JOBENOMICS™

Cloud Computing

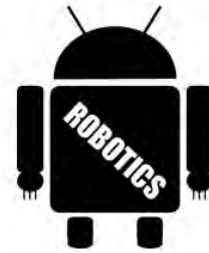ROBOTICS

BIG Data

AI

NATIONAL BROADBAND

WWW 3.0

Internet of THINGS

Network Technology Revolution (NTR)

26 November 2016

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NTR Executive Summary

The Network Technology Revolution (NTR)

The NTR is defined by Jobenomics as a perfect storm of transformative network and digital technologies, processes, systems and services including:
Big Data, Cloud Computing, Semantic Webs, Synthetic Reality, Mobile Computing, Ubiquitous Computing, Quantum Computing, 5G Broadband, Geo-Location, Near-Field Communications and Beacons, Inductive Charging, Spatial Sensing, Computer Vision and Pattern Recognition, Natural Language Processing and Speech Recognition, Data Mining and Predictive Analysis, Machine Learning, Transfer Learning, Deep Learning, Robotics, Telepresence and Telechirs, Nanobotics, Chatbots, Mechatronics, Memetics, Biometrics, Smart Cards, Blockchains, FinTech, Multifactor Credentialing, Emotive Surveillance and Management, Identity Management, Anonymity Networks, Ambient Intelligence, Artificial Intelligence and Intelligent Agents.

The NTR will revolutionize labor forces, economies and nations via the:
Digital Economy and its seven distinct but interconnected communities:
(1) Electronic/Mobile Commerce Economy, (2) Sharing/On Demand Economy, (3) Apps/Bot/AI Economy, (4) Platform Economy, (5) Gig/Contingent Workforce Economy, (6) Data-Driven Economy and (7) Internet of Everything Economy.

The NTR will be brilliantly innovative and creatively disruptive:
Creating tens of millions of new businesses and billions of jobs globally, and/or
Destroying tens of millions of new businesses and billions of jobs globally.

The NTR will ultimately transform society with humanity working alongside smart machines, sophisticated robots and intelligent agents:
Revamping existing institutions and governments,
Instituting new and different ideas, beliefs, behaviors and cultures, and
Changing the very nature of human endeavor and work.

The Network Technology Revolution (NTR) is defined by Jobenomics as the "perfect storm" of next-generation network and digital technologies that will (1) transform economies, (2) revamp existing institutions, businesses, labor forces and governments, (3) institute new and different ideas, beliefs, behaviors and cultures, and (4) change the very nature of human endeavor and work.

The nascent NTR already has been brilliantly innovative and creatively disruptive. The more creative the NTR becomes the more destructive it will be. From an American outlook, with the proper focus and leadership, the NTR can create millions of new U.S. small business and tens of millions of jobs. Left unattended, unstructured and unplanned, the NTR is likely to render half of the U.S. workforce obsolete in the near future. From a global perspective, the NTR can be even more transformational.

From an NTR perspective, Jobenomics sees three major U.S. labor force trends occurring today that will have a dramatic effect on America's future economy and employment, (1) more than any other

labor force trend, the NTR will create significantly more employment opportunities for the contingent workforce than the standard workforce, (2) new workforce entrants and NTR-savvy digital natives have a substantial different view regarding the way business is currently conducted and their roles in business, and (3) those who cannot adapt will likely depart the U.S. labor force to the growing netherworld of perpetual familial and government assistance.

The power of the NTR should not be underestimated or understated. What took centuries to transform in the Agricultural Age and decades in the Industrial Age, now takes years to transform in the emerging Digital Age. Computing power increased 400,000 fold since the advent of the first microprocessor in 1971. Today, half of the world's population carries a smartphone with the power of a 1980s room-size supercomputer. This super-colossal, miniaturized, proliferated and customized power is poised to transform society exponentially more via a perfect storm of over three dozen emerging, revolutionary NTR technologies, systems, processes and services.

Even in today's fledgling stage of development, the NTR's impact is extraordinary. At maturity, the NTR's future impact is likely to be somewhere between phenomenal and cataclysmic. Some of the world's leading technical thinkers (Steven Hawking, Bill Gates, Elon Musk) believe that the perfect storm of NTR technologies, systems, processes and services can potentially pose an "existential threat" to mankind when machines achieve the level of general human intelligence—the point of "singularity"—which could arrive as early as mid-Century.

