtain a mesh. A possible solution is the use of *Poisson Surface Reconstruction* software (http://www.cs.jhu.edu/~misha/Code/PoissonRecon/) [42], but for "flat-like objects" it is possible to employ a 2.5 representation. This allows the creation of a Digital Surface Model (DSM), which is a regular array of *Z* created by using the irregularly spaced *XYZ* data. Obviously, the original point cloud must be rotated in order to set the *Z* axis along the depth.

4 Experiments

During this year's Easter holiday (2010) the author had the opportunity to visit Rome. Several objects were photographed with a low-cost camera (Samsung ST45, 4000×3000 pixels, costing roughly 120 Euros).

The route (Fig. 3) begins with the Baths of Caracalla, visiting the Arch of Constantine, the Roman Forum, Musei Capitolini, Palazzo Barberini, Piazza dei Tribunali, Castel Sant'Angelo and the Vatican City. In all, 11 objects were surveyed and presented, but many other datasets were collected. Obviously, these are just a few examples of what a person can find in Rome!

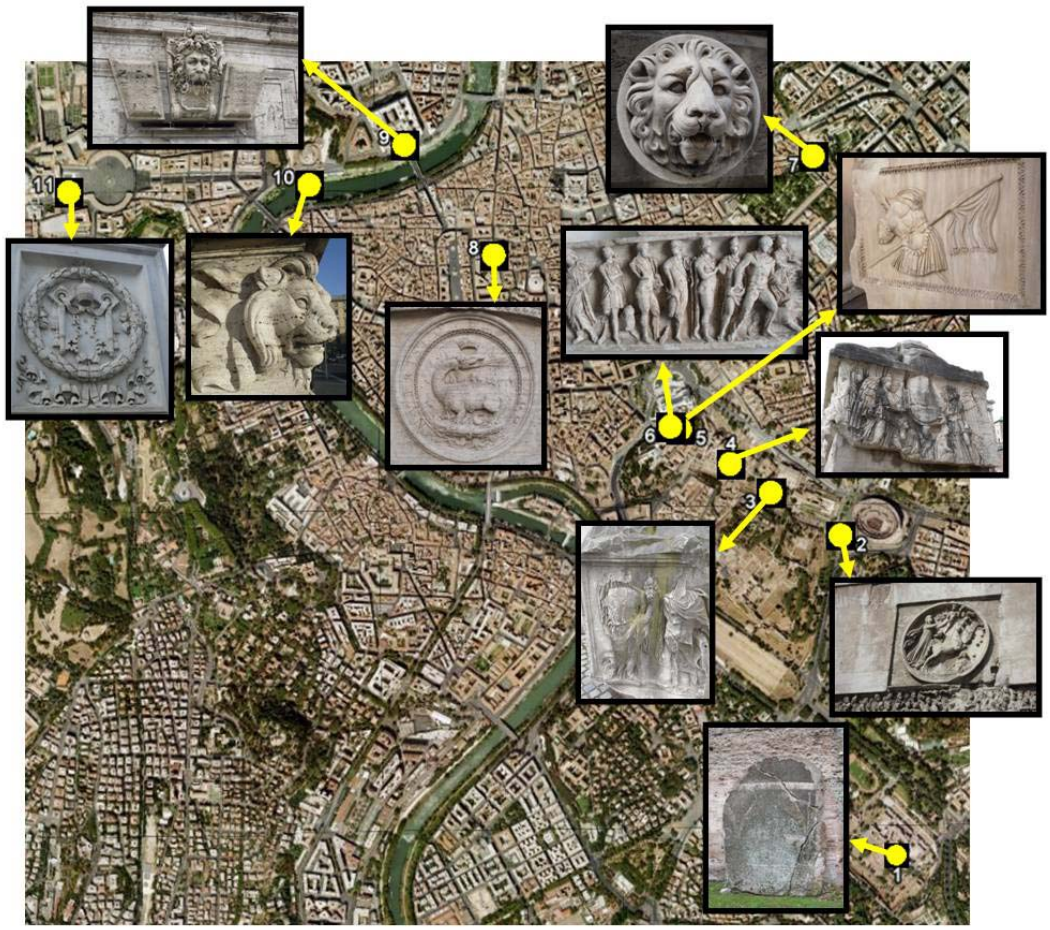

Fig. 3. The objects surveyed during the trip to Rome and their location: (1) Baths of Caracalla, (2) Arch of Constantine, (3-4) Roman Forum, (5-6) Musei Capitolini, (7) Palazzo Barberini, (8) Church of St. Louis of the French, (9) Piazza dei Tribunali, (10) Castel Sant'Angelo, (11) Vatican City


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All objects were reconstructed with more than 2 images to obtain a reliable solution. From a theoretical point of view, 2 images are sufficient for a complete 3D survey. However, fully automated methods must be able to work with incorrect data. The use of multiple images provides additional equations for the same unknown value, with the consequent possibility to check the quality of the solution. The robust estimation techniques implemented in the procedure showed a good resistance against outliers, without increasing significantly the computational cost. For these reasons, a minimum number of 4-5 images per object seems a good choice. In addition, more images than those strictly necessary allow the analysis of partially occluded parts that are not visible in the case of a few images.

The digital model can be saved using different file formats, for an efficient distribution and a quick visualization with free viewers. As the accuracy of the model is similar to that achievable with photogrammetric techniques, these models can be used for metric purposes, after setting an opportune scale factor.

Fig. 5. Textured digital models and replicas printed with resinated chalk. The undulate edges are due to an automated elaboration (exception made for the scale of the model, the selection of the printable area, and the thickening of the reconstructed surface). To obtain sharp edges a manual editing is needed

If the user wants to obtain a physical replica, the accuracy of the 3D digital model is normally superior to the printer resolution. This is useful for touristic applications, but also for accurate and detailed real surveys in the field of Cultural Heritage preservation, with an extension towards many other possible applications.

Fig. 5 shows two printed models. The printing took more than 6 hours, then the models were refined with a resin to strengthen the chalk.

5 Towards More Complex Scenes and Objects

Free-form objects (e.g. bas-reliefs, decorations, and ornaments) can be reconstructed with the method illustrated in the previous sections. For this particular kind of objects the combination of the proposed methodologies allows one to obtain a complete and detailed 3D model in a fully automated way.

In this paragraph the extension of the method towards more complex objects is presented. The main idea is the analysis of objects that have discontinuities and occlusions. This is the typical case of architectural

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34. Rousseeuw, P.J. and Leroy, A.M.: Robust Regression and Outlier Detection. New York: John Wiley, 329 pages (1987)
35. Barazzetti, L., Remondino., F., Scaioni, M.: Orientation and 3D modelling from Markerless Terrestrial Images: Combining Accuracy with Automation. The Photogrammetric Record. *In press*
36. Barazzetti, L., Remondino., F., Scaioni, M.: Extraction of accurate tie points for automated pose estimation of close-range blocks. Int. Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, vol. XXXVIII (Part 3A) (2010)
37. Gruen, A.: Adaptative least squares correlation: a powerful image matching technique. South African Journal of Photogrammetry, Remote Sensing and Cartography, Vol. 14 (3), pp. 175–187 (1985)
38. Zheltov, S., Sibiryakov, A.: Adaptive subpixel cross-correlation in a point correspondence problem. In Proceedings of Optical 3D Measurement Techniques, Zurich, Switzerland, pp. 86–95 (1997)
39. Wallis, R.: An approach to the space variant restoration and enhancement of images. In Proc. of Symposium on Current Mathematical Problemens in Image Science, pp. 329–340 (1976)
40. Gianinetto, M., Scaioni, M.: Automated geometric correction of high-resolution of pushbroom satellite data. Photogrammetric Engineering & Remote Sensing, (74), pp. 107–116 (2008)
41. Fraser, C.S.: Photogrammetric measurement to one part in a million. Photogrammetric Engineering & Remote Sensing, 58, pp. 305–310 (1992)
42. Kazhdan, M., Bolitho, M., Hoppe, H.: Poisson Surface Reconstruction. Symposium on Geometry Processing, pp. 61–70, Sardinia (2006)

Annex

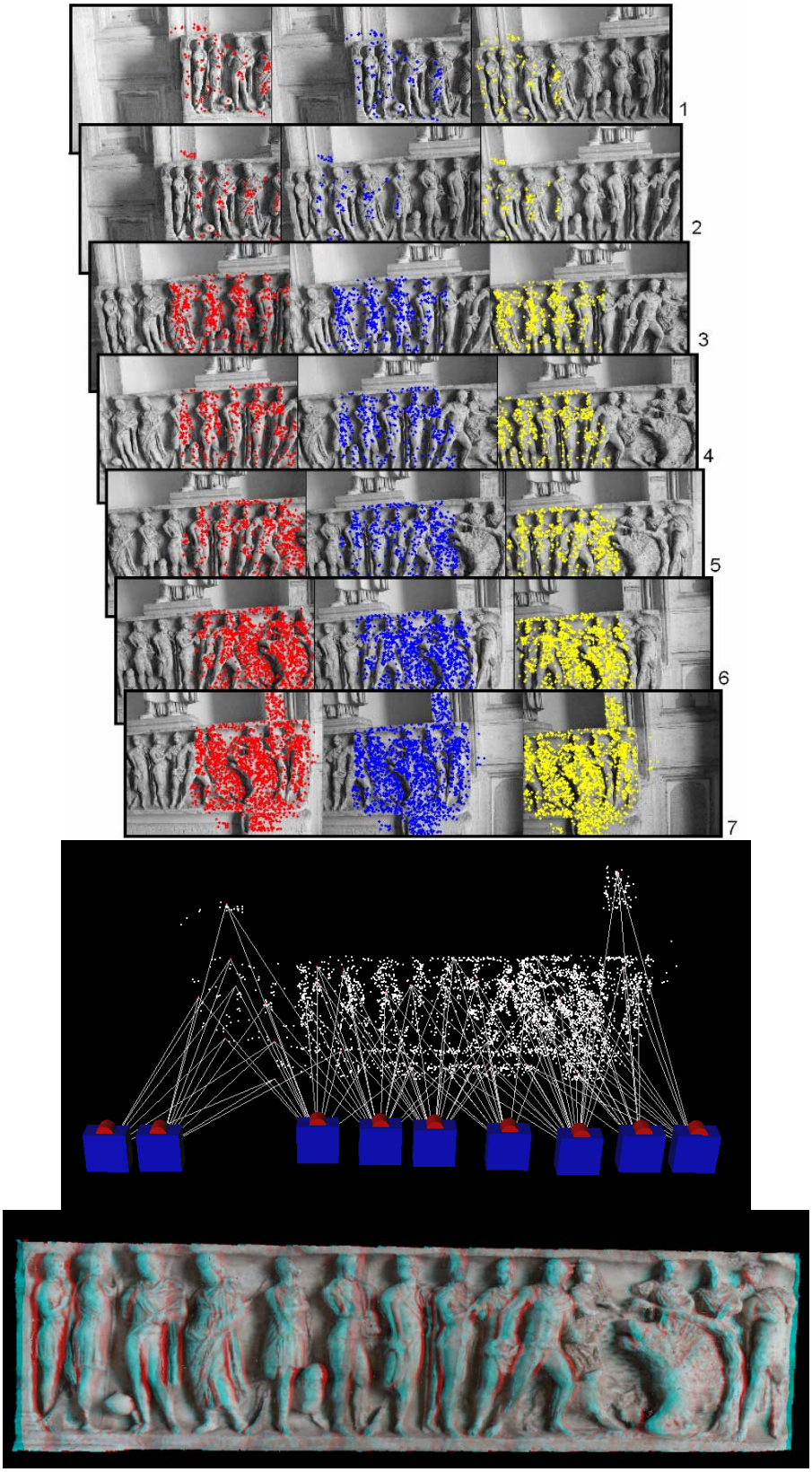

Fig. 9. Reconstruction of a bas-relief photographed in a famous Roman museum (Musei Capitolini): the matched image points between consecutive triplets (top), a 3D view of the camera poses (middle) and an anaglyph image of the final 3D model (bottom)


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Chapter 4

Original Creative Process of a Graphic Catalogue for Signalling: Typography, Arrow and Pictograph

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Abstract. The deconstruction from a typographic selection allows the planning of a creative process as an authorial graphic language, committed with the contents: the formal expression of the alphabet enlarges its visual values beyond an exclusive interest on a geometric clarity. In this case, the proposal is its implementation in the signalling for a natural environment.

Keywords: Signalling, Graphic Design, Typography, Environment, Eco-tourism

1 Introduction

This paper describes the original creative process of a graphic catalogue for signalling, that reinforces the environmental keys in minimum safety conditions. Its implementation is conceived for a space with a large affluence of hikers where agricultural, fishing or livestock breeding activities can coexist with others with an especial interest of the natural and ecological kind, constituting a highly interesting landscape, eco-culturally speaking.

The didactical level is highly emphasized, and acts as a starting point for the development of orientation projects that can be exported to other locations that have common features, while keeping enough margins to respect the local idiosyncrasy.

Signalling does not usually employ flashy resources to draw attention –that graphic manipulation that advertisement, for instance, uses– because its essence results from the message's simplicity. Therefore, in order to get the maximum amount of legibility, it is mandatory to say only what is required, using as few elements as possible. Other languages such as visual arts or music can be expressed with a certain amount of ambiguity, allowing to subjective interpretations that may enrich their task, but "didactical graphic" [1] should discard complex decoding.

Of all the resources that draw up a good legibility, typography is essential for text interpretation, as well as for spacing between characters, words and lines (kerning, spacing and tracking). Legibility is also about perceiving the letter's particular features [2]; its graphic anatomy, so to say.

2 Style Guidelines

Signs –arrow and pictograph– will be defined by means of typography through formal affinity links. The immediacy of reading is the main aim, and empathy comes second as identification stimulus, because it helps "textual legibility" [3] to be more receptive and therefore more efficient (quoting Eric Gill, "eventually, in practice, legibility comes to what one is used to"). Due to that, defining the typographic family involves an engaging task of searching and analyzing, extremely important in the subsequent development (graphic construction in concept prototypes).

Style guidelines must be assessed not only by means of the superficial aspect, but also by the correct choice of materials, the optimization of the constructive process and the way in which we solve the given necessities, with economic, visual and environmental rentability criteria. It begins with catalogue designing –typeface, signs and colour– before developing the remaining issues, that will be implemented bearing in mind the system's wholeness, structured from a linguistic code in three essential levels:

- Pictographs. Graphic, non-verbal forms that symbolize a message linked to the world of perception, through a visual sequence.
- Ideograms. Graphic, non-verbal signs that symbolize ideas and are conceptually autonomous, without the need of using letters (verbal language).
- Phonograms. Graphic, verbal sounds, composed not only of visual expression but also of phonic expression with articulation of speech sounds.

This is a synthesis of the evolutive scheme that G. Blanchard describes on "the systems and main elements of graphic notation" [4], thus establishing a path that goes from the world of perception (protographs / pictographs) to the conceptual world (ideograms / logographs), and finally to the verbal world (phonograms: alphabetic and syllabic writing); or else from drawing to writing, with a decreasing iconicity of the graphic form. This development defines the change from a mimetic formal thought to an abstract mental process that can be named: the word, a visual sign and at the same time, an oral one, the paradigm of the ultimate leap in human communication. At last: the phonic alphabet.

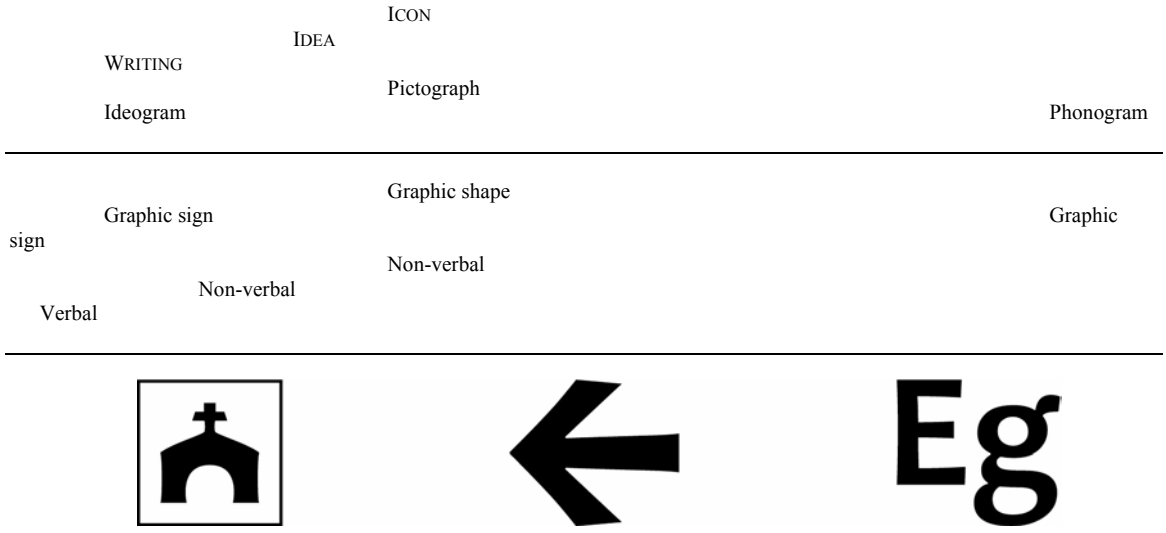

Fig. 1. Evolution of the linguistic code though the graphic form

Focusing on the design development that we are talking about, we can use a graphic catalogue –whose construction will be explained later– as an example within the evolution of representation from perceptive to conceptual and verbal (fig. 1). It is important to previously recall those aspects, to better understand the use of semiotics while designing, because they are directly connected to the economy of signs and to a wider efficiency of the monosemous message (alphabet). N. Chaves [5] indicates a segmented typology of what he calls "institutional semiotics", into the enunciation about the identification of corporate image:

- The linguistic element: the verbal part in a strict interpretation (language and paralinguistic codes).
- The semio-linguistic element: mixed semiotics, such as the personal act that includes, for instance, oral language and dressing codes.
- The semiotic element: "pure" semiotics (art, scenography or decoration, strictly speaking).
- The semio-ergonomic element: "impure" semiotics (architecture, equipment).

The interpretation of a visual system composed of a series of graphic elements, whose relation between them, among other combinations, relies on visual resources such as outline definition, colour contrast or texture, arrangement in an enclosed space, size scaling, and so on, and can end up being so complex that the only way to transmit a global message is to decode the ensemble as a "whole"; in order to achieve that, it becomes necessary to represent a visual associations' code with its own meaning beyond the segmented perception of certain units. In consequence, the text necessarily has to take the role of an image, turning into what Vilches [6] labels "visual text" and into what Peltzer [7] assures: "texts can be images, just as a paper's diagramming is a text in itself, because even if not a single word is read, there already are messages, meanings and senses in the header", referring to newspaper designing.

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- Degree of solidness: the chosen typeface, as the other elements of the catalogue, must have a firm hue.
- Visual hierarchization: assignment of different reading levels to a complex, abstract system, that can also include maps and graphics, that sometimes can be comprehended at first sight and other times only when the reader comes closer.

SIGNIFICANCE

- Formal empathy: can be understood as the mental and affective identification with visual features that, in this case, transmit warmness: reading will be easier if the observer gets an amiable feeling.

Once the typeface is chosen, we do a deconstruction of the letter E to obtain an arrow, a process derived from a phonogram to diminish a symbol's neutrality that, in the regulations, lacks of any relevant meaning. A deconstruction to "destructure or decompose, even to disintegrate the structures that hold the conceptual architecture of a given system" [13]. In that way, the designing activity ceases to be merely a bad translation of existing, impersonal elements, and becomes a truly creative process through an authorial graphic language, committed to the components: the alphabet's formal expression enlarges its visual values beyond exclusive interest for geometric clarity. As any visual element has a meaning in itself, and as this meaning implies a specific order through integration and separation laying-out principles, every message carries with it an interpretation process, more or less complex, in two levels: denotation (to mean objectively) and connotation (an expressive feeling, in addition to its literal or primary meaning).

The designer is the one that minimises perceptive time as much as possible, and because of that, when deciphering the information shown in an orienting sign, the stressed features should be the ones related to denotation, because it is not a persuasive message as happens in the advertisement area, for instance. However, due to the observer's heterogeneous profile, this fact does not collide with the intended use of a determined using of a certain extent of connotation, especially when we are trying to design something meant to change the established practice, once the communication product has been tested to fairly rate the emotional response that the public reveals. Therefore, aesthetic has a primal importance in how the message stimulates, conditioned by its contents, the context where it is applied and the user to whom it is addressed.

We start with the typeface specified in the signalling manual of the Canarian Network of Protected Natural Landscape [14], *Switzerland Narrow Black*, which was selected because "it offers an easy reading, with an appropriate and well-proportioned structural rate of curved and straight lines, and because it is a relatively new typeface, quite extended and free from semantic connotations". From this statement, we can assume there is a lack of interest in getting an emotional answer, as if the goal was to design something as aseptic as an aspirin box or a users' manual, without taking into account the natural location as a media for expression. It is all right to have legibility as the main premise, but it is not enough in itself to configure a visual system that encourages the user to enjoy spending a day outdoors: the contemplation of the site allows to benefit from the creative resources, combining flexibility with efficiency, because many of our everyday decisions are originated by emotions and we can not discard them, because concepts such as utility and usability would then be incomplete.

The act of communicating requires, therefore, a good amount of complicity because, according to Jordi Pericot [15], "the public personalizes the meaning of the statement and becomes the co-author of the locution". Consequently, it involves two people and it is not advisable to keep a cold, distant attitude towards those whose attention we want to grab. According to Joseph Albers: when it comes to design, 1+1 is sometimes 3, which allows doubting that between form and function everything is function, when we really should say, at present, that "function can take any form" [16], without aesthetic being an automatic consequence of it. In the end, for a symbol to be effective it is essential for it to be remembered, apart from being recognisable; and, while respecting the formal synthesis that its value gives it, it is advisable to add some emotional quality to reinforce the visual information. For this reason, style also helps to identify the given image through the integration of a series of visual variables inevitably linked to socio-cultural and psychological factors.

2.1 Typography

Once the typeface has been chosen, we will build up the signs –arrow and pictograph– on criteria of formal affinity. Immediate readability is the main aim, adding empathy in a second level as stimulus for identification, because it helps typography to be more receptive and therefore, more efficient. Due to that,

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Fig. 19.

Fig. 20.

Fig. 21.

Candara, humanist sans-serif like *Calibri*, was designed by American Gary Munch [20] exclusively for Microsoft, a fact that turns it into one of the newest typographies to hit the market (2006). Just as *Berlin Sans FB*, its strokes do oscillate (fig. 22), but it differs from it (fig. 23) in its sharp angles (fig. 24). Finally, the g's ear and the Q's tail are very expressive (fig. 25), and display more personality than the others (fig. 26*, VAG Rounded Bold*; fig. 27, *Calibri Bold*; fig. 28, *Berlin Sans FB Regular*).

All the aforementioned letters are legible even when small-sized, thus meeting the basic standards for legibility such as significant increasing of x's height and the using of open forms, among which the *ink-trap* [21] varies in the meeting of straight and curved lines, that is to say, the degree of openness on the insides of the letter, as happens in the intermediate vortexes of the M (fig. 29, from left to right: *VAG Rounded*, *Calibri*, *Berlin Sans FB* and *Candara*). *Calibri* and *Candara* form an ample space, whereas *VAG Rounded* and *Berlin Sans FB* tend to close it, forming a thick union in the later.

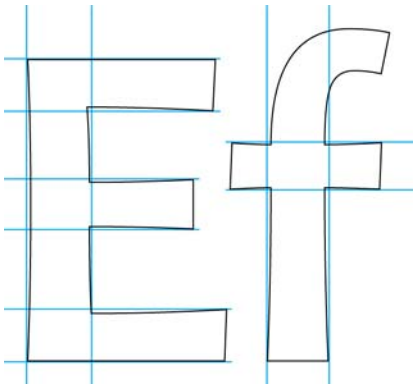

Fig. 22. Candara Bold

Fig. 23. Berlin Sans FB Regular

Fig. 24. Candara Bold

Fig. 25.

Fig. 26.

Fig. 27.

Fig. 28.

Fig. 29. Ink-trap in the interior sides of letter M

Another aspect to bear in mind for a good legibility is, as A. Frutiger says, the thickness of horizontal strokes, because "the typeface *Univers* has, proportionally, thin transitions (= elegance, etc.), whereas *Frutiger*'s are a bit thicker" [22], thus alluding to his own typeface as being specific for signalling. Let us see a comparison with H, one of the letters he suggests to recognise the more characteristic features of a typeface (fig. 30, from left to right: *VAG Rounded Bold*, *Calibri Bold*, *Berlin Sans FB Regular*, *Candara Bold* and *Frutiger Bold*, choosing his own as a reference). In all of them, the transversal arm is slightly thinner than the stem, making up for our tendency to see horizontal lines thicker than vertical ones, though

in *VAG Rounded* all strokes look exactly the same. On the whole, the horizontal stroke is very similar in thickness, but the height can point up some interesting details: in *VAG Rounded* it is placed under the horizontal stroke, fixed in *Frutiger*; in *Calibri* it stays the same, in *Berlin Sans FB* it is slightly lower and finally, in *Candara* it is even slightly risen, something to acknowledge as a compensation resource: even when a horizontal line is vertically centred, the eye always tends to see it under its real position, due to a weight effect of typographic hue. Because of this reason, the horizontal stroke on the H must be placed in relation to the optical centre, not to the mathematical one, to make the lower space seem bigger (if we place the letter upside down and mirrored, maybe we can appreciate the difference better).

With the n, a letter that *Frutiger* marks as determining, we can draw another comparison, placing the typefaces in the same order as before (fig. 31). In one hand, we can see the transition in the shoulder's connection to the stem (the shoulder is the rounded stroke on the n), from which we have traced the white triangle to make it visible enough. *VAG Rounded* has a small angle, *Calibri*'s is wider, but the top left start is straight –hardly there in *VAG Rounded*–, as opposed to *Berlin Sans FB*, *Candara* and to smaller extent, *Frutiger*, where the main stroke starts slightly sloping to the left. On the other hand, from these three *Candara* is the one with the wider base in the vertical stroke, something important as a leaning point, with a solid, steady feeling.

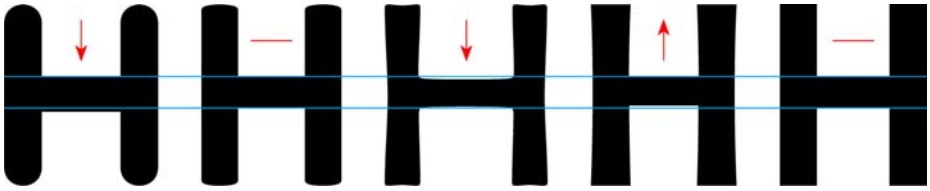

Fig. 30. Thickness and height of crossbar compared to stem in letter H

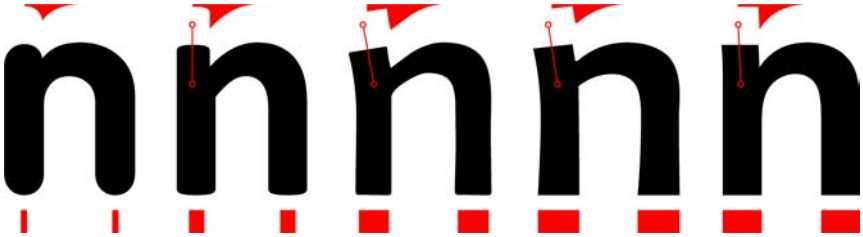

Fig. 31. Transition and slope of shoulder and thickness of stem in letter n

Letter o shows the curved stroke as an essential element of style (fig. 32, from left to right: *VAG Rounded Bold*, *Calibri Bold*, *Berlin Sans FB Regular*, *Candara Bold* and *Frutiger Bold*), and choosing once again the lowercase –whose balance in width is extremely important– we can appreciate that *VAG Rounded* has a smaller counter and in *Berlin Sans FB*, even if it is wider, its form is almost circular, inappropriate because the eye sees vertical strokes thinner than horizontal ones (we find the same flaw in *Futura*, for instance). *Candara* and *Frutiger* both have a counter whose width harmonizes with the strokes' thickness, whereas *Calibri* has this feature somewhat unevenly distributed, but not as extremely as *VAG Rounded*.

Up to this point, and following the explained arguments, we consider convenient to turn down some of the typographies for now: *VAG Rounded Bold* and *Berlin Sans FB Regular*. Among other aspects we have mentioned, the first ends up being somewhat inexpressive, with barely modulated strokes, which results in a weaker legibility compared to the others; the later, even if it does not require a bold style to be valid for signalling, has an Art-Déco origin [23] that lingers someway in its style (this feature is patent in letter k's tail, fig. 21).

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The minimum scale of the arrow when compared to the typeface is determined by the sum of E's stem plus the descendant (under the baseline), defined by the lowercase descendant (fig. 56). It is not the ideal proportion for both elements, so we recommend enlarging the arrow to increase consistency. Finally, we display the different ways to point out at directions (fig. 57).

Fig. 56. Minimum scale of arrow compared to typeface

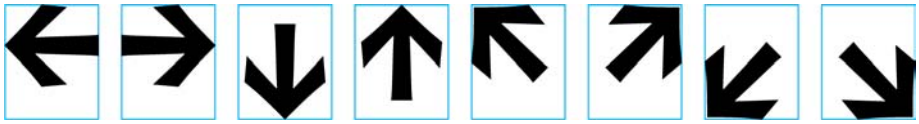

Fig. 57. Arrow orientation

I would like to emphasize the union between terminals and stem, adding a characteristic feature that appears in the chosen typeface for this study, helping to further reinforce, if possible, the integration of both elements (fig. 58). On the whole, the structural tension tends to concentrate at the vertex (fig. 59), following the strokes in the same direction while they narrow, something which favours a more dynamic character of the arrow, that gets more emphasized by the modelling of the stem when getting to it, built by an angle of 90º; because if the arrowhead is too obtuse it does not flow and if it is too sharp it vanishes; it is formed by three strokes to make the shape look more open, as we can appreciate in *Candara*, without the need to use an equilateral-triangle-shaped arrowhead which may cause, in this case, an excessive stain.

The final result avoids this strongly urban, impersonal appearance that is a feature of the arrow in *Switzerland Narrow Black* according to the regulations (fig. 60), with a greater feeling of stability in some of the turns (fig. 61).

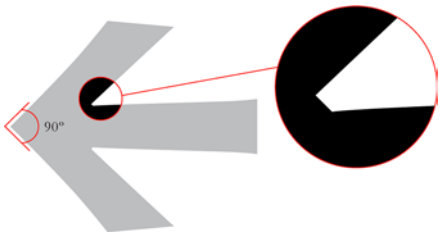

Fig. 58. Intersection feature

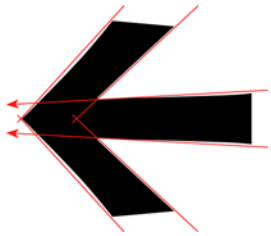

Fig. 59. Structural tension

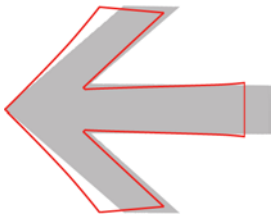

Fig. 60. Style juxtaposition

Fig. 61. Formal stability of the arrow

2.2.2 The Pictograph

We already have the typeface and the arrow, so the pictograph should follow the same guidelines to get a homogeneous catalogue that, without being too uniform, allows the immediate perception, as opposing to other kind of messages that intentionally look for a contrast and variety, especially as a graphic method in advertisement. According to Joan Costa, "designing pictographs always implies a process of progressive abstraction. From the complexity of a real scene or action, the designer takes the most significant elements in their minimum amount, to get the most of information and expressivity through them" [45]. This is, in a nutshell, the process I will carry out in the creation of, at least, six diverse pictographs, as a style guideline that can be applied to the rest. The concepts I intend to represent are: *Church*, an architectural element, *Ladies/Gents (public toilets)*, in order to integrate a set of human figures, *Drinking fountain*, a standard location for the visitor to take a break on his or her way, and *Picnic area*, a zone adapted for resting and eating. Besides those, mentioned in the regulations, we shall add two more: *Video* and *Audio*, that refer to audiovisual material for guided tours and interactive maps: nowadays, it is possible to get an earpiece with a MP3 player and films with a built-in GPS navigating system, storing files downloaded from a webpage as additional information. The first pictograph works as a standard to explain the creative process: the lineal outline is built on a mesh following regular proportions, the other part is completed by mirroring the drawing and, finally, we apply a selective modelling keeping the anchor points (fig. 62). The composition is balanced by a symmetry axis, synthesizing the form until we are left with two basic elements that define a church: a cross –more accentuated than the former one– and the double door, quite wide, so it does not get mistaken for the single doors we usually see in private homes (fig. 63). We already have a defined catalogue: typeface and symbols –arrow and pictograph– with a homogenized, open-form style that help its visual configuration (fig. 64). The resulting graphic language can blend with natural surroundings with that kind, familiar feeling that Eric Gill suggests as a legibility resource.

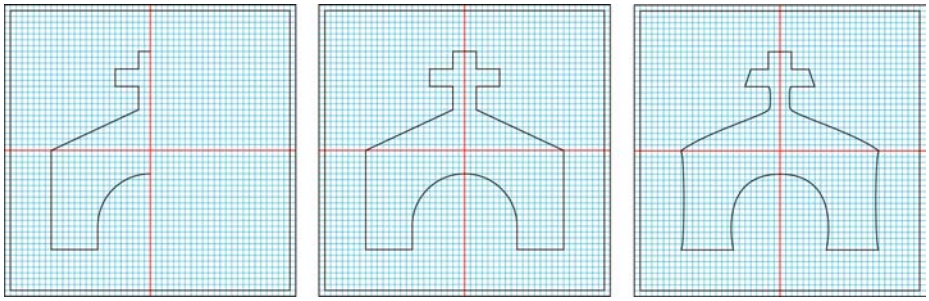

Fig. 62. Building the first pictograph: Church

Fig. 63. Comparing the old version (regulated) with the newly created original

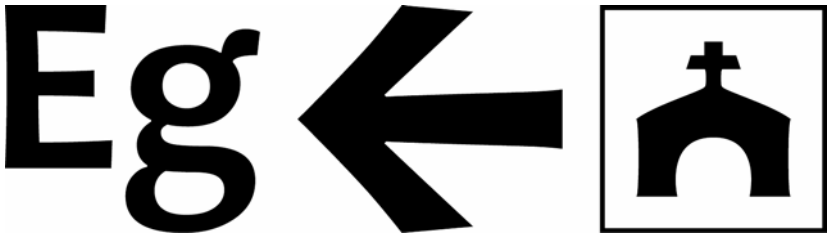

Fig. 64. Basic proposal of original catalogue


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Following the same guidelines, letters i and n produce the pictograph *Gents/Ladies toilets* (fig. 88). In *Drinking fountain*, it is letters b, V and L (fig. 89). In *Picnic area*, it is letter T that forms the pictograph (fig. 90).

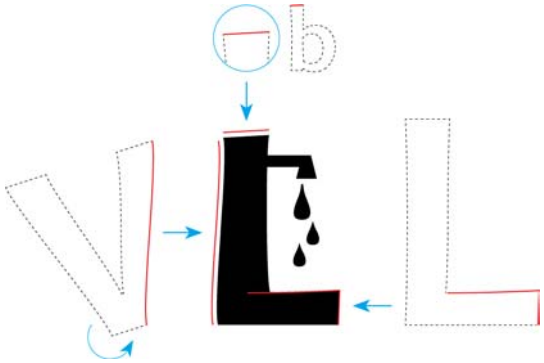

Fig. 89. Drinking fountain

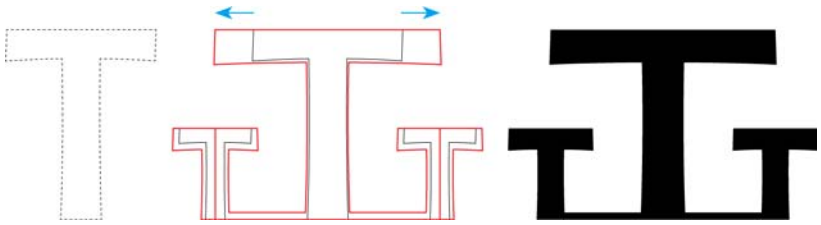

Fig. 90. Picnic area

In *Audio*, letter O is used to make the headphones' bow and, because the letter is not symmetrical, it has been counterbalanced in the final result (fig. 91). In fig. 92, *Video* makes use of letters H and o (the later keeps its asymmetrical feature).

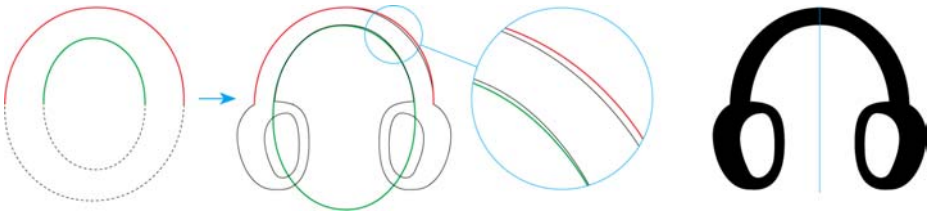

Fig. 91. Audio

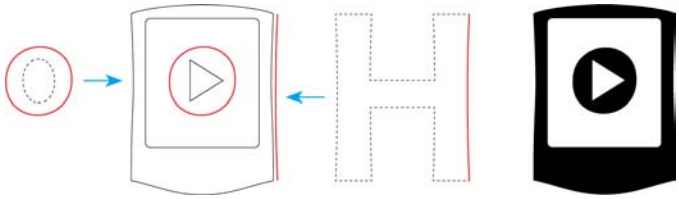

Fig. 92. Video

2.2.3 Colour

For direction and route-pointing signs, it is recommended for the colour of texts and pictographs to be the same: monochrome and, if possible, plain black (or a very dark hue). The background should be in a clear hue –not necessarily white–, but the resulting combination must have enough contrast to avoid affecting the legibility too much. The category of place will have its own colour, according to the regulations; a

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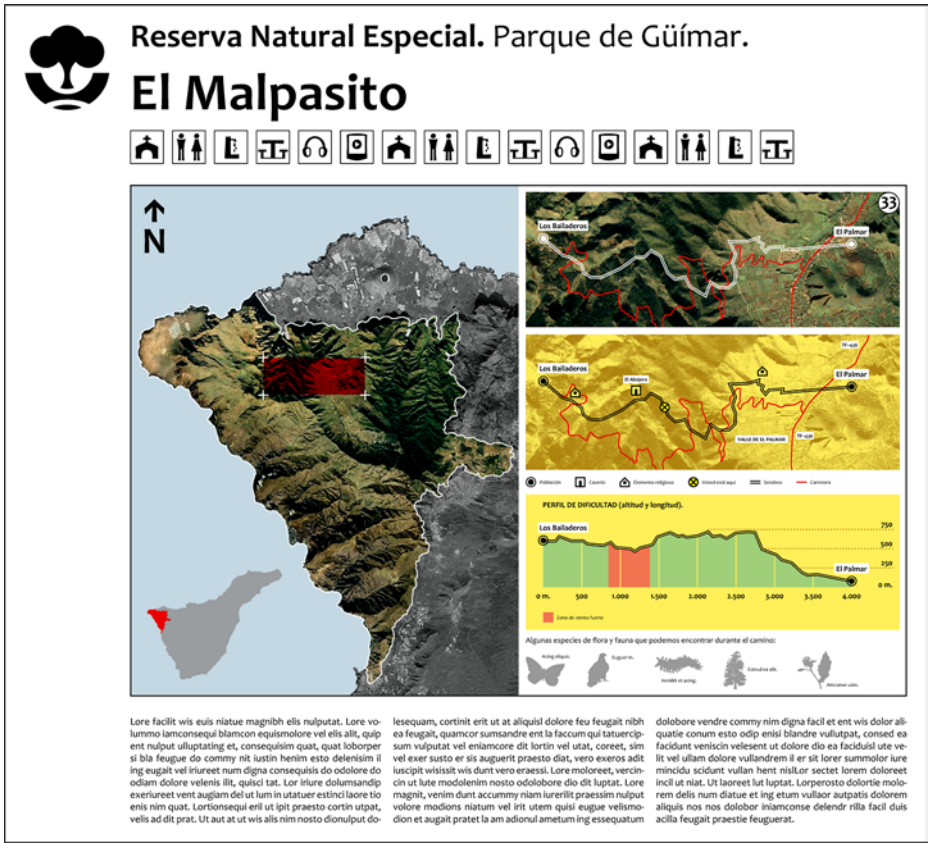

Fig. 96. Sign of the B/B.1 type (proposal with original logogram)

Fig. 97. Sign of the B/B.1 type (regulations)

Those two examples define a series of basic guidelines that can be translated to the rest of the typology. In any case, the best proof is to create a final prototype in 1:1 scale and evaluate its efficiency by testing it, for instance on a group of no less than five people with heterogeneous profiles of age, height, gender, education, etc. It is advisable to build the sign in a variety of materials, in order to try its level of acceptance in different finishes; besides from that, its location should be *in situ*, that is, in the very landscape, if we want to get an optimal analysis through its integration in the background for which it was created.

The graphic construction of the two models is explained in figures 98 and 99. Their template has been generated from a = 7 mm. module, also crucial to develop the remaining typology. The use of that rule must serve an optical arrangement that can be adapted to the message's different formats and targets, avoiding the mechanical implementation that restrains the natural order of the elements, with the subsequent impact on information (visual perception is especially guided by a logic of forms, independently of mathematical rules).

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Chapter 5

Allegorical Interfaces: A Literary Approach to Interface Design for Digital Reading

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Abstract. We are currently witnessing a new wave of digital reading devices that will probably significantly change the way we read and publish. This is not the first digital revolution of aspects of cultural production and perception. This paper compares the previous digital revolutions of the music, film and publishing industries and attempts a prognosis of coming changes in the way we will work with digital texts. As a conclusion a new notion of interface design for the emerging reading ecology is proposed and exemplified with the analysis of two interactive literary applications.

Keywords: Digital Reading, Ubiquitous Computing, Touch Interfaces, Hypertext, Video Game, Allegorical Interface, Interface Design

1 Introduction

With the introduction of the *iPad* by Apple Inc. we see not only an unexpectedly high amount of devices sold, there is also a wave of new tablet devices coming into the market from other companies. All these devices, including the *iPad*, are marketed as eBook readers and the expectation that they will revolutionize the reading and publishing landscape is widely held. By far not the first revolution of text as an essential component of human culture, it might be a revolution that will show lasting effects on how we read, write and share written knowledge. We witnessed similar revolutions induced by digital technologies in the music and in the film and television businesses that fundamentally transformed the nature of the two industries and the audience habits [1] [2] [3]. In both cases the combination of easy to use personal playback devices as well as content distribution enabled through the Internet changed how people consume music and films and how they conceive of ownership of the media they consume. These fundamental changes originated out of an amalgamation of accessible technology, appropriate interface designs and fashion. Bill Buxton gives a good analysis of the coinciding aspects in the success of the *iPod*, an earlier very successful music playback device [4]. We have a potentially similar situation currently in the field of digital reading devices in conjunction with emerging distribution platforms and there are indicators for a lasting transformation.

This paper will attempt an analysis of the current situation and construct from a media-inherent perspective what kind of transformation we will likely have to expect in the way we perceive text and how we work with text in a developing network-supported personal reading ecology. While the reception and distribution of digital texts is rather well established and accepted in the academic context [5] and in general information oriented reading, in literary reading there are so far no comparable standards or practices in existence. But it is the area of leisure and entertainment reading which very likely will be most affected by the recent wave of e-reading devices and the emerging digital distribution formats. For the purpose of our analysis we will briefly review the previous revolutions of reading, and in comparison with the changes in the music and film industry highlight the particular characteristics of literary reading that resisted so far a general acceptance and widespread distribution of digital reading. The paper will conclude with the formulation of a conceptual approach to rethinking the interface design of digital texts as a literary category. As an exemplification of the notion of the allegorical interface we will discuss two interactive projects that embody many of the aspects that we consider central to the literary approach to interface design discussed in this text.


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So far, only for text was it not easily possible to come up with a seamless technology that could successfully compete with the established technology of the book. The energy required to power a display, the size of a display necessary to show meaningful amounts of content, the inability to match the ease of access and lightness of a book, all these obstacles delayed the kind of personal digital reading revolution that happened earlier in the other fields [22].

The main delivery formats for hypertexts were in the early stage CD-ROM media and later, with the proposal of the World Wide Web as a hypertext project in 1990, online delivery via the Internet [23]. Despite the WWW there was still tremendous expectation for the growth potential of the CD-Rom as the publishing medium of the future [24] [25]. Publishers obviously preferred the CD-ROM to the online delivery since as an encapsulated unit that could be individually sold in a way very similar to books it keeps the traditional business strategies intact. Even though these were new and revolutionary delivery formats they did not start as pervasive a transformation as was expected.

With the market launch of devices like the *Reader* from Sony or the *Kindle* from Amazon this situation began to change. Finally devices with long lasting batteries and a reading experience that could up to a certain extent compete with the book or deliver an acceptable alternative. The new generation of reading devices now comes with a fashion aspect, online distribution through dedicated stores, and efficient marketing so that we might see a noticeable shift over to digital reading in the near future.

3 The Reading to Come

3.1 Previous Obstacles in the Way of Digital Reading

One of the main questions is what do we have to expect from this shift and what will this future reading be like? For the first time after two decades of literary reading in decline, the statistical report of the National Endowment for the Arts issued in 2009 indicated a rise in literary reading in the United States [26]. Earlier NEA diagnosed the steady decline of reading due to a society more and more permeated by electronic communication and entertainment technologies. The reports did not make the claim that these technologies were the cause for the decline but showed enough correlation to suggest this hypothesis [27] [28]. The latest report from 2009 shows an inversion of this trend, indicating that there is interest in literary reading and from these findings we can conclude that a successful combination of contemporary communication and entertainment technologies and literary reading can potentially trigger an even stronger renaissance of reading. While in the field that we earlier referred to as 'information oriented reading' usage patterns for electronic access and distribution of texts are established, mostly the fields of newspaper and magazine reading as well as literary reading will be impacted by the emerging transformations.

For our focus on the field of literary reading in this paper it will be necessary to question why this field did not go through similar changes as information oriented reading in the earlier described transformations. The hypertext format was also used for the production of literary texts. Not only were there efforts to bring existing works into the new digital format, but also original productions for the hypertext format. The most ambitious effort in making existing texts available in a digital format is probably the Project Gutenberg, which started in 1971 and had a significant growth in 2002, claiming 30,000 items in the collection in 2009 (http://www.gutenberg.org). Other efforts besides those of commercial publishers such as Voyager's Enhanced Books in this direction are the Internet Archive (http://www.archive.org), founded in 1996, and Google Books (http://books.google.com), which started in 2004. The production of literary hypertexts was more of a specialty for a limited audience. CD-ROM Publications like Michael Joyce's "Afternoon, a story" or Shelley Jackson's "Patchwork Girl" were often quoted by the hypertext research community but were published and distributed only by a specialized hypertext publisher. Expected to be the beginning of a new kind of textuality [12], digital reading did so far not make it into a general cultural practice with a significant established audience. The efforts on the side of lot of the publishers who were aiming to follow the revolution towards the eBook decreased and finally efforts to produce CD-ROMS were abandoned in the mid to late 1990s [29].

We can identify several aspects that are responsible for the lack of broad success of this medium. The discomfort of having to read on a computer, be it desktop or laptop computer with a heavy power supply versus a book that is independent, flexible and light is evident and will be remedied by current and future digital reading devices. The new devices make electronic reading more seamless and even go beyond the book in the sense that a single reader can store a large amount of books and thus reduces the weight of carrying several books in comparison with the printed book. Another point of criticism is the inferiority in

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3.3 Towards an Allegorical Interface

A similar critical position has been developed by Espen Aarseth who distinguishes reading situations which require so called 'trivial' effort such as page turning etc. to experience the content of the text from what he calls *ergodic* literature, where "nontrivial effort is required to allow the reader to traverse the text" [38]. This distinction is useful to construct a notion of interfaces that work not as a metaphor for the device in which a certain experience is delivered but realize a form that is inherently supporting the experience, i.e. the content of the text. We would like to call this type of interface an *allegorical interface*. Allegory is a literary figure that expresses meaning in a way that is not formulated literally in the text. It uses language, images or other kinds of representation to express its meaning [39]. An allegorical interface constitutes a figurative or symbolic representation of one or more core aspects of the text that is experienced through this interface. As an interface for a dynamic medium the notion of allegory encompasses besides the visual and textual also procedural allegories, which we can conceive of as functional mechanisms consisting of a series of actions that the reader goes through while reading the text that express a certain aspect of the content. The approach of integrating the navigational mechanism and the interface design into the structure of the text experience is a goal that has been pursued in a similar way in the field of video games. This approach is often formulated with the idea of simulation as its core and developed in opposition to narrative and representation. Simulation is conceived of as a mimetic likeness, a functional model that shares behavioral aspects of the situation to be expressed [40].

Our concept of the allegorical interface does not follow this strong opposition and rather focuses on the aspect of representation as a more abstract structural form that becomes part of the structure of the reading process. The reading process can be divided into two parts, the visual scanning and decoding of the signs, which is strongly dependent on the materiality and layout of the sign material, and the construction of meaning, which uses an ongoing process of constructing hypotheses and verifying them based on the sign material in correspondence with internal knowledge [41]. The structural form of the text and the reader's working through this structure is an existential part of the reading process, which is dependent on the medium in which the text is delivered and that accordingly has to be considered in its creative and expressive values. The term 'allegory' of course has a long history and a broad range of connotations. We are focusing here on the more literal sense of 'figurative speaking', which can, as Fineman elaborates, be seen as part of any literary structure [42]. The simulation approach as well as the concept of the allegorical interface are not mutually exclusive and can coexist as different attempts at re-formulating the reading experience in the framework of digital media. While the simulation approach does not actually focus on the reading process per se but the simulating action, the allegorical interface stands more closely in the literary context. But nevertheless it does not deliver the text as it was classically delivered in the printed book. Every translation of content from one medium into another necessitates changes in the structure and the form of experience of this content. In a by now classic way we have observed this in the process of adapting novels to the film medium [43] and in a similar way adaptation processes will be necessary here, too. It is impossible to think that we can deliver the same experience quality as in the printed book in digital reading devices, even though some of the implementations of page turning and page marking in current reading interfaces might suggest that.

4 Analysis of Examples

In order to exemplify the notion of an allegorical interface as it is proposed here, we are going to analyze two existing projects that have been realized as interactive literary works and presented as installations as well as published as interactive DVD-ROM publications. Even though these examples were made in a time before the significant restructuring of the reading ecology as outlined by this paper had taken place, they provide a valuable insight into the design strategies and conceptual considerations that we are considering a literary approach to interface design.

4.1 Case Study: An Interface Allegory for Remembering

As a first case study we will analyze the interactive project "*Bleeding Through – Layers of Los Angeles 1920-1986"*[44], which is the result of a collaboration of the media artists Rosemary Comella and Andreas Kratky together with the novelist and cultural critic Norman M. Klein. It was exhibited as an interactive installation at the ZKM Center for Art and Media in Karlsruhe, Germany, and published as a DVD-Rom.

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11.Conklin, J.: Hypertext: An Introduction and Survey. Computer, Vol. 20 (9), pp. 17–41 (1987)
12.Dalgaard, R.: Hypertext and the Scholarly Archive: Intertexts, Paratexts and Metatexts at Work. In Proc. of the 12th ACM Conference on Hypertext and Hypermedia, pp. 175–184 (2001)
13. Coover, R.: The End of Books. In: The New York Times Book Review 11, pp. 23–25 (June 1992)
14. Kernan, A.: The Death of Literature. Yale University Press, New Haven, London (1992)
15.Edwards, D. M., Hardman, L.: 'Lost in hyperspace': cognitive mapping and navigation in a hypertext environment, In: McAlleese, R.: Hypertext: Theory into Practice, Intellect Books, pp. 90--106 (1989)
16. Elm, W, Woods, D.: Getting lost: A case study in interface design. In Proc. of the Human Factors Society 29th Annual Meeting, pp. 927–931 (1985)
17.Bernstein, M. et al.: Structure, Navigation, and Hypertext: The Status of the Navigation Problem. Proceedings of the 3rd ACM Conference on Hypertext and Hypermedia, pp. 363–366 (1991)
18.Carter, L. M.: Arguments in Hypertext: A Rhetorical Approach. Proceedings of the 11th ACM Conference on Hypertext and Hypermedia, pp. 85–91 (2000)
19.Botafogo, R. A, Shneiderman, B.: Identifying Aggregates in Hypertext Structures. In Proc. of the 3rd ACM Conference on Hypertext and Hypermedia, pp. 363–366 (1991)
20.Bernstein, M. et al.: Architectures for Volatile Hypertext. Proceedings of the 3rd ACM Conference on Hypertext and Hypermedia, pp. 243–260 (1991)
21.Picker, J.: Victorian Soundscapes. Oxford University Press, New York (2003)
22. Jacobson, J., Comiskey, B. Turner, C., Albert, J., Tsao, P.: The last Book. In: IBM Systems Journal, Vol. 36 (3), pp. 457 (1997)
23.Berners-Lee, T., Cailliau, R.: WorldWideWeb: Proposal for a hypertexts Project (1990) Retrieved June 16, 2010 from http://w3.org/Proposal.html
24.ZKM | Center for Art and Media: Artinact 1. Cantz Verlag, Ostfildern (1994)
25.Hauffe, H.: Die elektronische Revolution und ihre Auswirkungen auf Verlage und Bibliotheken. In: Bollmann, S.: Kursbuch Neue Medien. Bollmann Verlag, Mannheim (1995)
26.Office of Research & Analysis, National Endowment for the Arts: Reading on the Rise (2009)
27.Office of Research & Analysis, National Endowment for the Arts: Reading at Risk (2004)
28.Office of Research & Analysis, National Endowment for the Arts: To Read or not to Read (2007)
29.Jacsó, P.: Who is doing what in the CD-ROM Publishing Realm? Computers in Libraries, pp. 55–56 (1996)
30.Dillon, A., McKnight, C., Richardson, J.: Reading from Paper versus Reading from Screen. The Computer Jourbal, 31, 5, pp. 457–464 (1988)
31.Mangen, A.: Hypertext Fiction Reading: Haptics and Immersion. Journal of Research in Reading, Vol. 31 (4), pp. 404–419 (2008)
32.Röller, N., Zielinski, S.: On the Difficulty to Think Twofold in One. In: Diebner, H., Druckrey, T., Weibel, P. (eds.) Sciences of the Interface, 282–291, Genista, Tübingen (2001)
33.Nielsen, J.: iPad Usability: First Findings From User Testing (2010). Retrieved June 17, 2010 from http://www.useit.com/alertbox/ipad.html
34.Nielsen, J.: Kindle 2 Usability review (2009). Retrieved June 17, 2010 from http://www.useit.com/alertbox/kindle-usability-review.htm
35. Myers, B., Hudson, S.E., Pausch, R.: Past present, and future of user interface software tools. ACM Transactions on Computer-Human Interaction (TOCHI) – Special issue on human-computer interaction in the new millennium, Part 1, Vol. 7 (1), pp. 3–28 (2000)
36.Johnson, J. et. al.: The Xerox "Star": A Retrospective. In: Human-Computer Interaction. Morgan Kaufmann, San Francisco (1995)
37. Pollack, A.: Most of Xerox's Suit Against Apple Barred. In: The New York Times (24 March 1990)
38.Aarseth, E.: Cybertext. Johns Hopkins University Press, Baltimore (1997)
39."allegory." Encyclopædia Britannica (2010). Retrieved June 17, 2010 from Encyclopædia Britannica Online (http://www.britannica.com/EBchecked/topic/16078/allegory)
40.Frasca, G.: Simulation versus Narrative. In: Wolf. M., Perron, B. The Video Game Theory Reader, pp. 221–235. Routledge, New York (2003).
41. Gross, S., Lese-Zeichen.: Wissenschaftliche Buchgesellschaft, Darmstadt (1994)
42.Fineman, J.: The Structure of Allegorical Desire. October 12, pp. 46–66 (1980)
43.Chatman, S.: What Novels Can Do That Films Can't (And Vice Versa). Critical Inquiry, Vol. 7 (1), pp. 121–140 (1980)
44.Comella, R., Klein, N.M., Kratky, A.: Bleeding Through – Layers of Los Angeles, 1920-1986. Hatje Cantz, Ostfildern (2003)
45.Schudson, M.: Dynamics of Distortion in Collective Memory. In: Schachter, D.L.: Memory Distortion. Harvard University Press, Cambridge, Massachusettes (1997)
46.Ginzburg, C.: Clues: Roots of an Evidential Paradigm. In: Ginzburg, C.: Clues, Myths, and the Historical Method. Johns Hopkins University Press, Baltimore (1989)
47.Furlong, E.: Imagination. George Allen & Unwin, London (1961)
48.Shneiderman, B.: Designing the User Interface. Addison-Wesley, Reading (1998)
49.Golovchinsky, G., Marshall, C.: Hypertext Interaction Revisited. In Proc. of the 11th ACM Conference on Hypertext and Hypermedia, pp. 171–179 (2000)
50.Carassai, M.: From Machinic Intelligence to Digital Narrative Subjectivity: Electronic Literature and Intermediation as "form of life" Modification. Proceedings of the Digital Arts and Culture Conference (2009)

Chapter 6

Interface Quality Aspects Based on Learning Styles and Collaborative Tasks

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Abstract. In this chapter, is presented a global frame for quality features specification on virtual education environments known as *e-learning.* The quality specifications are evaluated according to usability and communicability features, which are defined in relation to the analysis made by a personalized trainee or a student, based on his learning style and the collaboration features in the group type tasks. The quality specifications are established within a global frame of the design process focused on the user, and paying special attention to the analysis, design and evaluation stages. Using these specifications we aim to achieve better quality in the educational processes intrinsic to the e-learning environment, because it will facilitate an early quality evaluation in terms of usability and communicability.