NTR's "Perfect Storm". Industrial Revolution (IR) transformed America from an agricultural-based society to an industrial-based society. WWII and post-WWII Military Technology Revolution (MTR) underpinned the creation of the largest economic superpower on the planet. The 1980s Information Technology Revolution (ITR) ushered in an information age of prosperity and international commerce. Today, the Network Technology Revolution (NTR) is reshaping the global economy. Like the IR, MTR and ITR, the NTR could lead to the creation of millions of U.S. businesses and tens of millions of new American jobs, as well as countless economic and social benefits. Globally, the NTR's potential is exponentially greater in terms of business, employment and societal transformation.

The NTR is characterized by a "perfect storm" of highly advanced technologies, systems, processes and services including **big data** (datasets that are too large to efficiently handle), **cloud computing** (practice of using a network of remote servers hosted in data centers to store, manage, and process big data), **semantic webs** (thinking websites), **synthetic reality** (blending of the virtual and natural worlds), **mobile computing** (proliferation of smart mobile devices and micro-devices), **ubiquitous computing** (embedding microprocessors in everyday objects to communicate without human interaction), **quantum computing** (harnessing the power of atoms and molecules to perform memory and processing tasks), **5G broadband networks** (50-fold speed increases and 1000-fold data volume improvements), **geo-location** (the process of determining the location of an entity by means of digital information processed via the Internet), **near-field communications** and **beacons** (short-range wireless technology that connects devices), **inductive charging** (electromagnetic wireless charging of devices, micro-devices and nano-devices), **spatial sensing** (real-time detection, measuring, mapping and analysis of objects in relationship to the environment), **computer vision** and **pattern recognition** (training computers to gain high levels of understanding from digital images and videos and recognizing patterns and regularities in the data), **natural language processing** and **speech recognition** (the ability of a computer program, machine or intelligent agent to understand and

respond to human speech), **data mining** and **predictive analysis** (using advanced algorithms to analyze large databases to make predictions about unknown future events), **machine learning** (systems that can learn and teach each other), **transfer learning** (machine "reasoning" that takes lessons learned from past human experiences and applies it digital domains), **deep learning** (an artificial intelligence technique allowing machines to extract patterns from big data in the same manner that the human brain does), **robotics** (automated machines capable of movement), **telepresence** and **telechirs** (operating machines remotely to sense and create an effect or control), **nanobotics** (also called nanomachines, nanoids, nanites and nanomites are microscopic self-propelled machines with a degree of autonomy and reproductive capability at the molecular level), **chatbots** (web robots that run automated tasks or simulate conversations with users), **mechatronics** (technology combining electronics and mechanical engineering), **memetics** (machines that can create memes to mimic cultural traits and ideas), **biometrics** (agents that can identify and track biological traits), **smart cards** (credit card-like devices that can send and store personal and identifying material), **blockchains** (distributed digital economy public ledgers), **fintech** (financial technology oriented to transforming incumbent financial institutions and corporations), **multifactor credentialing** (automated authentication and identification of crowds, individuals and intelligent agents), **emotive surveillance** and **management** (systems that analyze and manage emotions), **identity management** (controlling user access and restoring damaged online identities), **anonymity networks** (networks that enable users to block or trace data and identities), **ambient intelligence** (when formerly dumb or mute objects are given the ability to communicate), **artificial intelligence** (or AI, intelligent algorithms and agents that will augment human interactions), and **intelligence agents** (AI agents that replace or supersede the need for human intervention and actions).

The **Digital Economy** is an economy that is based on digital and networked technologies, which is increasingly intertwining and preempting today's traditional economy. The **E/M Economy** consists of electronic and mobile commerce that is transforming economies, government, business and society via network and digital technology, systems, processes and services. The **Sharing/On-Demand Economy**, is a new wave of peer-to-peer, access-driven businesses that are characterized by the ability of individuals to rent or borrow goods rather than buy and own them or to quickly fulfill consumer demand via the immediate provisioning of goods and services. The **App/Bot/AI Economy** refers to the range of economic activity surrounding intelligent web-based applications. Apps (applications) are the digital interface through which we live, work and play and the primary way we engage with media, brands and ultimately with each other. A bot, also known as a web robot, an internet chatbot or simply bot, is an interactive, artificial intelligence-driven software application that runs automated tasks or simulates a conversation to deliver text-, voice- or video-based information to a user via a networked device. Artificial intelligence (AI) is the intelligence exhibited by machines or software that is able to do things normally done by people. The **Platform Economy** encompasses NTR-enabled social, business and government activities. A **Gig/Contingent Workforce Economy** is an environment in which temporary positions are common and organizations contract with independent workers for short-term engagements. A **Data-Driven Economy** involves accessing and exploiting information and knowledge contained in big-data pools to maximize operational efficiencies and reduce costs. The **Internet of Everything Economy** brings together people, process, data, and things to make networked connections more relevant and valuable than ever before—turning information into actions that create new capabilities, richer experiences, and unprecedented economic opportunity for nations, businesses and individuals.