Keywords: Communicability, Interface, Quality, E-learning, Usability, Users, Heuristic

1 Introduction

E-learning systems should provide an environment apt to facilitating the learning and teaching process. Therefore it is important to have usable systems with the purpose of reaching the educational desired goals. The learning environment and the learning materials are both designed on the base of a set of requirements from the areas of the technology and education [1], considering also the basic principles of *Human-computer interaction* (*HCI*), which provides a set of techniques and methodologies for the design of interactive systems [2] [3].

The *e-leaning* system is essentially interactive, and therefore the interaction should be a key element for its design, mainly considering the needs and the profile of the users.

The term usability is often associated with the quality of an interactive system which is easy to use and learn. It is defined by ISO 9241-11 as the *measure of how much a product is usable for certain users to attain specific goals with effectiveness, efficiency and satisfaction in a context of specific use.*

Usability constitutes a key factor in the students' acquisition of knowledge and skills in a satisfactory way. From an instructive point of view, the e-learning activities are meant to stimulate the educational process of the student, and therefore those activities should be provided for him, ensuring that they best match his learning style. The aim is to satisfy the personal expectations of the student and/or the appropriate ones for his/their education. In this concern, the user-centered design [2] is a philosophy of design, and a process where needs, requirements and limitations of the final user constitute the center of each stage of the design process. By involving the users in each phase of the project, we try to ensure that the final product will fulfill their needs and the required features, allowing in this way a positive learning experience for them.

The ISO 13407 establishes four design activities for the user-centered design: *to understand and specify the use context; to identify and specify the user and the organizational requirements; to evaluate the designs on the base of the requirements; and to produce design solutions.* Each stage presents the following features: they are directed to users (their experience and satisfaction); the model is directed by a user input, a substantial participation of the user (studies, experiences, feedback and motivation), the description and profile of the user, and the design of an interative prototype (software engineering); then also various additional processes (often informal or non specified processes); and last, the learning evolution through the "trial and error method" [4].

On the other hand, it is necessary to consider three factors to determine the usability of a system: user, educational content and environment where the system is to be used. Where user includes the self identification and the discovery of their needs and features; *educational content* includes the need to determine guides of design, techniques, and requirements that should be fulfilled, and then, the different aspects related to the content isolation and content visualization; the *educational environment* considers the identification of the requirements and features of the learning environment, the task analysis and the interaction design. These three dimensions assist to provide a complete view of the usable e-learning processes, with the characteristic of usability, and also to arrange the learning process in the user-centered design [5] [6] [7].

In this work, a global frame for usability and communicability specifications is proposed, considering the proper student profile, mainly his learning style and his collaborative group tasks, within the global frame of the user-centered design.

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2 Collaborative Usability and Communicability

The teaching and learning virtual environments, also called e-learning, are computer science applications developed for educational goals. They are applications designed with the purpose of facilitating the communication between the users, mainly teachers and students, and are implemented in different modes: distance e-learning or a combined mode of distance and face-to-face e-learning (blended learning) [8]. Considering the e-learning goals and the range of possibilities that it provides, they should rely on features that are related to the approach of the design of user-centered systems [9]; besides they should be usable and should consider the features and skills of the users in the moment when they interact with the virtual learning environment and with the educational contents.

Usability (Nielsen, 1993) is a feature meant to establish the use facility in the user interfaces and is defined considering five quality components: *learnability*, or capacity of being grasped, *efficiency*, *memorability* or *capacity of being remembered*, avoidance of user *errors* and generation of *user satisfaction*.

In an educational context, where elements such as objectives and goals, instructional strategies, educational resources, contents, etc., are to be found, the usability is not a unique and intrinsic software feature, but also it should be defined within a use context, taking into account, among other things, the educational goals and the user expectations and motivation.

Besides, in this type of environment, when promoting group tasks in a collaborative mode, the students are prepared to allow the members of the group to have fluent communication and to exchange ideas and information between them, in a synchronous or asynchronous way, and also to facilitate the coordination, cooperation, and collaboration in activities development and conflict solving, with the aim of attaining the individual or group objectives. To summarize, the appropriate and characteristic elements of a collaborative system are: communication, coordination and cooperation [10].

To this purpose, collaborative usability is defined from the process perspective as the effectiveness, efficiency, and satisfaction with which a product allows the users to attain their specific objectives in a specific use context. And from the product perspective, it is defined as the software capacity for being understood, learnt and used by a group of users in a specific use context [11].

On the other hand, communicability is synergistically related to usability, even though they are totally different branches [3]. The usability responds to the information building and modeling from an interaction perspective, and conversely, the communicability responds to the information architecture as a base for the visual layout that expedites the recognition of the interaction elements.

In this relationship, an interface is considered to be an element related to the expectations of the user, which are important to consider [3]. It is said that an interface is considered by the user as something meaningful when it consciously articulates the efficiency of the visual stimuli to create a context which may be used as a communication channel. It also enhances the sensitivity of the user from the emotional connection that it generates, and at the same time it strongly and clearly communicates the use functions of the system. Therefore, the emotion has an important role in the interface design, creating a channel-like context, and widely improving the interaction. It is unreasonable to think of an interface design if at the same time the control of the stimuli is not considered as part of the communication goals.


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existence and could perform an action over it, and *intuitive comprehension*, where the possible actions over the media object should be evident.

Finally, visibility and intuitive comprehension of the media object are designed to satisfy the user's goal, and therefore media object interface in the learning process should be self-explicative, but should not necessarily give instructions on how to interact with media objects.

Besides, media objects should be descriptive in relation to other objects in the context, as well as with visual composition, to achieve consistency between the represented design and actions.

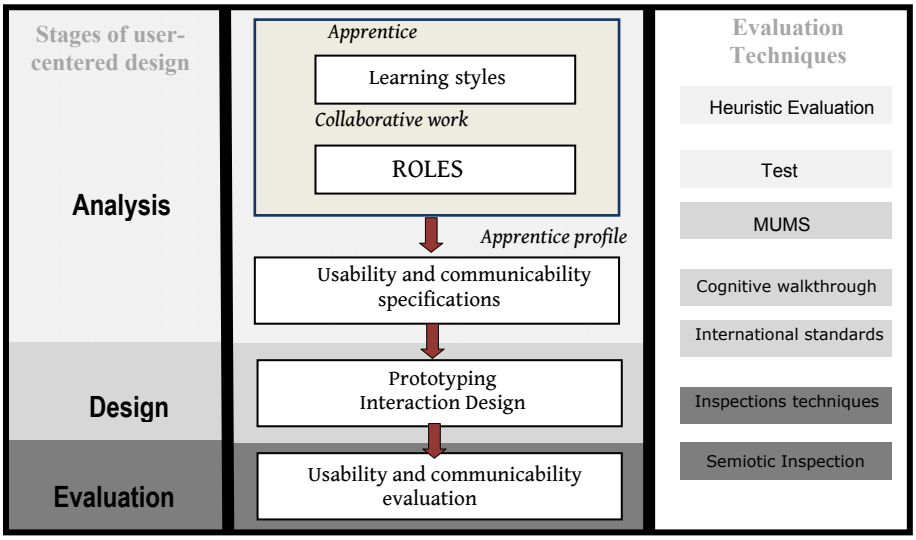

Fig. 1. Global model for quality specifications

5 Conclusion

A system with a poor interaction design, especially an e-learning system, cannot improve its usability by just changing the graphical user interface. Because of this, an apprentice user-centered model satisfies the usability evaluation previous to the identification and acknowledgment of the apprentice within a virtual learning environment, based on his learning styles and preferences.

Bearing in mind learning styles and certain aspects of group collaboration, the specifications for usability and communicability become a remarkable influence in the educational process, which in the future will make easier the system validation process, according to the fulfillment of the user's expectations and needs.

Finally, a work plan for the e-learning project operation can be designed with a specification frame that takes into account appropriate instructional methods to benefit the group academic performance and software quality, based on early usability measurement.

References

1. Jonassen, D., Howland, J., Moore, J., Marra, M.: Learning to Solve Problems with Technology. A Costructibist Perspective (2003)
2. Shneiderman, B.: Designing the user interface. Strategies for efective human-computer interaction. Massachusetts: Addison-Wesley (1998)
3. Cipolla-Ficarra, F.: 2010. Quality and Communicability for Interactive Hypermedia Systems: Concepts and Practices for Design. New Jersey: IGI Global (2010)
4. Constantine, L., Windl, H.: Usage-Centered Design: Scalability and Integration with Software Engineering (2000
5. Ardito, C., Marsico, M., Lanzilotti, R., Levialdi, S., Roselli,T., Rossano,V., Tersigni, M.: Usability of E- learning tools. AVI '04: Proceedings of the working conference on Advanced visual interfaces, pp. 80–84, ACM Press, Gallipoli, (2004)
6. Miller, M.: Usability in E-Learning. Learning Circuits, January (2005)


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Chapter 7

Electronic Commerce: A Great Opportunity for the Blind

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Keywords: e-Commerce, Blind, Accessibility, Usability, Screen Reader

1 Introduction

Electronic commerce is a new way for computer users to shop. Its advantages are many -- choosing from an array of vendors and shops, making purchases without having to physically move from your desk, home, or office, or even shopping from anywhere at all thanks to mobile devices. This new way to purchase goods and services is very interesting for people with disabilities, since they can increase their personal autonomy without having to ask someone to accompany them shopping, or having to rely on others to do their buying for them. However, in order to make this opportunity really effective and efficient, on-line systems must be accessible and usable by all, including those who are obliged to interact through assistive technologies (e.g., via screen readers). Making eCommerce accessible and usable for a screen reader user means that she/he should be able to concentrate on the purchase, access all information, and finish the transaction in complete autonomy as well as security.

For blind people eCommerce can be a valuable tool for increasing their independence but it is necessary to analyze whether what is available on the market is really "open" to this user category. This chapter investigates the issue by considering the eBay platform, which is probably the e-commerce system most often used to make purchases online [8]; we aim to provide an overview of the main problems encountered by this particular user category in order to propose possible strategies and solutions.

In this chapter we first discuss characteristics of eCommerce, focusing on opportunities and problems for people with disabilities. We explore concerns regarding interaction using a screen reader, the assistive technology used by blind people, and also discuss a brief review of the literature in the field, with particular attention to users with special needs. Next, we report the results of an electronic survey carried out with 22 blind and 22 sighted users in order to understand the difficulties and obstacles they experience when shopping on-line, soliciting their expectations and suggestions for making the interaction simpler and more satisfying.

Next we analyze the interaction with one of the most popular e-Commerce web sites (eBay) simulating different user's skills from different visually- impaired people. Simulation was carried out by three sighted authors and another who has been totally blind from childhood. Based on these results and on source code inspection, we will focus on a wide variety of navigation and interaction issues resulting from the lack of applied accessibility and usability criteria in the design phase. Accessibility allows users to explore web page content, while usability provides online users with simple, efficient, and satisfying navigation and interaction. Difficulties encountered during navigation and search must be distinguished from those encountered during a commercial transaction. Buying a product requires users to have clear, complete feedback on the correctness of the commercial transaction. This last step in online shopping can be considered the point when virtual reality ends and the real world begins; from that moment any action will have some consequence in real life since it is necessary to provide personal data and to use one's credit card.

2 e-Commerce: Opportunities and Problems for the Blind

Electronic commerce is an extraordinary evolution of the normal procedures and features of classic commercial services. The web offers visibility to all, and allows anyone to act as a seller. Its strength lies in the possibility of reducing the cost of goods and the fact that their geographical location has no importance: an attractive website that offers a pleasant browsing experience can be enough to guarantee success. On the web, stores become virtual and one can move around browsing a vast quantity of products, though sometimes their alluring photos hardly coincide with the reality.

Recent studies show that although online shopping is not yet a mass reality, it seems strangely unaffected by the present economic crisis, probably due to its virtual aspect [9, 18]. When discussing strategies to make online shopping more popular, it is important to pay attention to the customer who wants to buy but finds the electronic process too difficult or unsafe. The impossibility of physically examining products before payment, the safety of an online transaction, communication (and preservation) of sensitive data (credit card numbers and consumers' personal data) feeds customers' doubts and fears [11, 26, 3]. It is estimated that the percentage of users who actually complete a purchase is about 5% of total visitors to an eCommerce web site. Usually vendors try to increase the number of customers by extending their visibility with advertising strategies, but acting on the reasons why 95% of customers are lost along the way could also be a winning strategy.

A study analyzing user interaction on eCommerce websites confirms that one positive feature is a detailed description of each product, since it increases confidence in the purchase and displays the seller's professional expertise [10]. In the process of increasing richness of content, unfortunately vendors usually give greater importance to the visual perception of the web page; this meets the majority of user needs, but does not work for visually impaired people who need alternative ways of delivering the same content.
eCommerce services are particularly interesting for the blind, who may have mobility problems and often cannot shop on their own. But a blind person who navigates the web looking for a product of interest cannot be captured by a particular visual rendering of the web site; she/he is interested mainly in finding accurate and timely information on a given product category in the shortest time possible, without being buried by a vast amount of useless information.

At the moment, many visually impaired users cannot interact alone with eCommerce websites and are obliged to complete their purchase with the help of a family member or friend. This shows not only that their experience of web navigation is only partial and limited, but also that the final operation, which is purely a procedural one, could remain out of reach to this user category.

Accessibility of eCommerce web sites is an important research topic but until now it has mainly focused on categories such as children or seniors and there has been no real attention to the specific needs of the disabled. The world of disabilities is heterogeneous, and studying principles of web design to allow easy use of the Internet for each kind of disability is very difficult. Nevertheless, many user studies suggest that totally blind users encounter more difficulty than people with other sensorial disabilities (such as low vision, motor or hearing impairments) when executing specific tasks [6, 15, 21].

In order to understand how to improve their interaction with a web page it is important to observe how blind people navigate using assistive technologies, and study the potential of these devices. Since blind users generally access the Internet using a screen reader and a voice synthesizer, an analysis of the page structure will be presented as it is interpreted by JAWS (the most commonly used screen reader in the Italian blind community [17]) and shows the difficulties encountered by either a novice or expert visually impaired user.

The screen reader is an assistive technology that interprets and announces screen content to the user. Mixing text and structure (links, tables, headings), a screen reader makes it difficult to interact with websites that have complex layouts and dynamic content (such as popular eCommerce and auction Web sites). To perceive page content aurally, sightless people usually interact via keyboard since vocal commands are subject to error and difficult to manage. For example, the most common element in a page of eCommerce is the table, which is the most complicated widget for screen reader interpretation and thus one of the most critical elements for the end user. Tables that seem very well-built if they are visually evaluated, but not well-designed in terms of accessibility, are incomprehensible to anyone who listens to the sequential exposure of its content. Poor usability leads to a potential loss of revenue for on-line companies and a missed opportunity to increase a blind person's independence. Providing simpler, more understandable UIs would benefit all users and fuel the expansion of electronic commerce. The screen reader has many features that would be of great help, but unfortunately it requires a great effort to memorize complicated key combinations that are often difficult to execute in practice. For these reasons knowledge of the assistive technology is not and cannot be complete for most users, so the screen reader is still underused despite its potential.

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advanced screen reader commands have problems using combo boxes, check boxes and radio buttons, especially since there is no easy way to move rapidly from one to another without special commands. To improve the survey's usability we added an HTML heading tag to each question, enabling users to identify questions by moving from one heading to the next (or previous).

Among several different solutions, we chose Google Docs (http://docs.google.com/), the only platform offering fewer interaction difficulties (via screen reader), and also to learn how this kind of popular software could become a real work tool for blind people. The survey, physically stored in a Google server, was proposed to potential participants selected from institutional associations for the blind (that were involved in our previous studies), and contacted via open mailing lists of the visually-impaired communities.

Buying a product is very different from navigation and search: users require clear, complete feedback on the correctness of the commercial transaction. To learn what kind of feedback people need vs what they actually receive, we structured the questionnaire with multi-choice questions (with potential drawbacks) and text boxes for a free description of any difficulties experienced by users. We organized the questionnaire in sections (invisible to the user), each one investigating one user feature: characterization of the sample relative to genre, age and Internet knowledge; purchasing habits; knowledge and use of eCommerce; problems or general perception of user trust in economic transactions. Another optional section (only for visually-impaired users) concerned assistive technologies. The final section of the survey investigates the degree of difficulty experienced by users when filling out the questionnaire, in order to understand potential limits or misunderstandings and be able to correctly interpret user answers. A pilot test was performed with two users (one blind) to verify the questionnaire's usability (comprehension, clarity, navigation via screen reader, etc.) and to refine the questions.

In the following we describe the results of the survey. To simplify reading, we discuss results first for blind and then sighted users, also highlighting differences and similarities between the two samples. We received a total of **22** questionnaires from visually impaired persons: 12 from the on-line survey and 10 in the Word version. The sample comprised 23% females and 77% males: 82% were totally blind and 18% visually impaired. The sample age is shown in Fig. 1.

5 Results: Blind Users

Regarding Internet and Web knowledge, the skill levels in the sample consisted of 59% intermediate, 9% novice and 32% expert.

A total of 77% of the sample uses the JAWS screen reader (88% of whom use v 10.0 or later). It is remarkable that 64% of the sample uses the screen reader only in basic interaction mode, without taking advantage of its advanced commands. The remaining 23% uses other screen readers such as Supernova and NVDA and/or magnifiers.

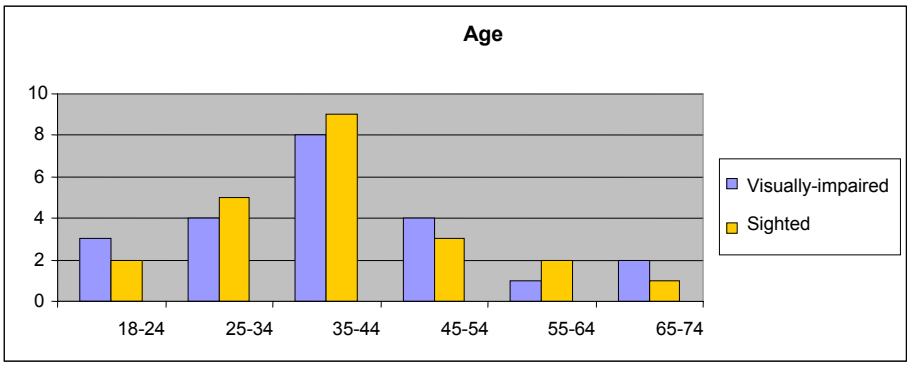

Fig. 1. Age of the sample of visually-impaired persons participating in the survey compared with sighted users

Concerning habits when buying goods, 32% of users buy basic necessities by themselves and 59% buy other items (electronic devices, clothes, household appliances, etc.). It is remarkable that only 14% of the sample habitually shops online. However, 86% of users seek information and evaluations before buying an expensive item, mainly using Internet sources (product info and user evaluations) and asking friends (64% and 59% respectively). Furthermore, 82% of the sample reported needing the help of a sighted person to carry out commercial transactions (involving money and sensitive data).

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There is no doubt that the degree of experience affects the success of any task, both simple navigation in order to find information or buying an online product. Since we are unable to check on or ensure basic equal skills to every person (as it depends on family, social and economic aspects as well as on individual characteristics), when we talk about usability we intend “easy use” regardless of the degree of individual skill. A website is usable if it is usable for any user, including novice and differently-abled persons.

For people with disabilities in general, and especially for visually impaired people, any level of experience requires extra effort compared to someone with no disability.

Blind users are generally dependent on software and hardware equipment that they use every day; having to interact with the computer keyboard they keep only basic commands in mind. This contrasts with the tendency of screen reader designers to implement new features associating them with new keyboard shortcuts, increasing the amount of data to memorize and requiring additional cognitive effort.

6 eBay platform: A Case Study

This section describes what a blind user experiences when interacting with eBay, one of the most popular eCommerce web sites. The specific elements we analyze derive from feedback of people interviewed via the electronic questionnaire; these users almost unanimously reported problems related to navigation, such as unclear links, inaccessible tables, and inadequate information.

Method

The analysis was conducted using JAWS version 11.0 with Mozilla Firefox (version 3.6.10) and Internet Explorer (version 8.0). Any differences depending on the browser used will be described as they occur in the text.

The study of the website eBay.com (English version) was conducted by simulating the phases of searching for and purchasing a product, an iPod device. The user had to interact with various web pages in any single session. However, for our purposes, only one page per step -- the most relevant -- will be analyzed in detail. We used as many JAWS commands as possible, to better simulate a vast range of users, including the proficient. Although usability tests with blind people have shown us that the medium-level user frequently knows only a few screen reader advanced commands, we wished to give to each analyzed page "all possible chances", simulating the medium-level user but also the best case of interaction made by an expert user.

Accessibility and usability must provide the ability to *easily* access (not just access) any user interface (UI). For instance, having to use a strange combination of keyboard keys (often impossible for a human hand to press) in order to obtain adequate information, means that the UI is “poorly accessible”.

In addition to the screen reader we used the following tool:

Firefox Accessibility Extension (Illinois Center for Information Technology Accessibility).

This tool is a browser add-on that provides several useful features. It virtually analyzes the HTML page and immediately provides information about the presence or absence of elements that allow the page to have a good level of accessibility: alternative text for images (alt or title attributes), descriptive information about the links, frames, tables, forms, etc. In addition it shows the web page layout in "small screen", allowing one to immediately see how the page would look on small devices, such as smartphones and PDAs.

Interacting with the eBay platform

Let us consider interacting with eBay to buy an Apple iPod. We have to open the main eBay page to search for what we need and to buy the one we like. In the following we describe the user interaction with the main pages involved in this procedure. For each case, we consider general characteristics when interacting with common JAWS commands, as well as cases when the reading is mainly sequential (Case A), made via Tab key (Case B), or through specific and advanced JAWS commands (Case C).

First page

Let us consider the first page available at the URLhttp://www.ebay.com/, which is shown in Fig. 5 (on the date of the study October 11, 2010).

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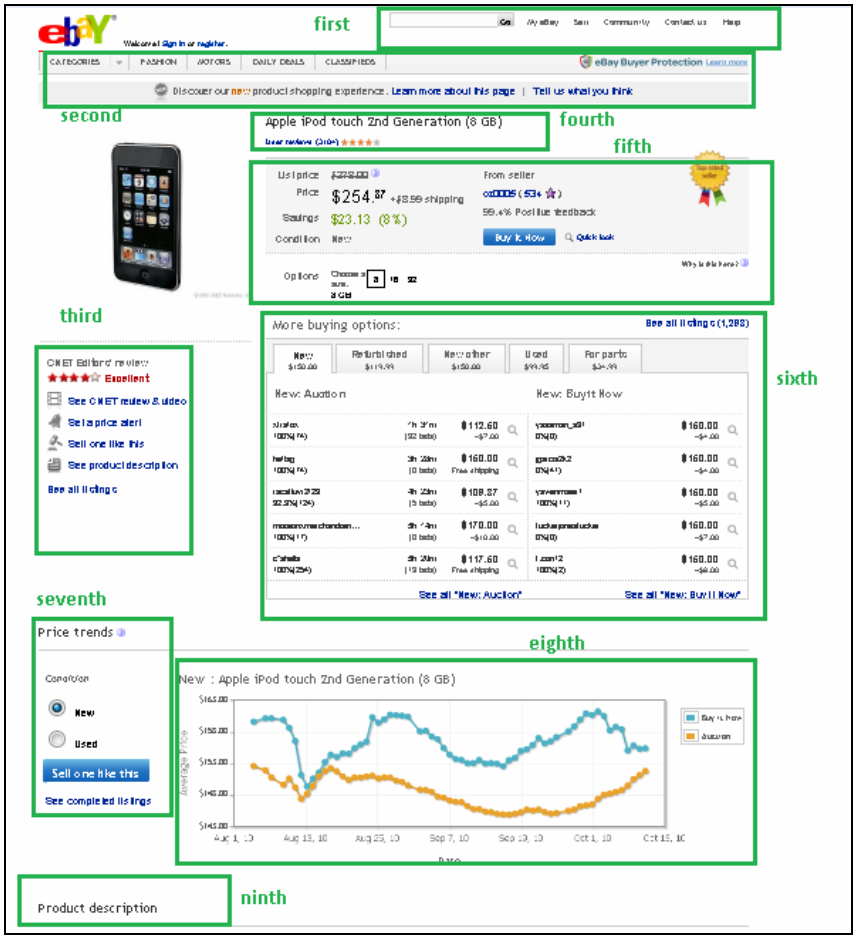

Fig. 8. eBay.com third page

The main accessibility and usability issues encountered in the interaction:

- Start and end of page indicator are missing;
- INS+F6 = This page has only one heading, the link to the chosen product;
- INS + F7 = link list: The same considerations as for the previous page

The details of the interaction using different strategies of exploration (A, B, C):

Case A: sequential reading

The reading follows the sequential order of blocks shown in Fig. 8. As for the other pages, sequential reading seems quite difficult. Unlike the previous cases, this time the page elements all seem to be correctly interpreted by JAWS that provides a detailed (but not exhaustive) description as it encounters them. For example, on this page there are six tables well-announced by JAWS, but once again reading their content is not easy, and due to the absence of appropriate headings, the user can be overwhelmed by an enormous amount of useless data.

Case B: TAB key reading

Up to the fifth block shown in Fig. 8, reading proceeds in the same order as in sequential mode (in this case there is no tabindex attribute). However, the rest (that is, the chart on the average price of the product at various times compared with ones derived from the auction and the section on product specifications) is skipped because it has no elements that can receive focus. A useful thing is that most of the links on the page, being "accessories" because the product has already been identified, are located at the end of the page and so they do not necessarily have to be read.

Case C : Using different key combinations (JAWS advanced commands):


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Chapter 8

Analyzing, Measuring and Reducing The Digital Divide

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Keywords: ICTs, Digital Divide, e-Inclusion, Measurement, Survey, Users

1 Technology vs. Exclusion

In order to understand what the ICTs (Information and Communication Technologies) represent to our times it will be enough to try to live without them for a whole day. In this moment where cell phones, computers, TV sets etc are a significant part of our daily lives, it is very difficult for a large section of the population to be able to conceive of not using these devices to perform habitual tasks. Consulting bank balances, publishing and offering products, paying taxes and invoices, also reading newspapers, are some of the multiple transactions that can be performed using the Internet.

"The Internet is not so much a tool as a new social space that restructures social relations" [1].

As a counterpart of the technological progress that a lot of communities enjoy, there are others that are technologically excluded.

It means a lot of people must go "personally" to the banks, government agencies, to publish, offer, sell or buy their products, or even know the news. It means too, a waste of time and money in traveling, employees answering questions personally, bank clerks attending clients in bank branches, and long, long queues everywhere.

Also the excluded people are excluded citizens too, because they cannot reach e-Government, e-Services, e-Transparency and, of course they cannot participate in their government decisions by using e-Democracy.

"The shift from a focus on a digital divide to social inclusion rests on three main premises: (1) that a new information economy and network society have emerged; (2) that the ICT plays a critical role in all aspects of this new economy and society; and (3) that access to ICT, broadly defined, can help determine the difference between marginalization and inclusion in this new socioeconomic era" [2].

Technology allows people to be communicated and to reach services, information and knowledge by the use of the Internet. That means, too that there are people who are not communicated to by the Internet, and also who are not able to get information, services, leisure and knowledge. Those people are technologically excluded and have to live their lives without enjoying a lot of technology's benefits, being far away from the nowadays global society.

2 e-Inclusion

According to the European Community (EC), e-Inclusion aims to achieve that "no one is left behind" in enjoying the benefits of ICT [3].

Technology knowledge and use allows people being included in this world. Specially Information and Communication Technologies, that offer people to be "on line" with the world. That means not only chats or social nets, but also, e-learning, e-working, e-government, e-banking, e-commerce, e-business, etc.


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6.3 Questionnaires Results

The survey form allows carrying out of a lot of comparisons among the three belts. These comparisons address different subjects as: general knowledge level, computer science, economic issues, etc., in order to understand the situation in which each community is immersed. With the goal of showing the most significant results, the results concerning training and technology are shown. To be able to measure the technological gap some indicators belonging to different categories were selected:

Information Technology Knowledge: It is possible to highlight that in the three belts, a big part of the population declares that they don't have any computer science knowledge, the figure increases while the distance from the first to the third belt grows. Figure 1, shows the population's percentage with no computer science knowledge. In addition to the information shown in Figure 1, it can be watched that the highest percentage of inhabitants that declare to have excellent computer science knowledge, belong to the first belt, and is only 3%.

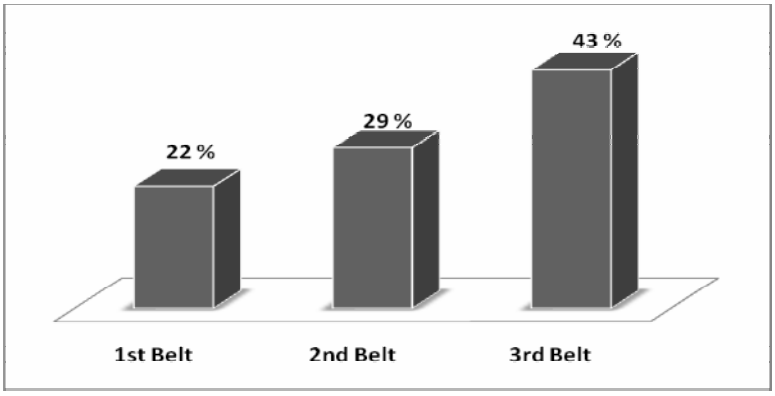

Fig. 1. Population's percentage that doesn't have any Information Technology knowledge

Population that is interested in learning information and communication technology: inhabitants who answered that they don't have any computer science knowledge, were asked if they were interested in learning it. The results show that in the three belts, more than 50% of the people want to learn computer science. Regarding the third belt, 75% of the respondent declares that they are interested in learning it. Figure 2 shows with a dark gray bar the percentage, by belt, of the people interested in learning computer science, and with a light gray bar, the opposite answer.

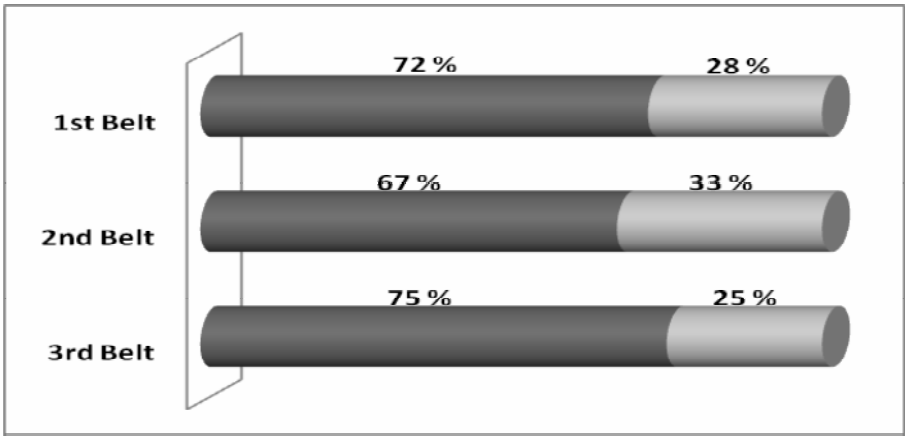

Fig. 2. Percentage, by belt, of the people interested in Information Technology


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takes into account the percentage of the population that considers distance learning as a great possibility of training, because there are few or none travel costs and the time for training can be choose by the trainee.

1. **Socioeconomic issues:** Although the questionnaire has several questions regarding the quantity of persons that lives in the family house, if they have their own vehicle and which kind it is, the significant questions, in order to determine the technological gap are oriented to technology. That's why, the research is based in indicators such as if the person has TV cable or satellite service or only TV by air.

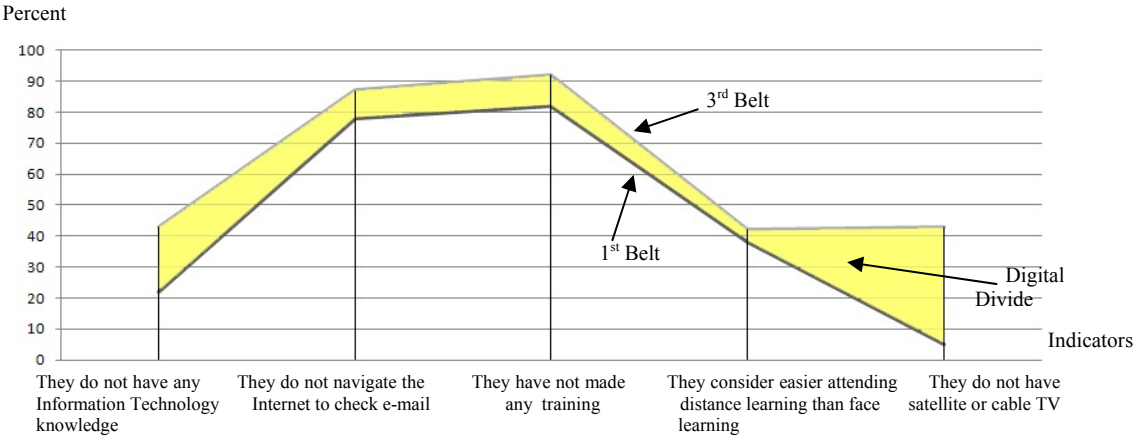

Fig. 7. Digital divide between first and third belts

The figure 7 shows the graphic regarding items 1, 2 and 3. The x axis shows following the indicators that belong to the three items explained above:

- Percentage of population that doesn´t have any information technology knowledge.
- Percentage of population that doesn´t navigate the Internet to check their e-mail.
- Percentage of population that hasn't done any information technology training.
- Percentage of population that considers distance learning as a great possibility of training.
- Percentage of population that doesn't have TV cable or satellite service or only TV by air.

The upper line represents the result of the third belt survey where the deficiency percentages are higher. The lower line shows the same indicators, but shows the results of the first belt.

The area enclosed between the upper line (corresponding to the third belt) and the lower line (corresponding to the first belt) is the digital divide.

7 Proposed Solutions

Being aware of the digital divide that exists among different neighborhoods of the same county and of its meaning to the involved population, that applies to the whole country too as it is explained above, it was decided to train the most marginal communities.

So the proposed solution was to provide FREE TRAINING.

The training was going to be taught by the professors who belonged to the research team.

There were three ways of performing it: (1) Face to face training; (2) Blended training; (3) Distance training (this option was rejected because the trainees weren´t able to get, by themselves, available computers to practice)

The research team has studied several ways of delivering knowledge to those communities by means of free training in computer labs.

Regarding the fact that the people to be trained don't have enough money to travel to take the classes, three possible ways of doing it were proposed:

- Training in Computer Labs belonging to schools placed in or near the trainees' neighborhoods.

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8.1.3 Learning Material

In parallel, three members of the research team were trained to teach radio lessons. In distance education, contrary to face education, the teacher couldn't watch the students' faces and expressions; they couldn't ask questions of the students to check if they had understood the subject, or to check how quick they answer [11]. Also it is very difficult to teach about computers to students who had never seen or used one. That was the reason why some graphical material was made and delivered to the students through the high schools, in order to allow them to watch the material while the teachers explain them in the radio program. Figure 7 shows three of these graphical materials as an example.

8.1.4 Training Radio Lessons

The micro-programmes were developed twice a week during two months. Each one of the sixteen micro-programmes was made alive with the following structure:

- Brief review of the previous class.
- Title and development of the day's class.
- Day's class conclusions.

The lesson was developed in a pleasant environment were the teacher chatted with the programme's host who made more interactive explanations.

Two telephone numbers were frequently repeated during the class: one for the students to call and ask questions, and the other to send text messages. All the questions that were received during the microprogram were answered alive in the discussion block. Three modules were developed: (1) Hardware, (2) Software, and (3) The Internet. Each of them had theoretical issues explained during the radio programme, also these issues were complemented with four practices, three hour long each one, fulfilled in computer labs.

Finally a final theory and practice exam was taken. Figure 8 shows the first page of each module. There were 11 pages in whole.

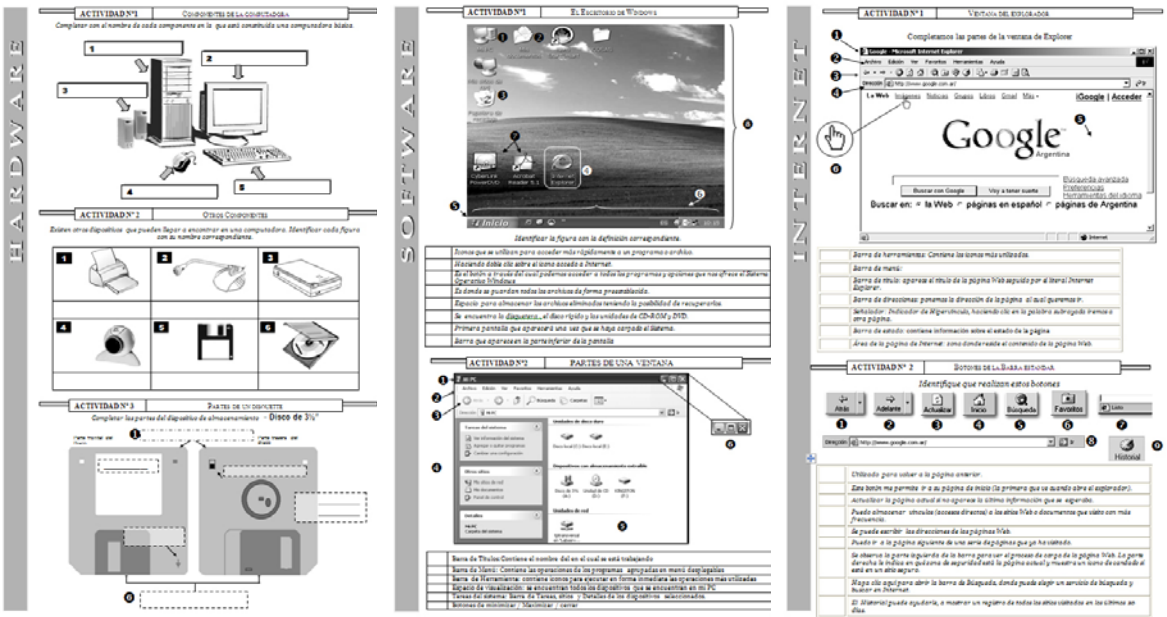

Fig. 8. General view of each module first picture

8.1.5 Training Results

As a result of the trainee selection explained above, 84 persons attended this first training experience. In order to reduce the quantity of trainees for each practice class and to perform a better monitoring of each one of them, three practice groups were built.

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Chapter 9

Context-dependent Notification Management for Awareness Support in Collaborative Environments

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Abstract. The chapter describes the COntext depeNdent awaReness informAtion Delivery (CONRAD) framework, which underlies our awareness support tool. Specifically, the work focuses on the notification management policies offered by CONRAD, which enable the user to steer the reception of awareness information in a context-dependent way, by taking into account the activity in her/his focus of attention while (s)he operates within the collaboration environment. The framework attempts to address the trade-off between informing and interrupting the user by applying filters which reduce the number of notifications to be submitted. In particular, CONRAD offers two context-dependent policies which support the selection of the notifications to be delivered on the basis of the user's activities, in order to convey the information which is most likely useful for her/his current behavior.

Keywords: Collaborative Environments, Management, Notification, Context, Information, Awareness

1 Introduction

As observed in various studies, such as the work by Pendyala and Shim [1], people are increasingly relying on online services for managing their private and business activities. For instance, many private users are employing Web 2.0 services to manage their life schedules and to communicate with each other; e.g., consider shared calendars, e-mail, Instant Messaging services and social networks. Moreover, as far as business activities are concerned, recent project management tools, such as [2], adopt Web 2.0 services to support cooperation and resource sharing among mobile users. Furthermore, rather different application areas are resorting to the Internet, using Web 2.0 services to support user collaboration. For example, in the transport domain, car-pooling, car-sharing and other types of services are being integrated in Web-based portals enabling users to travel together and to manage their journeys in real time; e.g., see the iTour European project [3].

The online management of activities has obvious advantages, such as the immediate and ubiquitous access to resources and the possibility of interacting with co-workers, friends, etc., by means of synchronous and asynchronous communication tools. For instance, a document sharing service can be used to carry out collaborative editing work; a Web calendar can be used to provide other people with information about one's schedules and commitments; an Instant Messaging application, or an e-mail tool, can be used to interact with other people either synchronously or asynchronously. However, each application works in isolation, without sharing any information with the remaining business services. Moreover, each application separately manages the user's workspaces and collaboration contexts, offering a partial view on the state of such contexts, focused on the types of activity it is devoted to. Thus, in order to be aware of what is happening around, the user is in charge of inspecting such workspaces and merging them into a unified view which abstracts from the various application-oriented views.

As a practical example, let's consider Mary, a woman with two children, who works in a place 2 hours away from her home and participates in a car-sharing initiative with her colleagues. At work, Mary is part of different projects involving distributed teams of people, who constantly keep in touch with her in order to carry out the assigned tasks. By managing her personal and work schedules online, Mary can check news from her children's school and from her travel mates at any time, using a smart phone. Similarly, she can check the state of the tasks assigned to her at work and monitor the progress of her shared documents from any place. However, how many different applications does she have to use for these purposes? Also


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However, they are developed as closed environments, assuming that users employ a pre-defined set of business services for their activities (e.g., document sharing alone).

As a matter of fact, the Web 2.0 and cloud computing [15] support the development of open service clouds which integrate heterogeneous services in order to manage, e.g., customized collaboration environments satisfying the needs of specific user communities. Our goal is thus to develop an awareness support service which can be used in this new type of environment. In this perspective, two main challenges have to be addressed: the first one is the integration of the workspaces managed by the business services [16], in order to provide the user with a unified, structured view of her/his activity contexts, which replaces the application-oriented perspectives offered by individual business services. The second challenge is the integration of the awareness information generated by such services into a unified stream, reflecting the user's interests and priorities, in order to reduce the information overload and the interruption effect.

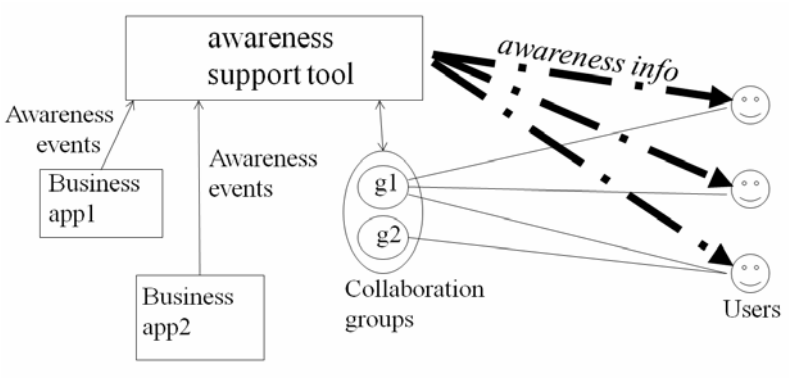

Fig. 1. Awareness support in the CONRAD framework

Figure 1 describes the approach we propose in a pictorial way. Rectangles represent the awareness support tool and the applications that are integrated in the collaboration environment (Business app1 and Business app2). Ovals represent the collaboration groups that have been defined in the environment (g1 and g2). Faces denote users and are associated to collaboration groups by means of plain lines. As shown in the figure, the awareness support tool keeps an explicit model of the users' collaborations. Moreover, it absorbs (see the plain arrows) the awareness events generated by the business services that are integrated in the collaboration environment, while users operate on their user interfaces. The collected information is then presented to the users in a holistic way (thick, dashed arrows), by merging the event flows generated by services and by administering them according to personalized notification preferences. In particular, the tool supports the filtering of irrelevant notifications, thus reducing the information overload on the users. For readability, the figure shows a very small collaboration environment which integrates two business applications and is used by a collaboration group (g1) composed of three users; one of such users also handles a private activity context which does not include any other participant.

3 Principal Contribution

3.1 Our Awareness Support Framework

CONRAD is an awareness support framework for open service environments. It acts as a mediator between the user and the business services, offering a single interface for the visualization of the awareness events and for the selection of personalized notification management policies. Specifically, it includes a Notification Manager tool which:

- Handles a Web-based awareness space that is organized as a structured workspace for accessing the awareness information concerning the user's collaborations.
- Enables the user to select the information to be conveyed as notifications, regardless of its originating service, by specifying personalized notification preferences.


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4 Related Work

To our knowledge, the NESSIE awareness management environment is the first proposal of a generic [24], extendable awareness support infrastructure to be applied in open environments. In that work, the user can define notification filters based on event patterns (similar to current e-mail filters), but the user's activity contexts are not modeled. In comparison, CONRAD synchronizes business services with respect to the user's contexts, so that the event classification can be done in a more precise way. Moreover, it enables the user to correct the classification of events in contexts, in order to repair the errors made by the system.

Atmosphere [25] introduces the concept of contextual awareness to relate objects and awareness events to contexts. However, it forces users to explicitly select the contextors representing their intentions while they perform actions (e.g., "final review" of a document). Differently, CONRAD bases the representation of the users' intentions by relying on task management, which has been recognized as an important feature for the organization of various collaborative activities, among which distributed collaborative writing.

Many groupware and project management tools (e.g., Project View IM [26], ActiveCollab [13], TeamWox [2]) support a project-based organization and filtering of notifications. In comparison, CONRAD improves notification management by filtering notifications on the basis of the activity context in the user's focus of attention. Moreover, CONRAD is based on an open architecture supporting its integration with heterogeneous services, while most groupware and project management environments are closed. Concerning notification management [27] propose the bounded deferral approach, which defers low-priority interruptions and computes the priority of the interruptions on the basis of a set of a-contextual features selected by the user; e.g., the messages from my boss have high priority. In comparison, CONRAD handles notifications on the basis of their context, as this might strongly influence the relevance of a notification; e.g., the messages from my boss might be relevant only if they are about work. Of course, the context-based filtering of notifications might be complemented with a feature-based selection in order to support the development of finer-grained notification policies.

5 Conclusion and Future Work

This chapter has presented the CONRAD framework for the holistic management of awareness information in open service clouds, integrating heterogeneous collaboration services. This framework provides a solution for enriching open collaboration environments with a flexible support to notification management and group awareness.

The main feature of CONRAD is the explicit management of the user's activity contexts and the consequent classification of awareness information. Thanks to this feature, awareness events can be grouped by context and presented in a Web-based awareness space supporting multi-faceted search. Moreover, notifications can be delivered to the user on the basis of fine-grained notification policies, which take the user's activities into account, e.g., by privileging the information related to her/his current activities and filtering out the other events. The notification policies offered by CONRAD have been proved to reduce the detrimental effects of interruption, while giving the users useful information for catching up with what is happening in their collaboration contexts.

In our future work, we plan to extend this framework in order to improve the presentation of information in the awareness space, introducing new opportunities for the user to personalize it (e.g., by introducing presentation policies for the awareness space). Moreover, we plan to investigate in detail privacy issues [29], in order to support the specification of individual privacy preferences for the management of the awareness information. Currently, standard policies are applied, which constrain the propagation of user information using the user's collaboration groups as access lists for such information. However, more specific policies might be envisioned in order to tune the collection of awareness events from business services (e.g., by shading details), or to introduce specific constraints on the propagation of information within a collaboration group.

Acknowledgments

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Chapter 10

Reviews on Photographic Representation

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Abstract. An analysis of the photograph must begin by understanding those key elements involved in its realization and apprehension. This needs to be so because of the many of the aspects that come into play with digital that are rooted in the basics of the photographic device itself. Beginning from established ideas and unquestioned generalizations only leads to a superficial and simplistic debate. Such is the case of the known relationship with the real. This paper begins with a critical analysis of the principles governing the photographic device and goes on to try to understand these, as the ensemble of operational and technical order elements that enables the production and dissemination of the photographic image. Subsequently the author discusses the implications of incorporating the digital model in the regime of photography.

Keywords: Photography, Analogical, Digital, Synthesis Image, Realism, Post-photography

1 Introduction

Speaking at this time of the foundations of image generation may seem a trivial act of little use. There is widespread agreement about the principles and elements that come into play. But a rigorous analysis finds that the ideas set are a set of inaccuracies and reductionism that culminate in an overly simplistic conception of the photographic medium. This has contributed to making present expectations with respect to the photographic image unenforceable. I am referring to the idea, so often debated and ever-present, of aiming to match reality with the photographic record, which tells us that a photograph is a faithful record of reality.

If we have to propose something that defines the essence of photography, to define the specificity of the photographic image, unquestionably we will have to refer to physical-chemical processes/electronics that allow the recording or registration of certain optical signals; it is called photosensitivity. In the words of Schaeffer [1] it is a chemical printing, the chemical effect of a physical causality (electromagnetic). That is to say, a flow of photons from an object (and emission, and by reflection) that touches the sensitive area.

It's an impression that runs away through the presence of a physical intermediary (the photon flux, light) between the impregnant (the subject sets the scene) and the impression made on the photosensitive surface. It is a process that is established under the principle of projection: the image is the result of point to point correlation between the real object (the impregnant) and printing. Although this certainly is only an ideal, since it follows a series of physical phenomena that impede the exact correlation between a point-object and a point-image.

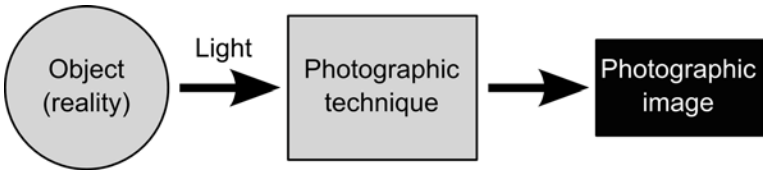

Fig. 1. Relations and components into a photographic image

For a better appreciation of the essence of the photographic device, we must remember that what we call today photography is the sum of a set of elements together to produce the image. Elements that are at times

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Fig. 2. The history of two manipulations

The image of the left, titled Doisneau's Kiss (1950) is considered to be the most sold in history, with approximately 410.000 copies made. This was due to a history that was described for many years: this photo had been taken fortuitously by Robert Doisneau while he was seated taking a coffee with his Rolleiflex in his hand. The above mentioned photographer drove his chamber between the multitude that were walking opposite to him and captured for all time this beautiful image of a lovers' couple kissing passionately while they were walking in the middle of the crowd. This was the history that was known for many years until 1992, when two impostors said they were for the protagonists of this photo. Nevertheless Doisneau got angry about that false declaration, would reveal the original history clarifying that legend in the following way: the photograph had not been taken at random, but it was done by two actors who he asked to pose for his camera.

The image on the right, the "tourist guy" was an Internet phenomenon. Shortly after 9/11, an image surfaced on the internet, purportedly from a camera found in the debris of the World Trade Center. The image showed a man, dressed in a wool cap, heavy jacket, and backpack, standing on the observation deck of the World Trade Center. Below him a jet plane can be seen flying towards the building. Because of its closeness and low altitude, it seems certain to collide with the tower. The picture purported to be one taken mere moments before the attacks on the World Trade Center began. The first person who claimed to be the tourist was the Brazilian businessman José Roberto Penteado. When Penteado started to get media attention, including an offer to be in a Volkswagen commercial, a 25 year old Hungarian man named Péter Guzli came forward as the real tourist. Guzli said however, that he did not want publicity and did not release his last name straight away. Guzli took the photo on November 28, 1997, and was also responsible for the initial edit. He edited the image for a few friends, not realizing it would spread so quickly across the Internet. He first provided the original undistorted photo and several other photos from the same series as proofs to a Hungarian newspaper. Later on, the show Wired News examined the evidence and confirmed that Guzli was the real "tourist guy" (Source: Wikipedia).

4 The Digital System

Digital, a priori, does not point to the symbolic systems produced with the image, but rather a way to treat the image in order to enable it to communicate in a particular scheme or context (computer processing). If we think carefully about this phenomenon, we conclude that it essentially consists of a metacoding of representation [9]. That is, the coding imposed at the time to organize a certain number of signs to produce a representation, there is another that takes place in a different plane. The essential quality of this coding technique does assume the role of support. Like a photograph or drawing using a physical medium, the role-enroll in the analog signals –continuous modulations spots– that make possible the very existence of the image. The fact that the same image-a photograph-can have a physical life on an analog medium and another on digital media leads us to think erroneously that the metacoding to be submitted at the time of migration from one medium to another is neutral.