The NTR will create or dismantle tens of millions of businesses and billions of jobs globally. Countries with a forward-looking national NTR strategy will garnish the bulk of the newly emerging digital jobs and businesses. There are 176 transformative NTR platform companies worldwide, each with a market valuation of over $1 billion, worth a total of $4.3 trillion in 2016.[1] China and the United States dominate with 64 and 63 major platform companies respectfully. U.S. platform companies are foundational in terms of innovation and transformation. U.S. foundational platform companies created the innovative and disruptive digital platforms on top of which other firms develop complementary technologies, systems, processes and services.

To a large extent, China's platform companies are built on U.S. foundational platforms. However, unlike their U.S. counterparts, China's platform companies are applying NTR-related technology, systems, processes and services within a government-backed strategic framework to mass-produce small businesses and jobs in order to raise 700 million Chinese rural poor out of poverty. To a lesser extent, these types of strategies are being promulgated in many other parts of the world. From a Jobenomics perspective, U.S. policy-makers and platform-CEOs need to concentrate America's exceptional NTR abilities on developing a state-of-the-art, network-centric ecosystem that will enable Americans to become self-sufficient and competitive in the emerging global digital economy.

America is blessed to be the home of NTR platform giants like Apple, HP, Facebook, Google, CISCO, Amazon, Microsoft, eBay and dozens of other NTR companies. While U.S. NTR giants are making great technical advancements in communication, media and entertainment, foreign countries in Asia and Europe are using U.S. technology to develop their labor forces and economies to a much greater degree than in the United States. As corporate citizens, U.S. NTR companies need to assume a much greater role in developing their domestic workforce that is capable of competing and prospering in the emerging global digital economy. From a Jobenomics perspective, NTR CEOs should take the lead (i.e., the responsibility) for creating a minimum of 10 million net new U.S. jobs within the next decade via the creation of network-centric small, micro and self-employed American businesses.

In conclusion, with the proper focus and leadership, an American NTR national initiative can create millions of new small business and tens of millions of jobs. Left unattended, unstructured and unplanned, the NTR is likely to render half of the U.S. workforce obsolete in the near future. The NTR could produce tens of millions of net new U.S. jobs and millions of small businesses. On the other hand, via automation, the NTR has the potential to obsolete tens of millions of existing jobs. A national NTR strategy is needed to maximize labor force gains and minimize labor force losses.

If Apple's used its energy to create NTR-optimized startup services, tens of millions of more Americans (and billions of people around the world) could be given the opportunity to build a business. If Facebook monetized social networks, tens of millions of new careers could be created. If CISCO would spend a small portion of time and effort developing the Internet of Business as compared to the Internet of Things, millions of new businesses could be created. The same is true of Amazon, Microsoft, Google, IBM, as well as the rest of the American NTR platform giants. Together, these companies could create untold numbers of new U.S. jobs and micro-businesses that would

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[1] The Center for Global Enterprise, The Rise of the Platform Enterprise: A Global Survey, January 2016, http://thecge.net/wp-content/uploads/2016/01/PDF-WEB-Platform-Survey_01_12.pdf

mitigate the erosion of the middle-class, provide new career paths for the digital generation, and create meaningful income opportunities and livelihoods for the evergrowing contingent workforce.

Via the creative and disruptive effects of the NTR, the global economy is transforming from the 20th Century's traditional economy to the 21st Century's digital economy (also known as the Internet, web, network or e-commerce economy). Today, the United States' economy is approximately 95% physical and 5% digital as a percent of GDP. The U.S. digital economy is growing at 20% per year and is likely to be the dominant economy based on a number of governmental, economic, technological and societal factors that can be managed but not controlled. Global competition for digital economic dominance has already begun.