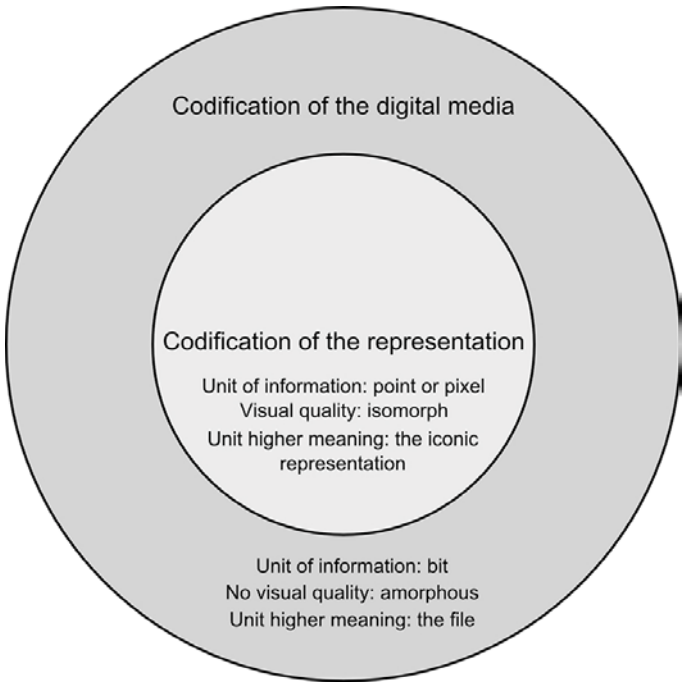

Fig. 3. Metacoding of digital system

The technological paradigm shift accounted for photography a time of crossroads, for some time it was thought that the incorporation of digital processes meant a break, being any image, even be the result of a search, outside the boundaries of photography. The coexistence of silver photography and digital photography led to, with the help of successive developments, a transition that has concluded that this last has assumed the former uses of traditional photography. Thus, it remains a milestone in the technological evolution of the photographic medium. So the registry values, of truth, of memory, of file, of identity, of fragmentation, etc. that had underpinned photography ideologically in the twentieth century are transferred to digital photography.

However it opens up new frontiers in digital image, as this not only can reduce to its visibility. It is indebted to processes that produce and the thoughts that support, and it is here that it confirms a change of nature, which is clearly oriented towards the virtual. And as stated by Fontcuberta [6] it is logical that also: every society needs a picture to your likeness. The silver photograph brings the image of industrial society and works with the same protocols as the rest of the production taking place within it. The materiality of photography silver regards the world of chemistry, the development of the steel and rail, the mechanization and the colonial expansion encouraged by the capitalist economy. In contrast, digital photography is the result of an economy that favors information as a commodity, capital opaque and invisible electronic transactions. It takes the language as a material, the codes and the algorithms. It shares the substance of the text or sound and can exist in their own distribution networks. It answers to an intensive world, to the supremacy of the dizzy speed and to the requirements of the immediacy and globality.

4.1 The Immateriality

When Sonesson states that when considered as an image, a computer image has something of a paradox its surface is not easy to find, we are pointing to one of its most unique particular specificities. Digital, such as the linguistic message or video electronic image shows up only at a given instant, so brief and localized. This is so because of their immateriality, for lack of a reality-based in aggregates of atomic material. Also its virtual nature is made exclusively by information units in the form of signals that lack any isomorphism with the image represented. This special configuration is responsible for the versatility of the medium, hence its consideration as a meta-medium, by allowing messages placed within it in time and space. We find that the photography while it once occupied a place, we can now see that the support is not indispensable:if the image exists “the digital photo is an image without place and without origin, rootless, has no place because it is everywhere” [6]. In connection with this feature we found another: the inaccessibility of the human perceptual system. As always, the sign exists only when it is perceived.

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Chapter 11

An Experimental Study on the Cognitive Characteristics of Modeling Notations

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Abstract. The aim of the study is to investigate the diagrammatic reasoning and error detection strategies of conceptual modeling representations. Experiments were performed on a notation-familiar group with degrees in computer science related fields and a domain-familiar group with experience in simulated systems. The use of eye tracking and verbal protocols together with performance data underlines the error finding and reasoning mechanisms of the two different groups. The experiment reveals that the diagrammatic complexity and degree of causal chaining are the properties of diagrams that affect understanding, reasoning and problem solving within software engineering representations. A follow-up experiment with domain-free participants was undertaken to study the performances, the effects of certain diagrammatic properties and the effects of gender. The results show, independenly from gender, that the degree of causal chaining positively affects error finding in simulation conceptual modeling representations while the diagrammatic complexity affects it negatively.

Keywords: Conceptual Modeling, Diagrammatic Reasoning, Error Detection, Eye Tracking, Verbal Protocol Analysis

1 Introduction

During the development phases of the lifecycle of software production, it is very common and almost compulsory for large systems' designers to prepare diagrammatic representations. Developers in modeling [1] and simulation[2] application domain work with diagrammatic representations starting from the conceptual modeling phase. Simulation conceptual modeling is a branch of modeling and simulation. Some aspects of knowledge engineering and cognitive science can be applied to issues in simulation conceptual modeling. These proposals suggest that simulation conceptual modeling involves constructing representations of human knowledge from a specific domain [1]. Robinson [2] defines conceptual modeling as the abstraction of a model from a real or proposed system, which includes a simplification of reality. A simulation conceptual model is the simulation developer's way of translating modeling requirements (i.e., what is to be represented by the simulation) into a detailed design framework (i.e., how it is to be done), from which the software, hardware, networks (in the case of distributed simulation), and systems/equipment that will comprise the simulation can be built [3] [4].

In simulation conceptual modeling, the representations play a central role of communicating, understanding and specifying requirements. However, few studies have been performed to reveal the cognitive properties of conceptual modeling representations. Although, a limited number of studies have been undertaken in a related field on the cognitive aspect and visualization of software development representations [5] [6] [7], most are checklist and performance based studies, such as number of defects discovered within a specific period of time [5] [9].

This current study was based on the premise that using the methods of Human Computer Interaction studies with a cognitive outlook can elicit effective results. An exploratory and comparative study consisting of two experiments was performed to observe the effects of diagrammatic properties and the error finding strategies of the domain-familiar and the notation-familiar subjects in simulation conceptual modeling notations. In the first experiment, the aim was to investigate error finding strategies with respect

[1] A model in this context is a static abstract representation of a system with its own assumptions and limitations.

[2] A simulation is a digital implementation of a model over time that generates an artificial history of the modeled systems [8].

to expertise. The follow-up experiment was conducted to evaluate the effects of certain diagrammatic properties, the effects of gender on these properties and the error finding performances independent from the expertise domains.

The initial representations of the KAMA project [10] [11] were used in this study. The framework includes a process definition (method) for guiding the conceptual modelers and domain experts, a notation for representing the conceptual models and a tool for supporting the process and the notation. The experiments were held in the Human Computer Interaction (HCI) Laboratory of Middle East Technical University (METU). Eye-tracking, video and auditory think-aloud data were collected for the analysis of the participants' error finding performance in simulation conceptual modeling representations.

In the first experiment, 10 domain-familiar participants and 10 notation-familiar participants worked on the representations of one entity state diagram (extension of the state diagram in UML) and three task flow diagrams (extension of the activity diagram in UML) from a military scenario. Although some studies report that experience and expertise improves software inspection or error finding in diagrams [5] [12], [13], in this study there were two groups from different expertise domains working on the same topic and with the outcome from two such groups have not previously been reported in the literature. Since one group is familiar with the software notations and the other group is familiar with the diagrams domain, the hypothesis was that there would be no significant difference in finding errors in the diagrams between the groups. It was also assumed that experience would improve error finding in both groups. A further supposition was that the success rates of the groups would differ with respect to certain error types.

In the second experiment, 24 university students worked on the diagrams of the motor vehicle tax law, debt collection and bankruptcy processes. In this follow-up study, the properties of diagrams, the effects of these properties on error finding and eye movement data, and the effect of gender on these properties were further investigated. These properties are defined as diagrammatic complexity and degree of causal chaining in this study based on relevant literature [13] [14] and findings of the first experiment.

2 Experimental Design

2.1 Background and Design

The human eye covers a visual field of about 200°, but receives detailed information, such as fixations and gaze durations, from only 2° [15]. Fixations are the rapid eye movements in which the gaze is directed to a number of foci to a specific area. *Saccades* are the most common way of moving the eyes in a sudden, ballistic way over a nearly instantaneous period of time [16]. Eye movements are considered useful for investigating the on-line cognitive process of diagram-based problem solving because eye movement provides problem-solving measures that solution time and accuracy cannot address [17]. Early studies show some evidence that eye movements can correspond to inference making [17]. Recently, eye movements have been used to identify the processes involved in problem-solving in geometric reasoning [18], reasoning about mechanical systems [14], insight problem-solving [19], arithmetic [20], and human-computer interfaces [21]. One study of insightful problem solving via tracking eye movements in relation to diagrams states that an initial period of purposeful problem-solving activity is followed by an impasse, a state of mind in which the problem solver feels that all options have been explored and he or she cannot think of what to do next [22].

Thought processes can be described as a sequence of states, each state containing the end products of cognitive processes, such as information retrieval from long-term memory, information perceived and recognized, and information generated by inference [23]. Obviously, one of the ways of obtaining the information is to ask people to "think aloud" and these reports are called verbal protocols [24]. The protocols collected during the duration of a task are called concurrent verbal protocols, which are considered to be the verbalization of thoughts, retrieved from working memory. Although some researchers debate the validity of verbal data, such as, whether it reflects cognitive processes adequately [23] [24], it has been widely used in many studies. For example, verbal protocol analysis has been used in research about process tracing [25], thinking and decision making behavior [26], computer-aided architectural design [27], user-interface design [28], usability [29], problem-solving [30], narrative writing [31], and diagrammatic reasoning [5] [32].

Verbal protocols give explicit information about the sequence of the items under consideration by the individual, and from this, the strategy being used is inferred as well as the contents of the working-memory [33]. The combination of eye movement and verbal protocols are useful for the analysis of cognitive

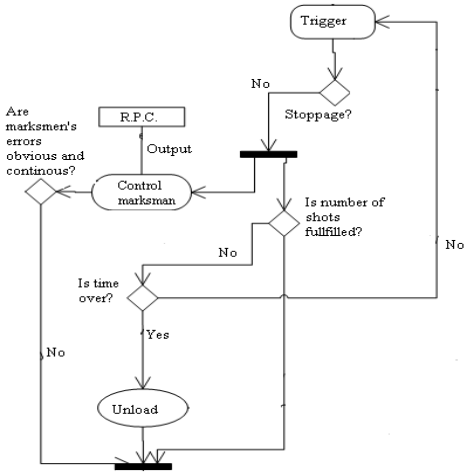

Fig. 3. A diagrammatically complex part

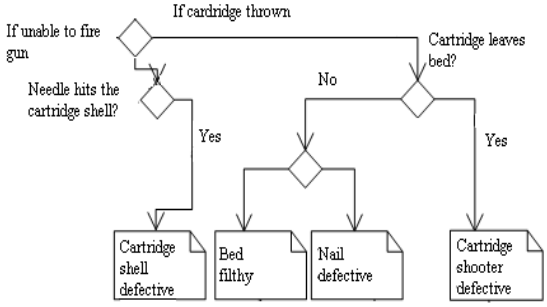

Fig. 4. A diagram with high degree of causal chaining

2.2 The Experiment

The participants took part in the experiment individually and each was given the scenario on paper 1 day before the experiment. Before a participant started to compare the diagrams on the screen of the eye tracking device, he was given a glossary of symbols used in the representations. The experimental materials were: the marksman state diagram, the stoppage removal activity diagram, the marksman mission training activity diagram, and the marksman mission ending and evaluating activity diagram. The diagrams appear on a linked web page and the diagrams' verbal explanations were transcribed and given in a printed form.

In the follow-up study, the domain of the scenario was deliberately changed to remove the effect of the subject on the diagrammatic properties. The diagrams of the motor vehicle tax law, debt collection and bankruptcy and their scenarios are used in the follow-up study. When the experiment began, the participant started reading the scenario on the paper, compares with this the diagrams and tries to find the errors. If a participant is silent for more than 1 minute, he is reminded to continue thinking aloud. Demographic data is collected for each participant through an interview after the experiment.

After the experiment, the participants' actions were categorized into segments according to the verbal protocols. The segments and the corresponding eye movement data were used in the tests.

2.2.1 Participants

After announcing that participants were required for an experiment on several non-public mailing lists, 10 domain-familiar and 10 notation-participants from the applicants were invited to the experiments with respect to their experience and expertise. The domain- familiar participants were all male military officers serving in the Turkish Armed Forces. In order not to introduce a gender variable, at this stage the notation-familiar participants were chosen from male candidates. The notation-familiar group members have


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References

1. Pace, D.: Conceptual Model Development for C4ISR Simulations. Proc. of the 5th International Command and Control Research and Technology Symposium, pp. 24–26 (2000)
2. Robinson, S.: Conceptual Modeling For Simulation: Issues And Research Requirements. Proc. of the Winter Simulation Conference, pp. 792–800 (2006)
3. Pace, D.: Ideas about Simulation Conceptual Model Development. Johns Hopkins APL Technical Digest 21(3), pp. 327–336 (2000)
4. Pace, D.: Impact of Simulation Description on Conceptual Validation. Proc. of the fall 1998 Simulation Interoperability Workshop, pp. 14–18 (1998)
5. Hungerford, B., Hevner, A., Collins, R.: Reviewing Software Diagrams: A Cognitive Study. IEEE Transactions on Software Engineering 30(2), pp. 82–96 (2004)
6. Kim, J., Hahn, J., Hahn, H.: How Do We Understand a System with (So) Many Diagrams? Cognitive Integration Processes in Diagrammatic Reasoning. Information Systems Research 11(3), pp. 284–303 (2000)
7. McDonald, F., Miller, J.: A Comparison of Computer Support Systems for Software Inspection. Automated Software Eng. 6, pp. 291–313 (1999)
8. Chapman, R. Conceptual Modeling Framework for Complex Synthetic Systems –an Example from F-15C Distributed Mission Training. Spring Simulation Interoperability Workshop (2000)
9. Juristo, N., Moreno, M., Vegas, S.: Limitations of Empirical Testing Technique Knowledge. In Juristo, N., Juristo, A. M. (eds.) Lecture Notes on Empirical Software Engineering, vol. 12, pp. 1–38. World Scientific, Singapore (2003)
10. KAMA: C4ISR Uygulamaları Ve Kavramsal Model Altyapı Çalışmaları Raporu (Eng. C4ISR Implementations and Conceptual Model Infrastructure Work Report. Technical Report Kama-Cisrmos-Kamacr-S00, Ankara, Turkey (2005)
11. Civelek, M.: Modeling a Sample Mission Space of T.A.F. by Using KAMA-C4isrmos. Graduation Project, Department of Information Systems, METU, Ankara, Turkey (2006)
12. Porter, A., Siy, H., Mockus, A., Votta, L.: Understanding the Sources of Variation in Software Inspections. ACM Trans. Software Eng. and Methodology 7, pp. 41--79 (1998)
13. Chandrasekaran, B., Glasgow, J., Narayanan N.: Introduction. In Glasgow, J., Narayanan, N. H., Chandrasekaran, B. (eds.) Diagrammatic Reasoning: Cognitive and Computational Perspectives, pp. 15–27. AAAI/MIT Press, Massachusetts (1995)
14. Hegarty, M.: Mental animation: Inferring motion from static diagrams of mechanical systems. Journal of Experimental Psychology: Learning, Memory and Cognition 18(5), pp. 1084–1102 (1992)
15. Levi, D., Klein, A., Aitsobomo, A.: Vernier Acuity, Crowding and Cortical Magnification. Visual Research 25(7), pp. 963–977 (1985)
16. Jacob, K.: The Use of Eye Movements in Human-Computer Interaction Techniques: What You Look At is What You Get. ACM Transactions on Information Systems 9 (3), pp. 152--169 (1991)
17. Grant, R., Spivey, J.: Eye Movements and Problem Solving: Guiding Attention Guides Thought. Psychological Science, 14 (5), pp. 462–466 (2003)
18. Epelboim, J., Suppes, P.: A Model of Eye Movements and Visual Working Memory during Problem Solving in Geometry. Vision Research 41, pp. 1561–1574 (2001)
19. Hegarty, M., Raney, E.: An Eye Movement Study of Insight Problem Solving. Memory and Cognition 29, pp. 1534–1555 (2001)
20. Suppes, P.: Eye-movement Models for Arithmetic and Reading Performance. In Kowler, E. (ed.) Eye Movements and their Role in Visual and Cognitive Processes, pp. 455–477. New York: Elsevier (1990)
21. Ellis, S., Candrea, R., Misner, J., Craig, S., Lankford, P., Hutchinson, E.: Using Eye Tracking Data to Help Build Better Web Pages. Poster presented at The 42nd Annual Meeting of the Human Factors and Ergonomics Society (1998)
22. Salvucci, D., Goldberg, H.: Identifying fixations and saccades in eye-tracking protocols. Proc. of Eye Tracking Research, Applications Symposium, 71-78. ACM, Palm Beach Gardens, FL (2000)
23. Ericsson, A., Simon, A.: Protocol Analysis: Verbal Reports as Data, Revised Edition. Bradford books/MIT Press, Cambridge, MA (1993)
24. Bainbridge, L., Sanderson, P.: Verbal Protocol Analysis. In Wilson, J. R., Corlett, N. (eds.) Evaluation of Human Work, 3rd edition, 169-201. Taylor & Francis, London (2005)
25. Todd, P., Benbasat, I.: Process Tracing Methods in Decision Support System: Exploring the Black Box. MIS Quarterly 11, pp. 493–512 (1987)
26. Schweiger, D. M.: Is the Simultaneous Verbal Protocol a Viable Method for Studying Managerial Problem Solving and Decision Making? Academy of Managerial Journal 26(1), pp. 185–192 (1983)
27. Gero, J., Tang, H. Concurrent and Retrospective Protocols and Computer-Aided Architectural Design. In Gu J., Wei, Z. (eds.) Proc. of the CAADRIA'99, pp. 403–410. Shanghai Scientific and Technological Literature Publishing House, Shanghai (1999)
28. Know, S., Bailey, W., Lynch, E.: Directed Dialogue Protocols: Verbal Data for User Interface Design. Proc. of CHI'89, pp. 283–287, ACM, Texas (1989)
29. Benbunan-Ficsh, R.: Using Protocol Analysis to Evaluate the Usability of a Commercial Web Site. Information and Management 39, pp. 151–163 (2001)

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Chapter 12

New Approaches on iTV: Usability and Mobility Issues

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Abstract. The wide adoption of small and powerful mobile computers, such as smart phones and tablets, has raised the opportunity to employ them in multi-user and multi-device iTV[1] scenarios. In particular, the partnership between a personal device and a shared one provides two possible output screens. Then, one significant research issue is to balance the visual interface between two devices with advanced output abilities. How do the devices compete or cooperate for the attention and the benefit of the user? Most notably, how is multi-device interaction iappreciated in multi-user scenarios? In particular, the standardization of HTML5 and the increase of cloud services have made the web browser a suitable tool for managing multimedia content and the user interface, in order to provide seamless session mobility among devices, such as smart phones, tablets and TV screens. In this chapter we present an architecture and a prototype that lets people transfer instantaneously the video they are watching between web devices. This architecture is based on two pillars: Websockets, a new HTML5 feature, and Internet TV (Youtube, Yahoo Video, Vimeo, etc.). We demonstrate the flexibility of the proposed architecture in a prototype that employs the Youtube API and that facilitates seamless session mobility in a ubiquitous TV scenario. In our research, we are exploring multi-device user interface configurations in the context of a leisure environment and for entertainment applications.

Keywords. iTV, Multimedia, Usability, HCI

1 Introduction

The majority of contemporary user interface systems consider a clear distinction between the input and the output devices. Indeed, the user interface systems in desktop computers, TVs, telephones, have usually distinguished between the input and the output devices. Smart phones and tablets are devices that don't consider this distinction. Moreover, the plentitude of devices enables the creation of ubiquitous computing scenarios [1] where the user can interact with two of more devices.

The remote control has been the most common way to interact with iTV. However, the popularity of mobile computers such as smart phones and tablets allow us to leverage the established way of interaction. A second screen could give the user more information and the possibility to interact, controlling, enriching or sharing the content [2]. In this work, we examine three alternative scenarios for controlling the content in a dual screen set-up and explore the respective evaluation methods.

Session mobility is the capability that allows a user to transfer an ongoing communication session like phone calls and media consumption from one device to another [3]. The concept of session mobility has been widely studied for mobile phone infrastructure but it hasn't ever had a point of view from Internet TV. In this paper we make this new approach developing a programming framework and an architecture for Internet TV session mobility.

[1] Interactive Television

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3 Architecture Proposed

The main challenge is to build an architecture that lets devices transfer or retrieve any video content and the control of these at any time and from anywhere between them. Also, a way to transmit any kind of information to be shown on any device (e.g. social TV applications) is defined in this architecture.

Simplicity has been the priority of the definition of this architecture taking account three important features in it:

- Simplicity of Interoperability: It is known that the Web is getting bigger not only in the ubiquity of the services but also in the potential of the applications. The growth of HTML5, its standardization and the increase of cloud services make it possible to think that browsers will be the perfect tool to interoperate between any devices. Bring this functionality (session mobility) to the web to make it easier and simpler that the interoperability defined in related research based on IMS and SIP, specially at the time of bringing new services and applications to session mobility.
- Simplicity on Scalability: One of the technologies used in the architecture proposed is WebSockets. This technology provides bi-directional, full-duplex communication channels and it is designed for being implemented in web browsers and web servers. This condition makes it easy to scale any service implemented on it.
- Simplicity of Implementation: A Web framework has been developed taking the reference model of this architecture to sample some of the possible applications and services it may provide.

The proposed architecture should also fulfill the requirements of the following scenario: A four member family is watching TV in the living room. The two children are watching TV in their tablets because they don't like what their parents are watching. One of the childrenwants to share what he is watching with the rest of the family. To do this, he just has to press the function "Extend TV" to transfer his session to the TV, the tablet of his sister or both of them. The session is transferred well in the frame that he was watching on his tablet from the beginning. When the session has been transferred, the TV remote controller or the tablet could control the video content.

The achuitecture assumes the following requirements:

- Internet Connection in any device connected.
- Browsers HTML5/Websockets capable.
- Video Content Server has an API to access and control the content at least.

Architecture reference model figure 1 shows the reference model with four parts clearly divided: Social Server, Channels, Video Server and Devices

3.1 Devices

It represents any kind of device equipped with an HTML5 browser. Each device can connect with Web-Socket (WS) Server playing three different roles:

- Remote Controller: The device is connected to the channel to control the video played in other device.
- Screen: The device is connected to the channel to play the video in itself.
- Remote Controller and Screen: The device is connected to the channel to play both roles.

To do this, it is necessary to define a Javascript Framework to implement all the actions defined, taking account the role of the device: connect, play, pause, next_video, pause_video, show_information, extend_video, retrieve_video. Each role has a different GUI. These are basic functions; more functions could be added.

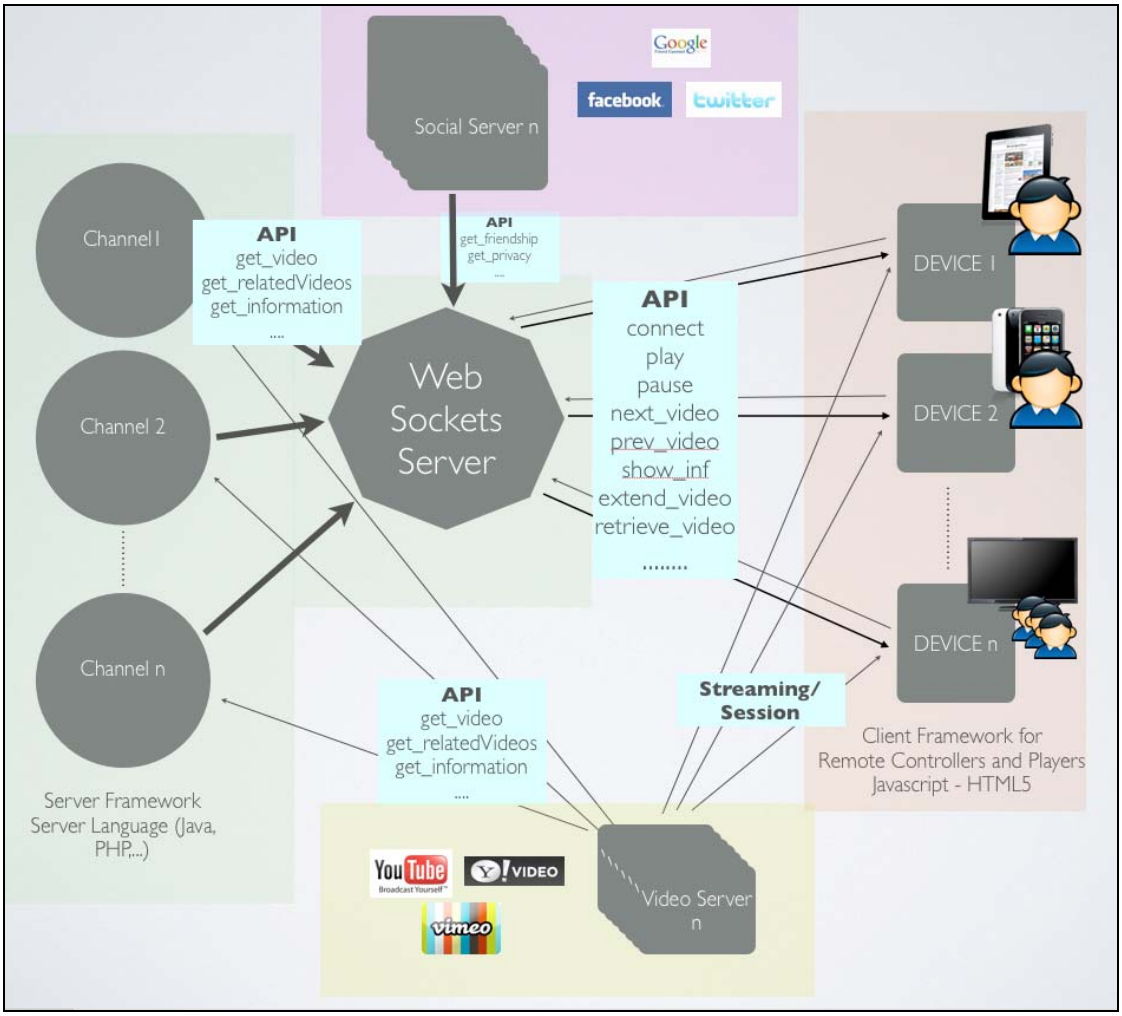

Fig 1. Reference Model

Two communications are possible:

- With the WS server to interconnect the different devices connected to the session.
- With the Video Server for the streaming reception and to send session information (with video server).

3.2 Web-Sockets Server (WS Server)

This is the manager of all the devices connected to all the channels and videos. The WS Server manages the session between browsers to transmit the required information for the devices and retrieves if the users connected to a channel can share actions and information.

3.3 Channels

Each channel represents a series of videos of different sources or not. It is referenced by an exclusive URI and devices can connect to this URI as the three roles mentioned before via the WebSockets. If the user wants to connect a device to the channel, he has just to enter the URL of the channel and select the role of the connection. Every channel retrieves video information from the video server.

3.4 Video Server

This serves the streaming to the devices of the videos asked for by the channels. Every Video Server must have an API to retrieve the videos to play for the device. The channels to access these videos will use a higher-level API developed in the framework.

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- A PHP Framework has been developed to implement the WS Server functionality. The framework at the moment just supports Youtube Videos.
- A Javascript framework has been developed that implements the functionality of remote controller and player.
- A TV connected to a set-top-box based on Linux (SIESTA distribution2).
- A tablet with SIeSTA operating system installed (Figure 3).
- A special remote controller (Figure 3)

Fig. 3. Tablet with SIeSTA[1] system and its remote controller

For this research researchers have proposed a GUI to test the ubiquitous concepts above iTV (Figure 4). There have been developed six TV functions in this prototype: Previous Video, Play/Pause Video, Next Video, Info, Extend Video and Retrieve Video. These two last functions make possible ubiquity transferring not only the video between devices but also the control. In the Figure 3, user 'c' has extended the video of the tablet to the TV and users 'a' and 'b' can also control the TV (this depends on the role of every user) and if they want retrieve the video to their devices.

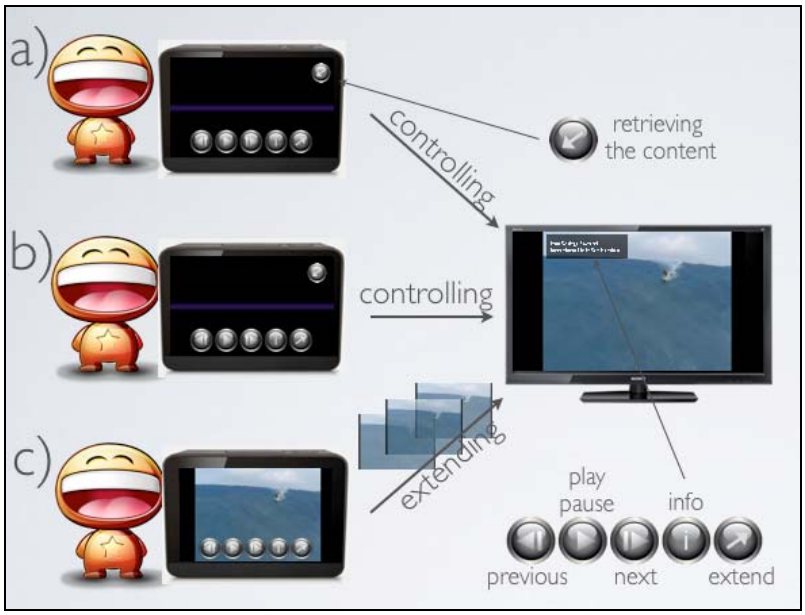

Fig 4. Scenarios

4.2 User Evaluation

Dual-screen interaction might not be suitable for every type of television content. Actually, it might be rather suitable for some types of content, but completely irrelevant for other types of content. Although

[1] SIeSTA system based on Linux


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Chapter 13

Usability Engineering Versus Social Sciences: An Analysis of the Main Mistakes

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Abstract. In the present work we present the strategies used from the formal sciences to transfer into the field of action many areas of the knowledge of the factual sciences through usability engineering. Additionally, the essential motives are enumerated through which social sciences have been the support of techniques and methods inside usability engineering. Simultaneously the patterns of this apogee and decay of a pseudo engineering are revealed, with the advance of the latest information technologies and interactive communication. Also a first diachronic and detailed analysis is made of the academic context in Europe and America which has boosted deviations inside the formal and factual sciences, with the theoretical goal of achieving an increase in the quality of the software and hardware.

Keywords: Computer Science, Social Sciences, Assessment, Usabillity Engineering, Communicability, Education, Job, Human Factors, Professional Ethics, Hypermedia, HCI

1 Introduction

One of the main goals of the computer marketing in the 80s was to meet the quality demands of the services that supply big customers, such as banks, big industries, city halls, universities, etc. [1] [2] [3]. At that time the terms used were less ambiguous and more straightforward than nowadays, because they talked about customers and not users or partners, for instance [4]. Those were times on which the big organizations counted on an internal computer department of their own, which took care of the purchase of commercial software for programming, managerial systems which could be modified and adjusted to their needs, hardware maintenance, etc. The high cost of the computer equipment forced the manufacturers of software and hardware to have a direct and practically daily contact with their customers, sometimes very widely spread in the local geography. Besides, the use of the internet at that time was focused on the academic or scientific field, but not on the commercial sector. Therefore, the firms had to resort to several mechanisms of the social sciences to collect data from their customers and reputation [5]. The explicit goal was to know the main problems they had in the use of the commercial hardware and software, and how to solve and prevent them. The implicit and essential goal was to keep a continuous cycle of marketing for the purchase of new products by the customers, such as updating of the operation systems, new versions of programming applications, new hardware, etc. [6] [7] [8].

The marketing of the latest technological breakthroughs has always needed a team of professionals who were external to the industries where these products were made for the promotion with business purposes. Those were diverse professional teams, but with an academic training in the social sciences, such as sociologists, psychologists, anthropologists, etc. Oddly enough, the same kind of professionals who were invited to work in interdisciplinary or transdisciplinary teams for software engineering during the 90s, with the purpose of increasing the quality of the products and services [9] [10]. Although in principle, these last three terms are used as synonymous in the context of educational marketing for the new technologies they have to be differentiated and require an in depth analysis prior to their use [11]. Sometimes this marketing hybridizes terms from the social sciences with engineering terms or terms regarding usability requirements in the evolution of interactive communication, thus creating real anti-models inside the sciences such as the expression “semiotics engineering” [12].

This is a serious mistake inside the context of science epistemology [13]. Making semiotics a subdomain of engineering contradicts the logic of the main international pioneers of this discipline, along the history of its evolution [14–18]. Oddly enough the origins of this non-scientific hybrid are to be found in religious private university teaching centres in Latin America. The purpose of such studies in America, Asia, Africa, Europe, Oceania, etc. is to get the highest economic profit from these students who are regarded as clients. Along the current research work it has been shown how in a myriad of cases the origins of these deviations inside the sciences take place in those non-secular university organizations. In these organizations the greed to get the highest profit in the shortest possible time and with the least scientific effort consists in constantly changing the curricula. The purpose of these changes is to constantly make educational offers to draw the attention of the future clients-students before the secular or public educational institutions. That's why one of the ways of evaluating the quality of the transfer among universities, businesses or industries and the research and development labs is to investigate the changes of the curricula of the universities before establishing cooperation lines with those organizations that only seek the highest financial profits resorting to all the instruments of marketing [19]. Evidently here we have a situation of imitating usability engineering [20] [21] in borrowing theories, techniques and models from the social sciences [22], but presenting them as something new because of the search of profit. In the example of semiotics engineering [23] the origins are diverse because although they have a component of research and development in the university context [10] [19], it has quickly been shifted to the computing industry sector. Therefore, it has been governed by other parameters, which at least respect the quality guidelines of software engineering and had a novel scientific basis such as was the context of the hypertexts, for instance. Now in both examples the problem posed by these deviations in the training and work market framework of the future generations of professionals is very high. The economic consequences may be high for the community, although a very small part of it, those individuals who prompt and boost deviations, quickly increasees the personal profits or profits for the organizations to which they belong. Although these deviations may be detected and although there may be an intention to correct them, this entails that one or two generations of professionals will have knowledge and/or experiences in multifarious sectors without a theoretical foundation or with little practice which will turn them into professionals without a clearly defined working future in the society to which they belong.

This is one of the reasons why there is a difference between the public university teaching centres where students and professors do not have the latest technological breakthroughs at their disposal in contrast to those non-secular universities. However, the former are capable of generating curricula where the students of the early computing courses are capable of setting up and programming their own PC starting from the different hardware components. That is, inside a same city we may have students (not customers) whose average age is not beyond 22, with the electronics and computing knowledge to set up a desktop PC. Whereas at the same age we have consumer clients of great microcomputer or multimedia phone brands who are registered in computer science faculties, but because of the confusion that prevails in their curricula are simple users of commercial software.

Between both situations deriving from the university teaching centres and/or R+D labs there is the hybrid situation which is the most negative and prompts a greater distance within the epistemology of the sciences that was described before. These hybrid institutions are universities that have a secular status in their constitution but their members act as if they belonged to a private religious enterprise. In these places we find a reality prevailing, which the linguist Ferdinand de Saussure brands as "parochialism" [17]. Of course their members try to disguise the term under a positive sign, such as a science that belongs to the intersection of several disciplines, but in fact this notion entails negative connotations. The geographical site of these places coincides with the mountainous areas of the Pyrenees and the Alps in Southern Europe, for instance. In the three presented environments the social sciences and their professionals are those who lose competences in the scientific environment in the face of the new information and communication technologies. Specially those belonging or representing the public or secular sector 100% because changes are structural or systematic according to the principles of the sciences.

The current research work starts with a brief state of the art of the marketing that was made in the quality era of software in 1990 from the scientific sector stressing usability engineering and its relation to the other disciplines. Later on the structural metamorphosis and the systematic transformations in the secular, non-secular and hybrid education in the south of Europe is analyzed (the names of the universities like those who collaborate directly or indirectly in the destruction of the sciences have been either left out or modified in the current work by privacy reasons). Then we probe into the imbalances caused in the sciences from mathematics and in a special way the quantification of the obtained results. Besides, we outline the social and economic costs of these distortions inside the sciences, with a special focus on the southern region of Europe (figure 6). Some of the aspects examined is the set of disciplines which make up usability engineering in their origins and the evolution in time. A rhetorical question allows us to reason about the increase or diminution of quality in the use of the interactive systems in the last decades. Finally,

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Once they took the positions of the pioneers in these avant-garde fields, the local collaborators wanted to get the utmost profit from their university degrees. That is, a PhD in as short a time as possible. Consequently, the phenomenon of the meteoric speed takes place in the cooking of PhD degrees in those regions. That is, engineers or graduates in physics, chemistry, mathematics, computer science, telecommunications, industrial etc., in three years and three more years for a PhD. In this way, a doctor in the public, private or hybrid universities could be 24-26 years old on average, when in countries such as France, Italy, Switzerland, Austria or Germany the average age was 30-32 years. The readers interested in this phenomenon can read the following bibliography [31] [32] which outlines how it is possible, across the three types of universities (public, hybrid and private) in a decade, to start from a first degree in anthropology, add a second degree in psychology, a master in audiovisual journalism, a PhD in telecommunications and a working curriculum in parallel of a managerial level in multimedia, usability engineering, tourism promotion and university teaching in the city of Barcelona. In the figure 1 are depicted each one of the stages of the real example in the imbalance of the sciences and their nefarious economical consequences in the middle and long term for the inhabitants of a community, regardless of their local, regional or national residence.

Fig 1. Depiction of the imbalances among the sciences in the university training (a Catalan example)

The university reforms from the ministries, science and technology secretariats, etc. of the Spanish state from the late past century and beginnings of the new millennium could not eradicate this phenomenon. The new technologies in computing and communication have spent many economical resources or European subventions but they have been managed by local and totally inexperienced staff, who work with a "cut, copy and paste" system. Originality, creativity, simplicity and universalism are not a part of their scientific daily practice [31].

Now, those who claim that those problems of scientific imbalances can be solved from the EU are wrong. The member states have not transferred their educational policy to the European capital. There are only some plans to achieve certain homogenization of the university studies through the interchange of university students (this is a very positive aspect) but towards a lower level in some of the member states, as exemplified by the famous "Bologna or Bolonia plan" [32].

5 The Poles of the Imbalances in the Sciences are Linked in Mediterranean Europe

In the following Italian example, we will analyze how an economic power with zero growth (during some of the last ten years [33]) also suffers from the imbalance of the sciences and specially within the framework of usability engineering, multimedia communication, the humanistic sciences and the training and education sciences (i.e., www.iulm.it). In contrast to the Catalan example, here the problems usually have their origin in the senior staff. They, after a series of failed experiences as consultors, trade unionists, system programmers, etc., find in the public or hybrid university field a kind of lifeguard until their retirement age.

presenting the very same final project for the degree in Italy, widening, modifying, translating it, etc. and present it as a doctor thesis in the Catalan university where he/she has paid the credits, for instance. In few words, with the prevailing parochialism in the mountainous areas of the European south, the "godparents" and "the miracles of scientific knowledge" are aplenty in Southern Europe, particularly since 1995 with the momentum of the Internet. Schematically, the stages of the current example can be depicted in the following way:

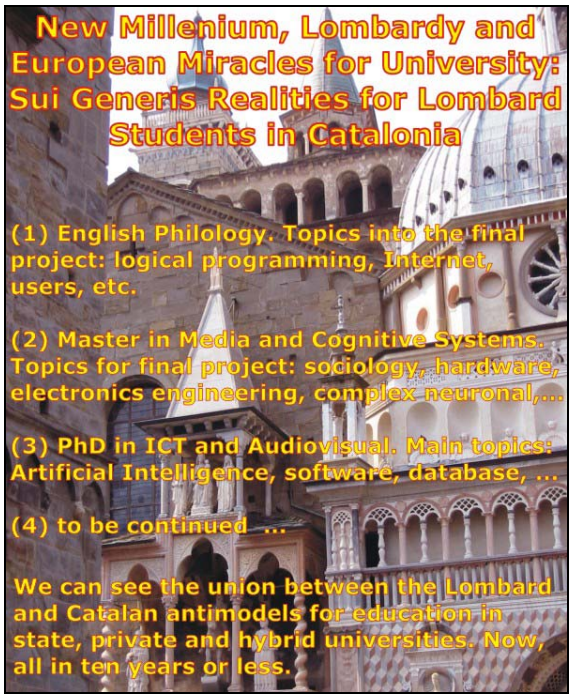

Fig 2. An example of the distortion genesis among sciences in the Lombardian university training

The two examples have made it apparent that the poles of the scientific imbalances tend to join over time because behind them is the parochialism in the universities. The economic and financial costs of these imbalances are very high for the survival of the societies, which although technologically developed suffer in silence and daily the loss of their quality of life, whether it is with millions unemployed or non-growing economies. The diachronic analysis has confirmed this reality. In both examples the interdisciplinarity of the sciences, the breakthroughs in the interactive systems, usability engineering, software engineering and the human factors have some common denominators among them.

6 Miscellany of Scientific Disciplines in the Origin of Usability Engineering

In late 1980, hypertext reading was about to make a great jump from the university scientific environment towards the commercial sector with the democratization of the CD-Rom support for the animated and static images, music, broadcasts, texts, etc. [35] [36]. It was the time in which the speed of access to the off-line databases made an interactive commercial product (hypertext or multimedia) be successful or be rejected by the users [37]. Besides, it was attempted to use to the fullest the capacity of the CD-ROMs resorting to the compression of the information for its storage and decompression for its retrieval [38]. Here is one of the fields where mathematics played an important role in those times. That is, generating algorithms to decrease the times of retrieval of the data, especially in the dynamic means [38] [39]. Some of those professionals attracted by the novelty of the commercial multimedia started to build scientific spaces, allegedly new for the whole of the computer science field. One of those was usability engineering [20]. However, from the point of view of design, interactive communication, the organization of the information in the databases, the cognitive models, etc., had nothing new in relation to the existing computer systems. The great breakthrough consisted in the capacity of data or information of the CD-ROM support and the non-sequential retrieval of digital content [35] [36].

Oddly enough, in the 90s the term "usability" was indistinctly used to refer to ergonomic aspects, inside and outside computer science. For instance, in Spain this deviation originates in many extra university organization in the South of Europe, whose main headquarters were or are in autonomous communities

such as Aragon, Baleares, Catalonia, etc. The purpose was the immediate profit of professors and researchers of the formal sciences to the detriment of real scientific knowledge. With the Internet they managed to create influential social networks which controlled opinion and the direction over the new technology of the mass media, especially in the digital version of the traditional communication media, that is, in newspapers, radio and television. It was in this way that the dynamic persuaders of the formal sciences broke in the year 2000 the horizontality of the Internet to generate authoritarian peaks or of limited access to the free distribution information [11]. Usability encompassed everything from the distribution of the icons in an interface down to the functioning of the classical can opener (main topics in University of Lérida and Catalan friends organization: Alzado, Cadius, etc.). Besides, the real pioneers mindful of the scientific principles were eclipsed from the on-line information networks that hid reality. We have an example in the following figures:

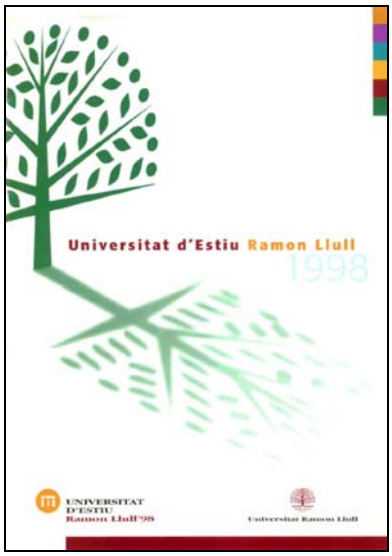

Fig 3. Publicity of the university summer courses from the first Human-Computer Interaction Lab in Spain (Barcelona)

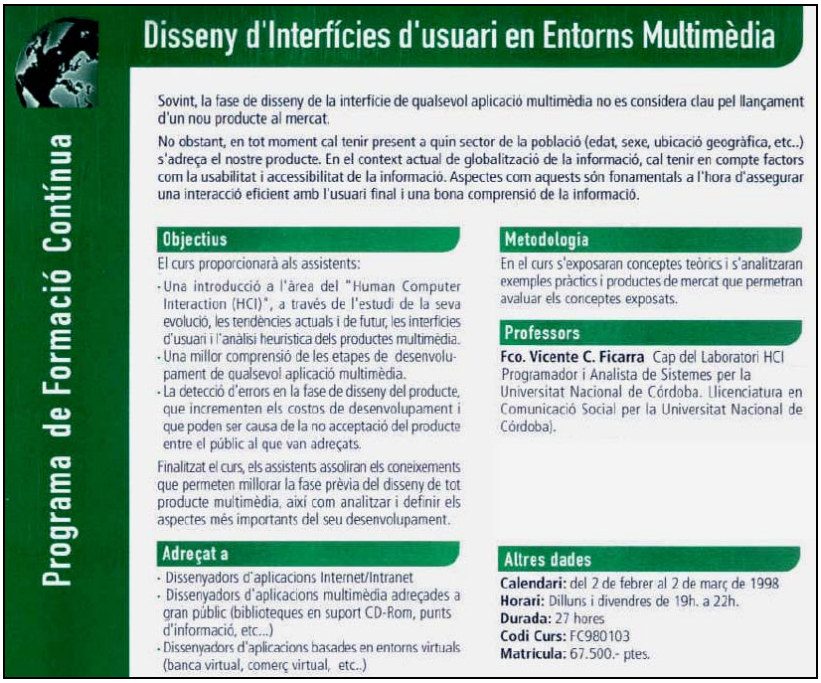

Fig 4. Programm of the university summer courses from the first Human-Computer Interaction Lab in Spain (Barcelona)

A university course that is promoted in print media gives away that it has been prepared with a lot of anticipation, especially in the field of usability engineering. That is to say, a course that promotes courses

for the summer 1998 means that two or three years prior to that it has been implemented in other university education milieus. Whereas in the website of the association (see Annex 1) they talk of an alleged scientific desert in the issues they handle. Consequently, five years after the pioneers, they portray themselves as a false oasis in the desert of usability engineering, human-computer interaction, interfaces, multimedia, etc., in the Spanish borders.

The systematic denial of the existence of pioneers in a national territory corresponds to a set of financial, political, sociological, psychological, psychiatric factors, so that the power groups gain power in the international relationships of the non-profit scientific associations. This greed for power in the scientific environment and perseverance in the persecution of those real pioneers has as its goal to participate in international projects obtaining great sums of money, and giving up after a short time the development or implementation of the obtained results.

That is to say, projects are financed in some places in the South of Europe which remain in the paper stage, stored in the files of city halls, autonomous governments, universities, businesses, etc. Here is the main reason why those who behave according to the ethical and epistemological principles of the sciences are sidelined.

Fig 5. Denial of the existence of pioneers in HCI from Spanish/Latin American universities and Spanish associations (University of Lérida –Spain, University of Cauca –Colombia, Pontifícia Universidade Católica do Rio de Janeiro – Brasil, Cadius –Spain, Alzado –Spain, Aipo –Spain, etc.)

The denial is made during decades, through allegedly non-profit organizations in Spain. However, they charge inscription fees to their yearlong members or having as the only businesses invited to the events they organize (conferences, symposiums, seminars, workshops, etc.) the great local bank or those state companies that have lasted through the decades thanks to the monopoly of the most expensive phone communications system from Lisbon to Moscow thus slowing down the advance of the Internet among the population [40].

In contrast those modest pioneers who have never got a local, national or international subvention can guarantee in a 100% the respect of the scientific rules.

Obviously it is unethical and unscientific to ignore the work made by modest people in the interfaces sector in Spain because they weren't born in Catalonia. When in fact they are real pioneers in that area of knowledge if a temporal and parallel analysis is made of those who falsely call themselves pioneers when in fact they are experts in "copying and pasting" the works of others [11] [41].

Here is one of the reasons why in Spain there are over 4 million unemployed (figure 6); the disastrous training of some university civil servants (professors and researchers) and the national sport some of them practice, that is, copying and pastig in Southern Europe, including the islands of the Spanish Mediterranean, such the Balearic Islands or or the European "economical motors", for instance, Alpes Rhône in France and Lombardia in Italy [11].

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that application was the focus of attention in the net until the commercial operation became a reality. Now, on the one hand there are the pressure groups, and on the other hand are the editorial heads. The latter should detect these pressures and deny them spaces in the mass media they direct.

9 Lessons Learned

The ease of use stated by Nielsen in the early 90s has been one of the essential principles in usability engineering. These principles have guided many international projects, with the goal set on bolstering the interaction of the users with the PCs. The goal was to get adults, adolescents, and children quickly acquainted to the fruition of multimedia interactive contents. Besides, the intentions that every potential user pursued had to be kept in mind at the moment of interacting with the multimedia systems, for instance, information, education, research, pastime, etc. However, one of the weak points of usability engineering in its origins was to establish a set of qualitative guidelines for the evaluation of interactive systems. There was only an adaptation of knowledge and experiences deriving from other disciplines, especially from the social sciences, software engineering, and interfaces design. The immediate impossibility of measuring the usability of systems stated by Nielsen damaged the establishment of accurate limits of the new discipline. In other words, in its origins the quality attributes, metrics, analysis procedures, models of design to be used in the assessments, the scientific profile the usability evaluators should have, etc. were missing.

Over time, the methods and techniques of heuristic assessment contained a wide range of knowledge in the fields of the interactive design, publicity, journalism, the fine arts, computer science, anthropology, sociology, etc., which has prevented having a single methodology of quality measurement. The avant-garde issues researched by usability engineering were related to the function of the technological evolution and the demand of potential users or clients, following temporary fashions with strong commercial purposes. Some issues of study (educational hypertexts, the tourism multimedia systems, e-books, on-line marketing, etc.) became the main axes of research, thus leaving aside aspects like the epistemological issues of the sciences. Now all those issues entailed a team work and prevented the formation of an ad hoc professional by the mentors and early followers of usability engineering. This new professional could solve in the most economical way the main issues that were started to be investigated in the domain of "usability engineering" for interactive systems looking at interface metaphors, the access times of the information stored in the digital supports (hyperbase), the internationalization of the hyperbases, the heuristic evaluations, the cognitive profile of the main users, etc.

In the south of Europe, the university and state studies of the new technologies took a long time to adapt the usability principles enunciated by Nielsen due to the incapacity or slowness in making up research teams. Simultaneously, the private and hybrid sector of the non-secular education treated the technology breakthroughs as a money source, even in extra-academic organizations that are theoretically non-profit. They found a novelty or a fashion in usability engineering. It had to be sold to their clients or students, using the resources available from educational marketing, to obtain the greatest benefits and without practically being interested at all in the scientific or educational aspect in the long term. Nowadays many of those former students who have paid significant amounts of money for degrees, masters, PhDs, specialization courses, etc., are included in the lists of the unemployed university professionals in Europe.

10 Future Lines of Research

The results obtained in the diachronic analysis make apparent the need of keeping on researching on the following issues:

1. Detecting and enumerating the techniques used by parochialism for the destruction of scientific progress, such as the cloning of professionals with temporary contracts, the use and abuse of "copy and paste" in the academic contents related to usability engineering, etc. Focusing the analysis on the non-secular or hybrid university institutions.
2. Researching more deeply from the point of view of sociology and Web 2.0 into the modus operandis of those organizations and individuals related to the new information and communication technologies which manage to exert a constant pressure on the traditional mass media.
3. Listing those applications that have arisen on a non-profit basis but whose main heads later on have sold them with time passing to the main international software and/or hardware companies.

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43. Cipolla-Ficarra, F.: The Importance of Visual Components in the Creation of Educational Hypermedia Packages for a Virtual Campus. Vienna: Springer-Verlag, pp. 151–165 (1996)
44. O'Neill, S.: Interactive Media: The Semiotics of Embodied Interaction. Berlin: Springer-Verlag (2008)
45. Kraemer, K., Dedrick, J., Sharma, P.: One Laptop Per Child: Vision vs. Reality. ACM of Communications, Vol. 52 (6), pp. 66–73 (2009)
46. Levinson, P.: Digital McLuhan: A guide to the information millennium. London: Routledge (1999)
47. Apple.: Macintosh Human Interface Guidelines. Massachusetts: Addison-Wesley (1992)
48. Nielsen, J., del Galdo, E.: International User Interfaces. New York: Wiley (1996)
49. Fernandes, T.: Global Interface Design: A guide to Designing International User Interfaces. Boston: Academic Press (1995)
50. Robson, R.: Globalization and the Future of Standardization. IEEE Computer, Vol. 39 (7), pp. 82–84 (2006)
51. Cipolla-Ficarra, F.: Explorative Navigation for Multimedia: Results of Heuristic Evaluation. In Proc. International Conference on Information Systems Analysis and Synthesis –ISAS '98, Vol. III. Orlando, pp. 140–147.
52. Cipolla-Ficarra, F.: Communicability Design and Evaluation in Cultural and Ecological Multimedia Systems. In Proc. Interrnational Workshop on Communicability –ACM Multimedia 2008. New York: ACM Press, pp. 1–8 (2008)
53. Castel, F.: Ontological Computing. Communications of ACM. Vol. 45 (2), pp. 29–30 (2002)
54. Cipolla-Ficarra, F.: Sistemas multimediales interactivos: Perspectiva comunicacional. Barcelona: Novática (112-113), pp. 4–6 (1995)
55. Cipolla-Ficarra, F.: El despertar de los PC a la infografía. Barcelona: Imaging (7), pp. 27–35 (1993)
56. Nelson, T.: Literary Machines. Sausalito: Mindful Press (1992)

Annex 1

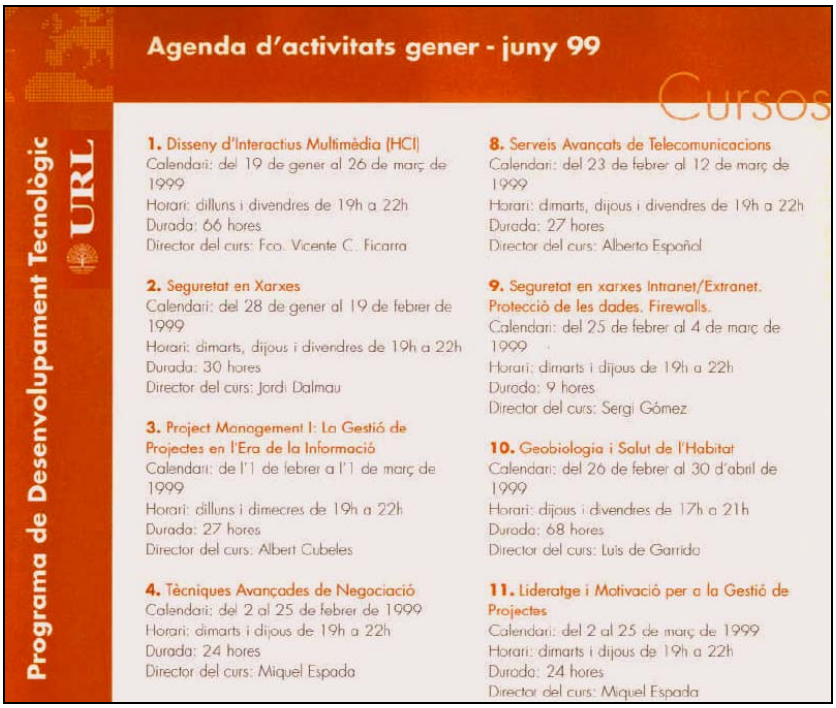

Fig. 9. Promotion of university courses from the first HCI lab about the design of interactive systems

The first HCI lab was organized in late 1996 and early 1997, without financial resources but with diverse internal and external collaborators who covered the main areas of that time, from the point of view of the technological and the interactive design. The context where it was inserted was more logical at that time: multimedia engineering (Barcelona, Spain). The subjects that were organized and coordinated inside it were human-computer interaction, dynamic and static media, multimedia production, hypermedia programmation, computer animation, usability enginnering, and models for multimedia system, aside from participating in seminars, masters, and continuous training courses, as it can be seen on figure 4.