While the United States leads in the technological arena, America lags in other areas, due to laissez faire government strategic planning, regressive policies and onerous regulations that restrict small business growth. Tens of millions of American jobs can either be created or lost by 2030 depending on America's approach to mitigating the disruptive nature of the NTR and maximizing business and jobs creation prospects afforded by emerging NTR technologies, processes and systems in regard to the new digital economy.

There is no question that the U.S. digital revolution is innovative, but has it created meaningful products and services? Moreover, has it created highly-scalable businesses that can reemploy workers that have been displaced new markets, industries, or technologies? From a Jobenomics perspective, the answer to both of these questions is not as much as it should have.

On the whole, disruptive displacements exceed innovative introductions, and are likely to accelerate significantly as the NTR matures. Jobenomics also asserts that much of products and services introduced by the digital revolution suppress creativity (the ability to generate new and useful ideas) and innovation (successful implementation of creative ideas). Social media generates petabytes (1PB = 250 million DVDs) of new user-generated content daily, but most of it is frivolous and fleeting. A glut of information does not equate to a knowledge-based society. It is estimated that 90% of the world's data has been created within the last two years without society getting appreciably smarter. Two-thirds of the next generation (Generation Z) lists gaming as their main hobby and communicates with emoticons (emotional icons) and emojis (ideograms or pictographs) that are better suited for the virtual world than the real world. To a large degree, the digital revolution promotes short attention spans, less developed face-to-face interpersonal skills, preference for unstructured environments and a degree of laziness that will make traditional forms of employment a challenge.

The NTR will not only displace a large percentage of workers, it will also transform the workforce from full-time employees to contingent workers. Contingency workers currently represent approximately 31% of the US workforce and are projected to increase to 40% of the US labor force in 2020, which is likely to be a conservative percentage given current trends in productivity, technology, necessity and ethnology (cultural dissimilarities with new labor force entrants). Contingent work (part-time workers, consultants, independent contractors, independent professionals, temporary contract workers, seasonal workers, freelancers, etc.) could quickly become the dominant (50%+) form of labor in the US work force within a decade.

NTR Technologies, Systems, Processes and Services—the Perfect Storm

Industrial Revolution (IR) transformed America from an agricultural-based society to an industrial-based society. The Military Technology Revolution (MTR) was one of the deciding factors in winning the Cold War and underpinned the creation of the largest and most competitive economic superpower on the planet. In the latter part of the 20th century, the Information Technology Revolution (ITR) ushered in a new era of prosperity and international commerce built largely on the Internet, which evolved from the U.S. military's ARPA-Net and creative genius of the co-founders of the personal computer, Bill Gates and Steve Jobs. Today, the emerging Network Technology Revolution (NTR) has the potential to reshape the global economy. Like the IR, MTR and ITR, the NTR could lead to the creation of tens of millions of new productive jobs, as well as countless economic and social benefits.

> **The NTR is defined by Jobenomics as a perfect storm of transformative network and digital technologies, processes, systems and services including:**
> Big Data, Cloud Computing, Semantic Webs, Synthetic Reality, Mobile Computing, Ubiquitous Computing, Quantum Computing, 5G Broadband, Geo-Location, Near-Field Communications and Beacons, Inductive Charging, Spatial Sensing, Computer Vision and Pattern Recognition, Natural Language Processing and Speech Recognition, Data Mining and Predictive Analysis, Machine Learning, Transfer Learning, Deep Learning, Robotics, Telepresence and Telechirs, Nanobotics, Chatbots, Mechatronics, Memetics, Biometrics, Smart Cards, Blockchains, FinTech, Multifactor Credentialing, Emotive Surveillance and Management, Identity Management, Anonymity Networks, Ambient Intelligence, Artificial Intelligence and Intelligent Agents.

The Network Technology Revolution is defined by Jobenomics as a perfect storm of network technologies, processes and systems including:

- **Big Data** is the term for a collection of data pools so large and so complex that it becomes difficult to process and access the data using traditional methods. Connected devices, enhanced user interface, and ubiquitous sensing are all drivers of the revolution in big data. For most people who casually use the Internet, their digital world is expressed in terms of kilobytes (10^3) and megabytes (10^6). For IT professionals, the digital world is now represented by zettabytes (10^{21}). The World Wide Web has now passed the zettabyte threshold, which is the estimated amount of data storage needed to record every written word in the history of mankind.   So what does the zetta-flood mean to America's digital future? Managing gargantuan levels of data is increasingly frustrating due to the complexities and costs of maintaining internal information technology environments. By 2020, the number of data files is projected to grow as much as 75 times, compared to 1.5 times growth of the available pool of IT professionals. As a result, organizations look to the promises of cloud computing to help solve issues related to ever-increasing amounts of big data.