Evidently, being pioneers in a technological area means directly and indirectly economic interests, and it is necessary to control them, inside or outside the educational institutions. To such purpose associations were organized, which, originating in the Catalan areas, have imposed their anti-educational model not


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Compilation of References

Aarseth, E.: Cybertext. Johns Hopkins University Press, Baltimore (1997)

Adeyeye M., Ventura N.: A SIP-based web client for HTTP session mobility and multimedia services. International Conference On Mobile Technology, Applications, and Systems (2010)

Agarwal, S., Snavely, N., Simon, I., Seitz, S.M., Szeliski, R.: Building Rome in a day. Proceedings of International Conference on Computer Vision, Kyoto, Japan. 8 pages (2009)

Aksit, M., Bergmans L., Vural S.: An object-oriented language-database integration model: The composition filters approach. In Proc. of the European Conference on Object-Oriented Programming –ECOOP (1992)

Alesina, A., Giavazzi, F.: Goodbye Europe. Milano: Rizzoli (2006)

Allen, D.: Getting things done: the art of stress-free productivity. Penguin (2003)

Amaral, A. et al.: European Integration and the Governance of Higher Education and Research. Berlin: Springer-Verlag (2009)

Ambrose, G., Harris, P.: Fundamentos de la Tipografía. Barcelona: Parramón (2007)

American Institute of Graphics Arts (AIGA). Símbolos de Señalización. Barcelona: Gustavo Gili (1984) Author's own recreation

American Institute of Graphics Arts: Símbolos de Señalización. Barcelona: Gustavo Gili (1984)

Ander-egg, E.: Techniques of Social Investigation (21th ed.). Buenos Aires: Hvmanitas (1986)

Aphek, E: Minimizing the Digital Divide and the Inter-Generation Gap. Children tutor seniors at computer and the Internet skills and get a lesson in history. http://www.acm.org/ubiquity/views/e_aphek_1.html

Apple: Macintosh Human Interface Guidelines. Massachusetts: Addison-Wesley (1992)

Ardissono, L., Bosio, G., Goy, A., Petrone, G., Segnan, M. Context-aware notification management in an integrated collaborative environment. In Proc. of UMAP Workshop "Adaptation and Personalization for Web 2.0", pp. 21–30, Trento (2009)

Ardissono, L., Bosio, G., Goy, A., Petrone, G., Segnan, M.: Open, collaborative task management in Web 2.0. In Proc. of MCCIS 2010 IADIS multiconference on computer science and information systems, pp. 20–27, Freiburg. IADIS Press (2010)

Ardissono, L., Bosio, G., Goy, A., Petrone, G., Segnan, M., Torretta, F.: Collaborative service clouds. Journal of Information Technology and Web Engineering, Vol. 5 (4), pp. 23–39 (2010)

Ardito, C., Marsico, M. De, Lanzilotti, R., Levialdi, S., Roselli,T., Rossano,V., Tersigni, M.: Usability of E- learning tools. In Proc. of the working conference on Advanced visual interfaces (AVI'04) pp. 80–84, ACM Press, Gallipoli (2004)

Arikan, O., Forsyth, D.: Interactive motion generation from examples. ACM Transactions on Graphics Vol. 21 (3) pp. 483–490 (2002)

Arya, S., Mount, D.M., Netenyahu, N.S., Silverman, R., Wu, A.Y.: An optimal algorithm for approximate nearest neighbour searching fixed dimensions. Journal of the ACM, Vol. 45 (6), pp. 891–923 (1998)

Asakawa, C., Leporini B.: Screen readers. Chapter of the book "Universal Access Handbook", Stephanidis C. (Ed), Taylor & Francis, June 11 (2009)

Bailey, B., Konstan, J., Carlis, J.: Measuring the effects of interruptions on task performance in the user interface. In Proc. of the IEEE International Conference on Systems, Man, and Cybernetics, pp. 757–762, Nashville: IEEE Press (2000)

Bailey, B., Konstan, J., Carlis, J.: The effects of interruptions on task performance, annoyance, and anxiety in the user interface. In Proc. of INTERACT'01, pp. 593–601, Tokyo (2001)

Bainbridge, L., Sanderson, P.: Verbal Protocol Analysis. In Wilson, J. R., Corlett, N. (eds.) Evaluation of Human Work, 3rd edition, pp. 169–201. London: Taylor & Francis (2005)

Bal, M.: Narratology – Introduction to the Theory of Narrative. Toronto: University of Toronto Press (2002)

Barazzetti, L., Remondino, F., Scaioni, M.: Orientation and 3D modelling from Markerless Terrestrial Images: Combining Accuracy with Automation. The Photogrammetric Record. *In press*

Barazzetti, L., Remondino., F., Scaioni, M.: Automation in 3D Reconstruction: Results on Different Kinds of close-range blocks. IAPRSSIS WG V/4, Newcastle upon Tyne (2010)

Barazzetti, L., Remondino., F., Scaioni, M.: Extraction of accurate tie points for automated pose estimation of close-range blocks. Int. Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, vol. XXXVIII (Part 3A) (2010)

Basili, V., J. Musa.: The Future Engineering of Software: A Management Perspective. IEEE Computer, Vol. 24 (9), pp. 90–96 (1991)

Bay, H., Ess, A., Tuytelaars, T., Van Gool, L.: SURF: Speeded Up Robust Features. Computer Vision and Image Understanding, Vol. 110 (3), pp. 346–359 (2008)

Beardsley, P.A., Torr, P., Zisserman, A.: 3D model acquisition from extended image sequences. Proceedings of 4th European Conference on Computer Vision, Lecture notes in Computer Science, Vol. 1065, pp. 683–695 (1996)

Benbunan-Ficsh, R.: Using Protocol Analysis to Evaluate the Usability of a Commercial Web Site. Information and Management Vol. 39, pp. 151–163 (2001)

Berners-Lee, T., Cailliau, R.: WorldWideWeb: Proposal for a hypertexts Project (1990) Retrieved June 16, 2010 from http://w3.org/Proposal.html

Bernstein, M. et al.: Architectures for Volatile Hypertext. Proceedings of the 3rd ACM Conference on Hypertext and Hypermedia, pp. 243–260 (1991)

Bernstein, M. et al.: Structure, Navigation, and Hypertext: The Status of the Navigation Problem. Proceedings of the 3rd ACM Conference on Hypertext and Hypermedia, pp. 363–366 (1991)

Beymer, D., Konolige, K.: Real-Time Tracking of Multiple People Using Continuous Detection, IEEE Frame Rate Workshop (1999)

Blanchard, G.: La Letra. Barcelona: Ceac (1988)

Bonatti, L., Frot, E., Zangl, R., Mehler, J.: The Human First Hypothesis: Identification of Conspecifics and Individuation of Objects in the Young Infant. Cognitive Psychology 44, pp. 388–426 (2002)

Borodin, A.: Computational Complexity and the Existence of Complexity Gaps. Journal of the ACM Vol. 19 (1), pp. 158–174 (1972)

Bosio, G.: A user perspective on cloud computing. In Proc. of the 3rd International Conference on Advances in Human-oriented and Personalized Mechanisms, Technologies, and Services (CENTRIC 2010), pp. 1–4, Nice (2010)

Botafogo, R, Shneiderman, B.: Identifying Aggregates in Hypertext Structures. Proceedings of the 3rd ACM Conference on Hypertext and Hypermedia, pp. 363–366 (1991)

Botto, F.: Multimedia, CD-ROM and Compat Disc. Wilmslow: Sigma Press (1992)

Boult, T., Chen, L.: Analysis of Two New Stereo Matching Algorithms'. In Proc. of the IEEE Conf. on Computer Vision and Pattern Recognition, pp. 177–182 (1988)

Breazeal, C.: A Motivational System for Regulating Human-Robot Interaction. In Proc. AAAI98. Menlo Park: AAAI Press, pp. 31–36 (1998)

Breazeal, C.: Designing Sociable Robots. Cambridge: MIT Press (2002)

Breazeal, C., Brooks, A., Gray, J., Hancher, M., McBean, J., Stiehl, W., Strickon, J.: Interactive Robot Theatre. Communications of the ACM, Vol. 46 (7), pp. 76–85 (2003)

Brohman, K. et al.: Data Completeness: A Key to Effective Net-Based Customer Service Systems. Communications of ACM, Vol. 46 (6), pp. 47–51 (2003)

Brown, M., Lowe, D.: Recognizing Panoramas. International Conference on Computer Vision, Vol. 2, pp. 1218–1225 (2003)

Bruce, A., Knight, J., Nourbakhsh, I.: Robot Improv: Using drama to create believable agents. In AAAI Workshop Technical Report WS-99-15 of the 8th Mobile Robot Competition and Exhibition. Menlo Park: AAAI Press, pp. 27–33 (1999)

Brudvik, J., Bigham, J., Cavander, A., Ladner, R.: Hunting for headings: sighted labeling vs. automatic classification of headings. In Proc. 10th International ACM SIGACCESS conference on Computers and Accessibility, pp. 201–208 (2008)

Bruno, W:. Necrológica por la civilización de las imágenes in: Anceschi et. al. Videocultura de fin de siglo. Madrid: Cátedra (1990)

Bunge, M.: The science: your method and your philosophy. Buenos Aires: Siglo XXI (1981)

Buxton, B.: Sketching User Experiences: Getting the Design Right and the Right Design. Morgan Kaufman Publishers, San Francisco (2007)

Buzzi, M. C., Buzzi, M., Leporini, B., Akhter, F.: Usability and Accessibility of eBay by Screen Reader. In: Proceedings of USAB 2009 - Usability & HCI Learning from the Extreme, Springer LNCS, pp. 500–510 (2009)

Buzzi, M. C., Buzzi, M., Leporini, B., Akhter, F.: User Trust of eCommerce Services: perception via screen reader. In Proc. of 3rd International Conference on New Trends in Information and Service Science (NISS2009), pp. 1166–1171 (2009)

Cabero, A.: Actitudes hacia los Ordenadores y la Informática. Universidad de Sevilla en Cebrian De La Serna, M. (Dir.): Medios y recursos didácticos, Málaga, Secretariado de Publicaciones de la Universidad de Málaga, pp. 85–98. http://tecnologiaedu.us.es/bibliovir/tics/pdf/1.pdf

Cadoz, C.: Las realidades virtuales. Madrid: Debate (1995)

Calvera, A.: De lo Bello de las Cosas. Barcelona: Gustavo Gili (2007)

Cano, P.: Las Nuevas Tipografías. Barcelona: Maomao (2007)

Carassai, M.: From Machinic Intelligence to Digital Narrative Subjectivity: Electronic Literature and Intermediation as "form of life" Modification. Proceedings of the Digital Arts and Culture Conference (2009)

Carballo Suárez, F.: El Diseño Periodístico y la Teoría de la Imagen. Navarra: Eunsa (2008)

Carter, L.: Arguments in Hypertext: A Rhetorical Approach. Proceedings of the 11th ACM Conference on Hypertext and Hypermedia, pp. 85–91 (2000)

Casas, S., Marcos, C., Vanoli, V., Reinaga, H., Saldivia C., Pryor J., Sierpe L.: ASTOR: Un Prototipo para la Administración de Conflictos en AspectJ, XIII Encuentro Chileno de Computación, Jornadas Chilenas de Computación (JCC 05), Chile (2005)

Casas, S., Marcos, C., Vanoli, V., Reinaga, H., Sierpe, L., Prior, J., Saldivia, C.: Administración de Conflictos entre Aspectos en AspectJ. In Proc. Sixth Argentine Symposium on Software Engineering (ASSE 2005) in 34th JAIIO, Argentina (2005)

Casas, S., Reinaga, H., Sierpe, L., Vanoli, V., Saldivia, C., Pryor, J.: Clasificación y Resolución de Conflictos entre Aspectos, VII Workshop de Investigadores en Ciencias de la Computación – WICC 2005, Río Cuarto, Argentina (2005)

Castel, F. Ontological Computing. Communications of ACM. Vol. 45 (2), pp. 29–30 (2002)

Català, J.: La imagen compleja. La fenomenología de las imágenes en la era de la cultura visual. Barcelona: UAB Press (2005)

Cesar, Bulterman, P., Jansen, J.: Leveraging the User Impact: An Architecture for Secondary Screens Usage in an Interactive Television Environment. Springer/ACM Multimedia Systems Journal (MSJ), Vol. 15 (3), pp. 127–142 (2009)

Cesar, P., Chorianopoulos K.: The Evolution of TV Systems, Content, and Users Toward Interactivity. Foundations and Trends in Human–Computer Interaction, Vol. 2 (4), pp. 279–374 (2009)

Cesar, P., Bulterman, D., Geerts, D., Jansen, J., Knoche, H., Seager, W.: Enhancing social sharing of videos: fragment, annotate, enrich, and share. In Proc. of the 16th ACM international Conference on Multimedia MM '08. New York: ACM Press, pp. 11–20 (2008)

Chandrasekaran, B., Glasgow, J., Narayanan N. H. Introduction. In Glasgow, J., Narayanan, N. H., Chandrasekaran, B. (eds.) Diagrammatic Reasoning: Cognitive and Computational Perspectives, pp. 15–27. AAAI/MIT Press, Massachusetts (1995)

Chapman, R.: Conceptual Modeling Framework for Complex Synthetic Systems –an Example from F-15C Distributed Mission Training. Spring Simulation Interoperability Workshop (2000)

Chatman, S.: What Novels Can Do That Films Can't (And Vice Versa). Critical Inquiry, Vol. 7 (1), pp. 121–140 (1980)

Chaves, N. La Imagen Corporativa. Barcelona: Gustavo Gili (1988)

Chen, C.: A Protocol Analysis Model for Investigating Computer Supported Problem-Solving Activities. Information Technology, Learning, and Performance Journal 71 (2), pp. 35–44 (1999)

Cheng, K.: Diseñar Tipografía. Barcelona: Gustavo Gili (2006)

Chong, B., Yang, Z., Wong, M.: Asymmetrical impact of trustworthiness attributes on trust, perceived value and purchase intention: a conceptual framework for cross-cultural study on consumer perception of online auction. In Proc. 5th International Conference on Electronic Commerce, ACM Press, pp. 213–219 (2003)

Chorianopoulos, K., Burón J., De Castro C., García E.: Delegating the visual interface between a Tablet and a TV. PPD10. Workshop on coupled display visual interfaces. Proceedings of the International Conference on Advanced Visual Interfaces

Cipolla-Ficarra, F.: Quality and Communicability for Interactive Hypermedia Systems: Concepts and Practices for Design. New Jersey: IGI Global (2010)

Cipolla-Ficarra, F.: An Evaluation of Meaning and Content Quality in Hypermedia. In CD Proceed. HCI International. Las Vegas, USA (2005)

Cipolla-Ficarra, F.: Communicability Design and Evaluation in Cultural and Ecological Multimedia Systems. In Proc. Interrnational Workshop on Communicability –ACM Multimedia 2008. New York: ACM Press, pp. 1–8

Cipolla-Ficarra, F.: El despertar de los PC a la infografía. Imaging (7), pp. 27–35 (1993)

Cipolla-Ficarra, F. Evaluation of Multimedia Components. In Proceed. IEEE Multimedia Systems '97, pp. 557–564, Ottawa (1997)

Cipolla-Ficarra, F.: Explorative Navigation for Multimedia: Results of Heuristic Evaluation. In Proc. International Conference on Information Systems Analysis and Synthesis –ISAS '98, Vol. III. Orlando: ISAS, pp. 140–147 (1998)

Cipolla-Ficarra, F.: Eyes: A Virtual Assistant for Analysis of the Transparency and Accessibility in University Portal. In CD Proc. Applied Human Factors and Ergonomics. Las Vegas, USA (2008)

Cipolla-Ficarra, F.: Mobile Phones, Multimedia and Communicability: Design, Technology Evolution, Networks and User Issues. New York: Nova Science Publishers (2011)

Cipolla-Ficarra, F.: Sistemas multimediales interactivos: Perspectiva comunicacional. Barcelona: Novática (112-113), pp. 4–6 (1995)

Cipolla-Ficarra, F.: The Importance of Visual Components in the Creation of Educational Hypermedia Packages for a Virtual Campus. Vienna: Springer-Verlag, pp. 151–165 (1996)

Cipolla-Ficarra, F. Vivas, E., Romo, Q.: Credibility Online: Quality Metrics for Evaluation. HCI International 2009, On Line Communities and Social Computing. Berlin: Springer-Verlag, pp. 171–181 (2009)

Cipolla-Ficarra, F., Nicol, E., Cipolla-Ficarra, M.: Research and Development: Business into Transfer Information and Communication Technology. First International Conference on Advances in New Technologies, Interactive Interfaces and Communicability, ADNTIIC 2010. Berlin: Springer-Verlag, pp. 44–61

Cipolla-Ficarra, F., Nicol, E., Cipolla-Ficarra, M.: Vademecum for Innovation through Knowledge Transfer: Continuous Training in Universities, Enterprises and Industries. Innovation through Knowledge Transfer 2010. Springer Verlag (Coventry, 2010), *in press*

Cipolla-Ficarra, F.: Persuasion On-Line and Communicability: The Destruction of Credibility in the Virtual Community and Cognitive Models. New York: Nova Publishers (2010)

Civelek, M.: Modeling a Sample Mission Space of T.A.F. by Using KAMA-C4isrmos. Graduation Project, Department of Information Systems, METU, Ankara, Turkey (2006)

Collazos, C.: Una metodología para el apoyo computacional de la evaluación y monitoreo en ambientes de aprendizaje cooperativo. Tesis doctoral. Universidad de Chile (2003)

Colombo, F.: La comunicación sintética. In Bettetini, G., Colombo, F.: Las nuevas tecnologías de la comunicación. Barcelona: Paidós (1995)

Comella, R., Klein, N.M., Kratky, A.: Bleeding Through – Layers of Los Angeles 1920-1986. Hatje Cantz, Ostfildern (2003)

Conklin, J.: Hypertext: An Introduction and Survey. Computer, Vol. 20 (9), pp. 17–41 (1987)

Constantine, L., Windl, H.: Usage-Centered Design: Scalability and Integration with Software Engineering (2000)

Coover, R.: The End of Books. In The New York Times Book Review 11, pp. 23–25 (June 1992)

Costa, J.: Diseñar para los Ojos. Barcelona: Costa Punto Com Editor (2007)

Costa, J.: La Esquemática. Barcelona: Paidós Estética (1998)

Costa, J.: Señalética. Barcelona: Ceac (1987)

Craven, J., Brophy, P. Non-visual access to the digital library: the use of digital library interfaces by blind and visually impaired people. Technical report,

www.blueherons.net

blue herons editions

Fallahkhair, S., Pembertom, L., Griffiths, R.: Dual Device User Interface Design for Ubiquitous Language Learning: Mobile Phone and Interactive Television –iTV (2005)
Faugeras, O., Luong, Q.T., Papadopulo, T.: The Geometry of Multiple Images. The MIT Press, pp. 646 (2001)
Featherman, M., Wells, J.: The Intangibility of e-Services: Effects on Perceived Risk and Acceptance. The DATA BASE for Advances in Information Systems Volume 41, Number 2, pp. 110–131 (2010)
Felder, R., Silverman S.: Cuestionario Índice de Estilo de Aprendizaje (Index of Learning Styles). Web: http://www.ncsu.edu/felder-public/RMF.html (1988)
Fernandes, T.: Global Interface Design: A guide to Designing International User Interfaces. Boston: Academic Press (1995)
Fernández Iñurritegui, L.: Análisis de Significados, Formas y usos Tipo-icono-gráficos de Identidad Visual Corporativa, p. 103. Doctoral thesis. País Vasco: University of País Vasco Press
Fernández-Iñurritegui, L.: Análisis de Significados, Formas y usos Tipo-icono-gráficos de Identidad Visual
Ferré Grau, X.: Integration of usability techniques into the software development process. International Conference on Software Engineering (Bringing the gaps between software engineering and human-computer interaction), pp. 28–35 (2003)
Ferreira Szpiniak, A, Sanz, C.: Hacia un modelo de evaluación de entornos virtuales de enseñanza y aprendizaje. La importancia de la usabilidad. TE&ET. Revista Iberoamericana de Tecnología en Educación y educación en Tecnología, pp. 10–21 (2008)
Fineman, J.: The Structure of Allegorical Desire. October 12, pp. 46–66 (1980)
Fischler, M., Bolles, R.: Random sample consensus: a paradigm for model fitting with applications to image analysis and automated cartography. Communications of the ACM, Vol. 24 (6), pp. 381–395 (1981)
Fong, T., Nourbakhsh, I., Dautenhahn, K.: A survey of socially interactive robots. Robot. Auton. Syst. Vol. 42 (3–4), pp. 143–166 (2003)
Fontcuberta, J. El beso de Judas. Fotografía y verdad. Barcelona: Gustavo Gili (1997)
Fontcuberta, J.: La cámara de Pandora. La fotografía después de la fotografía. Barcelona: Gustavo Gili (2010)
Förstner, W.: Computer Vision and Photogrammetry - Mutual Questions: Geometry, Statistics and Cognition. Bildteknik/Image Science, Swedish Society for Photogrammetry and Remote Sensing, pp. 151–164 (2002)
Fortnow, L., Homer, S.: A Short History of Computational Complexity. Bulletin of EATCS 80, pp. 95–133 (2003)
Fotis G. Kazasis, Nektarios Moumoutzis, Nikos Pappas, Anastasia Karanastasi, Stavros Christodoulakis: Designing Ubiquitous Personalized TV-Anytime Services (2003)
Fox, J.: A Mathematical Primer for Social Statistics. London: Sage Publications (2008)
Frasca, G.: Simulation versus Narrative. In: Wolf. M. J. P., Perron, B.: The Video Game Theory Reader, 221-235. Routledge, New York (2003)
Frascara, J.: El Diseño de Comunicación. Buenos Aires: Infinito (2006)
Fraser, C.: Photogrammetric measurement to one part in a million. Photogrammetric Engineering & Remote Sensing, 58, pp. 305–310 (1992)
Friedman, B., Khan, P., Howe, D. Trust online, Communications of the ACM, Vol. 43 (12), pp. 34–40 (2000)
Frutiger, A.: Reflexiones sobre Signos y Caracteres. Barcelona: Gustavo Gili (2007)
Furlong, E.: Imagination. George Allen & Unwin, London (1961)
Furukawa, Y., Curless, B., Seitz, S.M., Szeliski, R.: Towards Internet-scale Multi-view Stereo. IEEE Conference on Computer Vision and Pattern Recognition CVPR, San Francisco (2010)
Furukawa, Y., Ponce, J.: Accurate, Dense, and Robust Multiview Stereopsis. IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 32 (8), pp. 1362–1376 (2010)
Ganci, G., Handley, H.: Automation in videogrammetry. International Archives of Photogrammetry and Remote Sensing, Vol. 32 (5), pp. 53–58 (1998)
Gasparini, S., Garassini, B.: Representar con los nuevos media in: Bettetini, G., Colombo, F. Las nuevas tecnologías de la comunicación. Barcelona: Paidós (1995)
Gentry, A.: Using Learning Style Information to Improve the Core. Financial management Course and Financial Practice and Education. Spring-Summer (2000)
George Sciadas.: The Digital Divide in Canada. Ottawa, (2001).
Gero, S., Tang, H.: Concurrent and Retrospective Protocols and Computer-Aided Architectural Design. In Gu J., Wei, Z. (eds.) In Proc. of the CAADRIA'99, pp. 403–410. Shanghai Scientific and Technological Literature Publishing House, Shanghai (1999)
Gianinetto, M., Scaioni, M.: Automated geometric correction of high-resolution of pushbroom satellite data. Photogrammetric Engineering & Remote Sensing, (74), pp. 107–116 (2008)
Ginzburg, C.: Clues: Roots of an Evidential Paradigm. In: Ginzburg, C.: Clues, Myths, and the Historical Method. Johns Hopkins University Press, Baltimore (1989)
Gladstone, K., Rundle, C., Alexander, T.: Accessibility and Usability of eCommerce Systems. Computers Helping People with Special Needs, Springer LNCS Vol. 2398, pp.11–18 (2002)
Glatzer, H.: CD or DVD? That is the question. Computer Graphics World, Vol. 21 (2), pp. 57–58 (1998)
Golovchinsky, G., Marshall, C.: Hypertext Interaction Revisited. In Proc. of the 11th ACM Conference on Hypertext and Hypermedia, pp. 171–179 (2000)
Granshaw, I.: Bundle adjustment methods in engineering photogrammetry. Photogrammetric Record, Vol. 10 (56), pp. 181–207 (1980)

Grant, R., Spivey, J.: Eye Movements and Problem Solving: Guiding Attention Guides Thought. Psychological Science, Vol. 14 (5), pp. 462–466 (2003)
Gray, J.: Evolution of Data Management. IEEE Computer, Vol. 29 (10), pp. 47–58 (1996)
Greenblatt, A.: Television's Future. CQ Researcher, 17, pp. 145–168 (2007)
Greimas, A.: Structural Semantics: An Attempt at a Method. Nebraska: University of Nebraska Press (1984)
Grimes, A., Brush, A.: Life scheduling to support multiple social roles. In Proc. of CHI 2008: Human factors in computing systems, pages 821–824, Florence (2008)
Gross, S. Lese-Zeichen. Wissenschaftliche Buchgesellschaft, Darmstadt (1994)
Grudin, J.: Groupware and social dynamics: Eight challenges for developers. Communications of the ACM, Vol. 37 (1), pp. 92–105 (1994)
Grudin, J.: Partitioning digital worlds: focal and peripheral awareness in multiple monitor use. In Proc. of the SIGCHI Conference on Human Factors in Computing Systems. CHI '01. New York: ACM Press, pp. 458–465 (2001)
Gruen, A.: Adaptative least squares correlation: a powerful image matching technique. South African Journal of Photogrammetry, Remote Sensing and Cartography, Vol. 14 (3), pp. 175–187 (1985)
Gubern, R. Del bisonte a la realidad virtual. La escena y el laberinto. Barcelona: Anagrama (1996)
Gurbaxani, V.: The New World of Information Technology Outsourcing. Communications of ACM. Vol. 39 (7), pp. 45–46 (1996)
Gutwin, C., Greenberg, S.: The effects of workspace awareness support on the usability of real-time distributed groupware. ACM Transactions on Computer-Human Interaction, Special Issue on HCI in the new Millennium, Vol. 6 (7), pp. 243–281 (1999)
Gutwin, C., Greenberg, S., Roseman, M.: Workspace awareness in real-time distributed groupware: Framework, widgets, and evaluation. In Proc. of HCI on People and Computers XI, pp. 281–298, London (1996)
Hackos, J.T., Redish, J.: User Interface Task Analysis. John Wiley & Sons (1998)
Hahn, J., Kim, J.: Why Are Some Diagrams Easier to Work With? Effects of Diagrammatic Representation on the Cognitive Integration Process of Systems Analysis and Design. ACM Transactions on Computer-Human Interaction, Vol. 6 (3), pp. 181–213 (1999)
Hao, X., Mayer, H.: Orientation and auto-calibration of image triplets and sequences. IAPRSSIS, Vol. 34 (3-W8), pp. 73–78 (2003)
Haring, B.: Beyond the Charts: MP3 and the Digital Music Revolution. JM Northern Media (2000)
Harrison, B.: Power and Society: An Introduction to the Social Sciences. Boston: Thomson (2008)
Hart, S., Stavenland, L.: Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. In Hancock, P.A. and Meshkati, N. (eds.), Human Mental Workload, chapter 7, pages 139–183. Elsevier (1998)
Hartley, R.I., Zisserman, A.: Multiple View Geometry in Computer Vision. Cambridge University Press, page. 672 (2004)
Hauffe, H.: Die elektronische Revolution und ihre Auswirkungen auf Verlage und Bibliotheken. In: Bollmann, S.: Kursbuch Neue Medien. Bollmann Verlag, Mannheim (1995)
Hegart, M.: Mental animation: Inferring motion from static diagrams of mechanical systems. Journal of Experimental Psychology: Learning, Memory & Cognition 18, pp. 108–110 (1992)
Hegarty, M.: Mental animation: Inferring motion from static diagrams of mechanical systems. Journal of Experimental Psychology: Learning, Memory and Cognition 18(5), pp. 1084–1102 (1992)
Hegarty, M., Raney, E.: An Eye Movement Study of Insight Problem Solving. Memory and Cognition 29, pp. 1534–1555 (2001)
Hegarty, M.: Capacity Limits in Diagrammatic Reasoning. In Anderson, M., Cheng, P., Haarslev, V. (eds.) Theory and Application of Diagrams, 194-206. Springer, Berlin (2000)
Homepage of AspectJ™, Xerox Palo Alto Research Center (Xerox Parc), Palo Alto, California. http://aspectj.org.
Homepage of Hyper/J™, IBM Thomas J. Watson Research Center. http://www.alphaworks.ibm.com/tech/hyperj
Horvitz, E., Apacible, J., Subramani, M.: Balancing awareness and interruption: Investigation of notification deferral policies. In Proc. 10th International Conference on User Modeling, pp. 433–437, Edinburgh, (2005)
Hungerford, B., Hevner, A., Collins, R.: Reviewing Software Diagrams: A Cognitive Study. IEEE Transactions on Software Engineering 30 (2), pp. 82–96 (2004)
Hursch, W., Lopes, C.: Separation of Concern. Tech. Rep. NU-CCS-95-03, Northeastern University (1995)
Hutchings, D. R., Smith, G., Meyers, B., Czerwinski, M., Robertson, G.: Display space usage and window management operation comparisons between single monitor and multiple monitor users. In Proceedings of the Working Conference on Advanced. Visual interfaces. AVI '04. New York: ACM Press, pp. 32–39 (2004)
INEA (Instituto Nacional para la Educación de los Adultos) http://www.inea.gob.mx/ineanum/
Iqbal, S., Horvitz, E: Notifications and awareness: a field study of alert usage and preferences. In Proc. of the 2010 ACM Conference on Computer Supported Cooperative Work (CSCW 2010), pp. 27–30, Corfu (2010)
iTour. Intelligent Transportation for Optimized Urban Trips. Retrieved December 22, 2010, from http://www.itourproject.com/web/ (2010)
Ivory, M., Yu, S., Gronemyer, K.: Search result exploration: a preliminary study of blind and sighted users' decision making and performance. Extended abstracts of CHI 2004, pp. 453–456 (2004)
Jacob, K.: The Use of Eye Movements in Human-Computer Interaction Techniques: What You Look At is What You Get. ACM Transactions on Information Systems 9(3), pp. 152–169 (1991)

Jacobson, J., Comiskey, B. Turner, C., Albert, J., Tsao, P.: The last Book. In: IBM Systems Journal, Vol. 36 (3), pp. 457 (1997)
Jacsó, P.: Who is doing what in the CD-ROM Publishing Realm? Computers in Libraries, pp. 55–56 (1996)
Jazayeri, I., Fraser, C.: Automated 3D Object Reconstruction Via Multi-image Close-range Photogrammetry. IAPRSSIS, Vol. 38 (5). pages 6 (2010)
JBoss Community (2010). jBPM makes your workflow. Retrieved March 22, 2010, from http://www.jboss.org/jbpm.
Jenkins, H.: Quentin Tarantion's Star Wars? Digital Cinema, Media Convergence, and Participatory Culture. In: Thornburn, D., Jenkins, H.: Rethinking Media Change: The Aesthetics of Transition, MIT Press, Cambridge Massachusetts, pp. 281–312 (2003)
Johnson, D., Johnson, R., Stanne, M.: Cooperative Learning Methods: A Meta–Analysis. University of Minnesota. http://www.clcrc.com (2000)
Johnson, J. et. al. The Xerox "Star": A Retrospective. In: Human-Computer Interaction. San Francisco: Morgan Kaufmann (1995)
Jonassen, D., Howland, J., Moore, J., Marra, M.: Learning to Solve Problems with Technology. A Costructibist Perspective (2003)
Juristo, N., Moreno, M., Vegas, S.: Limitations of Empirical Testing Technique Knowledge. In Juristo, N., Juristo, A. M. (eds.) Lecture Notes on Empirical Software Engineering, Vol. 12, pp. 1–38. World Scientific, Singapore (2003)
Kagan, S., Kagan, M.: The structural approach: six keys to cooperative learning. Handbook of cooperative learning methods. S. Sharon (ed.) pp. 115–133. Greenwood Press, Westport (1994)
KAMA: C4ISR Uygulamaları Ve Kavramsal Model Altyapı Çalışmaları Raporu (Eng. C4ISR Implementations and Conceptual Model Infrastructure Work Report. Technical Report Kama-Cisrmos-Kamacr-S00, Ankara, Turkey (2005)
Karagöz, N. A., O. Demirörs: Conceptual Modeling Notations and Techniques. In Robinson, S., Brooks, R., Kotiadis, K., Van Der Zee, D. (eds.) Conceptual Modeling for Discrete-Event Simulation, pp. 179–209. CRC Press, The Netherlands (2010)
Karpf, D.: Implications of the Mobile Web for Online-Offline Reputation Systems. IEEE Intelligent Systems. Vol. 26 (1), pp. 40–47 (2011)
Kazhdan, M., Bolitho, M., Hoppe, H.: Poisson Surface Reconstruction. Symposium on Geometry Processing, pp. 61–70, Sardinia (2006)
Kernan, A. The Death of Literature. Yale University Press, New Haven, London (1992)
Kiczales G., Hilsdale E., Hugunin J., Kersten M., Palm J., Griswold W. An Overview of AspectJ. ECOOP, Hungary (2001)
Kiczales G., Lamping J., Mendhekar A., Maeda C., Lopes C., Loingtier J., Irwin J.: Aspect-Oriented Programming. In Proc. of ECOOP'97
Kiczales, G.: In Proc. 1st. International Conference on Aspect-Oriented Software Development. AOSD 2002. The Netherlands: ACM Press (2002)
Kilic, O.: Cognitive Aspects of Conceptual Modeling Diagrams: An Experimental Study. Master Thesis, Department of Cognitive Science, Middle East Technical University, Ankara, Turkey (2007)
Kılıç, Ö., Say, B., Demirörs, O.: Cognitive Aspects of Error Finding on a Simulation Conceptual Modeling Notation. Proc. of the ISCIS 2008, Lecture Notes in Computer Science, pp. 1–6. Berlin: Springer-Verlag (2008)
Kim, J., Hahn, J., Hahn, H.: How Do We Understand a System with (So) Many Diagrams? Cognitive Integration Processes in Diagrammatic Reasoning. Information Systems Research 11 (3), pp. 284–303 (2000)
Know, S. T., Bailey, W. A., Lynch, E. F.: Directed Dialogue Protocols: Verbal Data for User Interface Design. Proc. of CHI'89, pp. 283–287, ACM Press, Texas (1989)
Kobsa, A.: Privacy-enhanced web personalization. In Brusilovsky, P., Kobsa, A., Nejdl, W. (eds.), The Adaptive Web: Methods and Strategies of Web Personalization, Lecture Notes in Computer Science, Vol. 4321, pp. 628–670. Springer-Verlag (2007)
Kraemer, K., Dedrick, J., Sharma, P.: One Laptop Per Child: Vision vs. Reality. ACM of Communications, Vol. 52 (6), pp. 66–73 (2009)
Kraus, K.: Photogrammetry: Geometry from Images and Laser Scans. Walter de Gruyter (2008)
Kunz, W.: Tipografía: Macro y Microestética. Barcelona: Gustavo Gili (2002)
Läbe, T., Förstner, W.: Automatic relative orientation of images. Proceedings of the 5th Turkish-German Joint Geodetic Days, Berlin. 6 pages (2006)
Larkin, J., Simon, H.: Why a Diagram is (Sometimes) Worth Ten Thousand Words. Cognitive Science Vol. 11, pp. 65–99 (1987)
Lasar J. et al.: What Frustrates Screen Reader Users on the Web: A study of 100 Blind Users. International Journal of HUMAN COMPUTER INTERACTION 22(3), pp. 247–269 (2007)
Latorella, K.: Investigating interruptions: Implications for flightdeck performance. Technical Report TM-1999-209707, NASA (1999)
Le Comte, C.: Manual Tipográfico. Buenos Aires: Infinito (2004)
Leporini B., Andronico P., Buzzi M., Castillo C.: Evaluating a modified Google user interface via screen reader. In the Universal Access in the Information Society (UAIS), Vol. 7 (3), pp. 155–175 (2008)
Levi, D., Klein, A., Aitsobomo, A.: Vernier Acuity, Crowding and Cortical Magnification. Visual Research 25 (7), pp. 963–977 (1985)
Levinson, P.: Digital McLuhan: A guide to the information millennium. London: Routledge (1999)
Lidwell W. Holden, K., Butler, J.: Principios Universales de Diseño. Barcelona: Blume (2005)
Lister, M.: La imagen fotográfica en la cultura digital. Barcelona: Paidós (1997)
Logie, R. H., Della Sala, S.: Disorders of Visuospatial Working Memory. In Shah, P., Miyake, A. (eds.) The Cambridge Handbook of Visuospatial Thinking, pp. 81–120. New York: Cambridge University Press (2005)

Lowe, D.: Distinctive image features from scale-invariant keypoints. International Journal of Computer Vision, Vol. 60 (2), pp. 91–110 (2004)
Maas, H., Hampel, U.: Photogrammetric techniques in civil engineering material testing and structure monitoring. Photogrammetric Engineering & Remote Sensing, Vol. 72 (1), pp. 39–45 (2006)
MacIntyre, B., Mynatt, E., Voida, S., Hansen, K., Tullio, J., Corso, G.: Support for multitasking and background awareness using interactive peripheral displays. In Proc. of 14th Annual ACM Symposium on User Interface Software and Technology, pp. 41–50. ACM, New York (2001)
Mangen, A.: Hypertext Fiction Reading: Haptics and Immersion. Journal of Research in Reading, Vol. 31 (4), pp. 404–419 (2008)
Mangu, L., Brill E., Stolcke A.: Finding consensus in speech recognition: word error minimization and other applications of confusion networks. Journal Computer Speech and Language, Vol. 14 (4), pp. 373–400 (2000)
Mann, Z.: Three Public Enemies: Cut, Copy, and Paste. IEEE Computer, Vol. 39 (7), pp. 31–35 (2006)
Mark, G., Su, N.: Considering Web 2.0 technologies within an ecology of collaborations. In Proc. of SociUM: Adaptation and Personalisation in Social Systems: Groups, Teams, Communities, pp. 50–59, Corfu (2007)
Martínez-Val, J.: Comunicación en el Diseño Gráfico. Madrid: Del Laberinto (2004)
McDonald, F., Miller, J.: A Comparison of Computer Support Systems for Software Inspection. Automated Software Eng. 6, pp. 291–313 (1999)
McFarlane, D., Latorella, K.: The scope and importance of human interruption in human-computer interaction design. Human-Computer Interaction, Vol. 17 (1), pp. 1–61 (2002)
Meyer-Wegener, K.: Database Management for Multimedia Applications. Multimedia. Springer-Verlag, pp. 105–119 (Berlin, 1994)
Mijksenaar, P. Una Introducción al Diseño de Información. Barcelona: Guastavo Gili (2001)
Mikhail, E., Bethel, J., McGlone, J.C.: Introduction to Modern Photogrammetry. John Wiley & Sons (2001)
Miller, M.: Usability in E-Learning. Learning Circuits, January (2005)
Millward, P. First Monday, Vol. 8, (7). The Grey Digital Divide: Perception, exclusion and barriers of access to the Internet for older people. URL: http://firstmonday.org/issues/issue8_7/millward/index.html (2003)
Mitchell, W.: The reconfigured eye: Visual Truth in the post-photographic era. Massachussets: MIT (1992)
Moe, W., Fader, F.: Dynamic Conversion Behavior at E-commerce Sites http://mansci.journal.informs.org/cgi/content/abstract/50/3/326
Monga, M., Beltagui, F., Blair, L.: Investigating Feature Interactions by Exploiting Aspect Oriented Programming", Technical Report N comp-002-2.003, Lancaster University, England, (2003) http://www.com.lancs.ac.uk/computing/aop/Publications.php
Mossberger K., Tolbert Caroline, Stansburry M.: Virtual Inequality – Beyond the Digital Divide (2003)
Myers, B., Hudson, S., Pausch, R.: Past present, and future of user interface software tools. In ACM Transactions on Computer-Human Interaction (TOCHI) – Special issue on human-computer interaction in the new millennium, Part 1, Vol. 7, (1), pp. 3–28 (2000)
Negroponte, N.: Being Digital. A. Knopf, New York, p. 71 (1995)
Nell, N.: Los regímenes escópicos de lo virtual, Designis 5. Coorpus digitalis, semióticas del mundo digital (2004)
Nelson, T.: Literary Machines. Sausalito: Mindful Press (1992)
Nielsen, J.: Designing Web Usability. Indianapolis: New Riders Publishing (2000)
Nielsen, J.: iPad Usability: First Findings From User Testing (2010). Retrieved June 17, 2010 from http://www.useit.com/alertbox/ipad.html
Nielsen, J.: Kindle 2 Usability review (2009). Retrieved June 17, 2010 from http://www.useit.com/alertbox/kindle-usability-review.htm
Nielsen, J.: Let's Ask the Users. IEEE Software, Vol. 14 (3), pp. 110–111 (1997)
Nielsen, J. Mack, R.: Usability Inspection Methods. New York: Willey (1994)
Nielsen, J.: Traditional Dialogue Design Applied to Modern User Interfaces. Communications of the ACM, Vol. 33 (10), pp. 109–118 (1990)
Nielsen, J.: Usability Engineering. London: Academic Press (1993)
Nielsen, J., del Galdo, E.: International User Interfaces. New York: Wiley (1996)
Nister, D.: An efficient solution to the five-point relative pose problem. Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition, pp. 195–202 (2003)
Nister, D.: Automatic passive recovery of 3D from images and video. IEEE Proceedings of the 2nd International Symposium on 3D Data Processing, Visualization, and Transmission, pp. 438–445 (2004)
Nöth, W.: Handbook of Semiotics. Indiana: Indiana University Press (1995)
O'Neill, S.: Interactive Media: The Semiotics of Embodied Interaction. Berlin: Springer-Verlag (2008)
Pace, D.: Conceptual Model Development for C4ISR Simulations. Proc. of the 5th International Command and Control Research and Technology Symposium, pp. 24–26 (2000)
Pace, D.: Ideas about Simulation Conceptual Model Development. Johns Hopkins APL Technical Digest Vol. 21 (3), pp. 327–336 (2000)
Pace, D.: Impact of Simulation Description on Conceptual Validation. Proc. of the fall 1998 Simulation Interoperability Workshop, pp. 14–18 (1998)
Paciello, M.: Web accessibility for people with disabilities. Lawrence, KS:CMP Books (2000)
Parnas D.: On the criteria to be used in decomposing systems into modules. Communications of the ACM, Vol. 15 (12). pp. 1053–1058 (1972)

Pawlak, R., Duchien, L., Seinturier, L.: Compar: Ensuring safe around advice composition". In Proc. FMOODS 2005, Vol. 3535 of LNCS, pp. 163–178 (2005)

Pawlak, R., Seinturier, L., Duchien, L., Florin, G.: JAC: A Flexible Framework for AOP in Java. Reflection'01, In Proc. Third International Conference on Metalevel Architectures and Separation of Crosscutting Concerns Kyoto. September, pp. 25--28, Kyoto (2001)

Peitz, M, Waelbroeck, P.: An Economist's Guide to Digital Music. CESifo Economic Studies, Vol. 51 (2-3), pp. 359–428 (2005)

Pendyala, V., Shim, S.: The Web as the ubiquitous computer. Computing now, (September) pp. 90–92 (2009)

Pérez-Jiménez, M.: Status representacional de la imagen en el medio digital in Cultura digital y tendencias en la producción visual. La Laguna: University of La Laguna Press (2000)

Perfect, C.: Guía Completa de la Tipografía. Barcelona: Blume (1994)

Petrie, H., Badani, A., Bhalla, A.: Sex, lies and Web accessibility: the use of accessibility logos and statements on e-commerce and financial websites. In Proc. Accessible Design in the Digital World Conference 2005 (2005) http://pub1.bcs.boxuk.net/upload/pdf/ewic_ad05_s5paper2.pdf

Petrie, H., Hamilton, F., King, N.: Tension, what tension?: Website accessibility and visual design. In: Proc. 2004 International Cross-disciplinary Workshop on Web Accessibility (W4A), pp. 13–18 (2004)

Pichon, D., Bonnin, J., Seite, P., Rieublandou, G.: Inter-Terminal Multimedia Session Mobility in Next Generation Networks to Enhance IPTV. Consumer Communications and Networking Conference (CCNC), 7th IEEE (2010)

Picker, J.: Victorian Soundscapes. Oxford University Press, New York (2003)

Pinhanez, C.: A Service Science Perspective for Interfaces of Online Service Applications. In Proceedings of IHC 2008, pp. 11–20 (2008)

Pinhanez, C.: Service systems as customer-Intensive-Systems and its Implications for Serveiice Science and Engineerimg. In Proc. of Awaiian International Conference, HICSS-41 (2008)

Pollack, A.: Most of Xerox's Suit Against Apple Barred. In: The New York Times (24 March 1990)

Pollefeys, M., Koch, R., Van Gool, L.: Self-calibration and metric reconstruction in spite of varying and unknown intrinsic camera parameters. International Journal of Computer Vision, Vol. 32 (1), pp. 7–25 (1999)

Pollefeys, M., Van Gool, L., Vergauwen, M., Verbiest, F., Cornelis, K., Tops J., Kock, R.: Visual modelling with a hand-held camera. International Journal of Computer Vision, Vol. 59 (3), pp. 207–232 (2004)

Porter, A., Siy, H., Mockus, A., Votta, L.: Understanding the Sources of Variation in Software Inspections. ACM Trans. Software Eng. and Methodology 7, pp. 41–79 (1998)

Poster, M.: Cyberdemocracy: the Internet and the public sphere. In the Internet culture, ed. D. Porter, pp. 201–217. New York: Routledge (1997)

Potamianos, A., Narayanan, S., Lee, S.: Automatic Speech Recognition for Children. In Proc. Eurospeech,. Rhodes (1997)

Prinz, W. NESSIE: an awareness environment for cooperative settings. In Proc. of 6th European Conference on Computer Supported Cooperative Work (ECSCW '99), pp. 391–410, Pittsburgh (1999)

Project management & collaboration. Retrieved March 22, 2010, from http://www.activecollab.com/.

Pryor, J., Diaz-Pace, A. Campo M.: Reflection on Separation of Concerns. RITA. Vol. 9. (1), (2002)

Pryor, J., Marcos, C.: Solving Conflicts in Aspect-Oriented Applications. In Proc. of the Fourth ASSE. 32 JAIIO. Argentina (2003)

Qin, Y., Simon, H.: Imagery and Problem Solving. In Proc. of the 12th Annual Conference of the Cognitive Science Society, pp. 646–653. Erlbaum, Hillsdale, NJ (1990)

Ramírez Ramírez: La Educación a Distancia como instrumento de lucha contra la pobreza y de fortalecimiento democrático en América Latina. Universidad Estatal a Distancia de Costa Rica.

Randsdell, S.: Generating Think-aloud Protocols: Impact on the Narrative Writing of College Students. American Journal of Psychology 108(1), pp. 89–98 (1995)

Rao, W., Yang, C., Karri, R., Orailoglu, A.: Toward Future Systems with Nanoscale Devices: Overcoming the Reliability Chanllenge. IEEE Computer, Vol. 44 (2), pp. 46–53 (2011)

Reid, D.: An algorithm for tracking multiple targets. IEEE Transactions on Automatic Control, Vol. 24 (6), pp. 843–854 (1979)

Remondino, F., El-Hakim, S.: Image-based 3D Modelling, a Review. Photogrammetric Record, 21 (115), pp. 269–291 (2006)

Remondino, F., Fraser, C.. Digital Camera Calibration Methods: Considerations and Comparisons. IAPRSSIS 36(5), pp. 266–272 (2006)

Remondino, F., Ressl, C.: Overview and experiences in automated markerless image orientation. International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, Vol. 36 (3), pp. 248–254 (2006)

Rittenbruch, M.: Atmosphere: a framework for contextual awareness. International Journal of Human-Computer Interaction, Vol. 14 (2), pp. 159–180 (2002)

Robertson, S., Wharton, C., Ashworth, C., Franzke, M.: Dual device user interface design: PDAs and interactive television. In Proc. of the SIGCHI Conference on Human Factors in Computing Systems. CHI '96. New York: ACM Press, pp. 79–86 (1996)

Robinson, S.: Conceptual Modeling For Simulation: Issues And Research Requirements. Proc. of the Winter Simulation Conference, pp. 792–800 (2006)

Robson, R.: Globalization and the Future of Standardization. IEEE Computer, Vol. 39 (7), pp. 82–84 (2006)

Rodríguez, M.: Manual de Diseño Industrial. México: Gustavo Gili (1998)
Röller, N., Zielinski, S.: On the Difficulty to Think Twofold in One. In: Diebner, H., Druckrey, T., Weibel, P. (eds.) Sciences of the Interface, pp. 282–291, Genista, Tübingen (2001)
Romero, C.: Mil refranes, mil verdades. Madrid: Ediciones del Prado (1997)
Roncella, R., Forlani, G., Remondino, F.: Photogrammetry for geological applications: automatic retrieval of discontinuity in rock slopes. SPIE 5665, pp. 17–27 (2005)
ROOTS: LogicAJ – A Uniformly Generic and Interference-Aware Aspect Language. http://roots.iai.uni-bonn.de/researh/logicaj/ (2005)
Rousseeuw, P.J., Leroy, A.M.: Robust Regression and Outlier Detection. New York: John Wiley, page 329 (1987)
Salas, C.: La crisis explicada a sus víctimas. Barcelona: Altera (2009)
Salvucci, D. Anderson, R.: Automated Eye-movement Protocol Analysis. Human-Computer Interaction Vol. 16, pp. 39–86 (2001)
Salvucci, D.: Mapping Eye Movements to Cognitive Processes. Unpublished Ph.D. dissertation, Carnegie Mellon University, Pittsburg (1999)
Salvucci, D., Goldberg, H.: Identifying fixations and saccades in eye-tracking protocols. Proc. of Eye Tracking Research, Applications Symposium, pp. 71–78. ACM Press, Palm Beach Gardens, FL (2000)
Saussure, F.: Course in General Linguistics. New York: McGraw-Hill (1990)
Scheirer, W., Rocha, A., Heflin, B., Boult, T.: Difficult Detection: A Comparison of Two Different Approaches to Eye Detection for Unconstrained Environments. In Proc. the Third IEEE Int. Conf. on Biometrics: Theory, Applications, and Systems (BTAS 2009). Washington, D.C. (2009)
Schmutz, P., Heinz, S., Métrailler, Y., Opwis, K.: Cognitive Load in eCommerce applications-Measurements and Effects on User Satisfaction.Advances in Human Computer Interaction Article ID 121494-2009 (2009).
Schudson, M.: Dynamics of Distortion in Collective Memory. In: Schachter, D.L.: Memory Distortion. Cambridge: Harvard University Press (1997)
Schweiger, D.: Is the Simultaneous Verbal Protocol a Viable Method for Studying Managerial Problem Solving and Decision Making? Academy of Managerial Journal Vol. 26 (1), pp. 185–192 (1983)
Scupelli, P., Kiesler, S., Fussell, S., Chen, C.: Project View IM: a tool for juggling multiple projects and teams. In Proc. CHI'2005: Human factors in computing systems, pp. 1773–1776, Portland (2005)
Serrano, S., Martinez-Martinez, E.: La brecha digital: Mitos y Realidades. Universidad Autónoma de Baja California, México, pp. 4–10 (2003)
Shaaeffer, J.: La imagen precaria. Madrid: Cátedra (1990)
Shneiderman, B.: Designing the User Interface. Addison-Wesley, Reading (1998)
Slay H., Thomas, B.: Interaction and Visualisation across Multiple Displays in Ubiquitous Computing Environments. AFRIGRAPH 2006, Cape Town, South Africa, pp. 25–27 (2006)
Snavely, N., Seitz, S.M., Szeliski, R.: Modeling the World from Internet Photo Collection. Int. J. Comp. Vis., Vol. 80 (2), pp. 189–210 (2007)
Sonesson, G.: La fotografía entre el dibujo y la virtualidad, http://filserver.arthist.lu.se/kultsem/pdf/Posfotografia.pdf (2009)
Sony History: Mr. Morita, I would Like a Walkman. Retrieved June 7, 2010 from http://www.sony.net/Fun/SH/1-18/h4.html (2010)
Sorlin, P.: Los hijos de Nadar. Buenos Aires: La marca (2004)
Soulages, F.: Estética de la fotografía. Buenos Aires: La marca (2005)
Squires, D.: Usability and Educational Software Design: Special Issue of Interacting with Computers. Interacting with Computers, Vol. 11, (5), pp. 463–466 (2005)
Stenitzer, M., Putzhuber, M., Nemecek, S., Büchler, F.: Accessible Online Shops for the Older Generation and People with Disabilities. K. Miesenberger et al. (Eds.): ICCHP 2008, Springer-Verlag LNCS 5105, pp. 462–465 (2008)
Storzer, M., Krinkle, J.: Interference Analisys for AspectJ, FOAL: Foundations of Aspect-Oriented Languages (2003)
Sung, K. Recent Videogame Console Technologies. IEEE Computer, Vol. 44 (2), pp. 91–95 (2011)
Suppes, P.: Eye-movement Models for Arithmetic and Reading Performance. In Kowler, E. (ed.) Eye Movements and their Role in Visual and Cognitive Processes, pp. 455–477. New York: Elsevier (1990)
Tanter, E., Noye, J.: A Versatile Kernel for Multi-Language AOP. In Proc. of ACM SIGPLAN/SIGSOFT – Conference on Generative Programming and Component Engineering (GPCE 2005, Estonia) LNCS. Berlin: Springer-Verlag, Berlin (2005)
Tarr, P., Ossher, H., Harrison, W., Sutton, S.: N Degrees of Separation: Multi-Dimensional Separation of Concerns. In Proc. of ICSE'99
TeamWox. TeamWox GroupWare. Retrieved March 22, 2010, from http://www.teamwox.com (2010)
Tessier, F., Badri, M., Badri, L.: A Model-Based Detection of Conflicts Between Crosscutting Concern: Towards a Formal Approach. In Proc. International Workshop on Aspect – Oriented Software Development (WAOSD 04). China (2004)
Tobarra M., Montero F. Gallud J. A.: Usabilidad Colaborativa: Caracterizando la Usabilidad en Entornos Colaborativos. Grupo de investigación LoUISE. Universidad de Castilla-La Mancha. Albacete. España. IX Congreso Internacional Interacción, Albacete (2008)
Todd, P., Benbasat, I.: Process Tracing Methods in Decision Support System: Exploring the Black Box. MIS Quarterly 11, pp. 493–512 (1987)
Torr, P.: Bayesian Model Estimation and Selection for Epipolar Geometry and Generic Manifold Fitting. Int. J. Comp. Vis. Vol. 50 (1), pp. 35–61 (2002)

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