- **Cloud Computing** is as big a paradigm shift away from personal computers (PCs) as PCs were from mainframes in the 1990s. Cloud computing is the practice of using a network of remote servers hosted in data centers to store, manage, and process data, rather than a local server or personal

computer. To most people, cloud computing is as amorphous as its name suggests. It is not hard to comprehend that most zetta-data will be stored in the "cloud" due to economies of scale and the decreasing cost of virtualized mega-servers in super data centers. However, the "cloud" is much more than storage alone. It also entails security, connectivity, portability, access, and other issues including privacy, legal and regulatory.

- **Semantic Webs** are websites that interpret "meaning" much in the way humans do. In the beginning, the World Wide Web (WWW) consisted of non-semantic, read-only websites that focused only on data retrieval. Today's WWW 2.0 websites are semi-semantic, read-write websites that facilitate data sharing as evidenced by social media (Facebook, Twitter, etc.) and blogging. WWW 3.0 will introduce fully semantic, read-write-execute websites. WWW 3.0 browsers will perform functions for humans in merged virtual/physical worlds, and will act like personal assistants that learn the interests of users based on their previous activities, avatars that will represent the user's alter ego in the virtual world, and virtually enhanced 3D worlds that will assist users in their physical world to educate, train, as well as entertain. Semantic web technology is now migrating to mobile devices, which will enable these devices to not only understand user preferences but understand the meaning of what they want and predict what they may need based on the environment/location of the user.

- **Synthetic Reality.** Technologies in the digital world are advancing rapidly, especially in the realm of synthetic-reality, which includes augmented reality (AR), mixed reality (MR) and virtual reality (VR). In AR, the visible natural world is overlaid with a layer of digital content. MR virtual objects are integrated and responsive to the natural world. VR places the user entirely in a virtual world normally via the use of googles or helmets. AR, MR and VR are often referred to as computer-simulated reality allowing users to simulate physical presence (sight, touch, hearing and smells) in real and imagined worlds. Haptics (kinesthetic communication that creates the sense of touch by applying force, vibration or motion to a user) is also gaining widespread acceptance in synthetic reality. Synthetic reality body suits are also being developed for a total immersion synthetic reality experience. Unlike high-definition flat screen technology that makes memories from what people witness, synthetic reality makes memories from what people experience—the difference between observation and immersion.

  The U.S. military's AR/VR awareness and visualization systems, and AR/MR/VR commercial systems, like Google Glass (AR) and Magic Leap (MR), will connect the semantic web to humans on the move, providing people with information tailored to their geo-located position and annotated with personalized items of interest via semantic networks. Major synthetic reality markets include video gaming, entertainment (movies, sports, live concerts and adult entertainment), medicine, manufacturing and arts/design.

- **Mobile Computing.** Smartphones and other mobile devices are the defining technology of the 21st century. They are now the fastest-selling devices in history. Handheld NTR devices (smart phones/pads/tablets connected to cloud-based data centers) are rapidly replacing personal

computers and their related peripherals. According to CISCO[2], in 2014, only 40% of total IP traffic originated with non-PC devices, but by 2019 the non-PC share of total IP traffic will grow to 67%. In 2014, Wi-Fi and mobile devices accounted for only 33% of IP traffic but will increase to 66% by 2019. Today, half of the world's adult population owns a smartphone. By 2020, 80% of the population will own a mobile communications device-a device that holds so much power that it can create economies, topple institutions and addict large segments of society. The average American spends 4.7 hours a day on mobile devices that are selling in excess of 2 billion devices per year. Futurists predict that screen-based mobile communications will continue to grow until year 2030 and eventually be replaced by ubiquitous micro-devices embedded into wearables (glasses, jewelry, clothes, etc.), vehicles, electronics and appliances. Interconnected wearable medical devices will allow wireless health monitoring to greatly improve prevention, thereby extending human life and reducing the cost of healthcare.

- **Ubiquitous Computing** (everywhere computing) is closely related to mobile computing but more expansive. Ubiquitous computing is an advanced computing concept that integrates computation into an environment via a myriad of embedded microprocessors in everyday objects (from clothes to animals to inanimate objects) that would be able to communicate information without requiring human interaction. Ubiquitous computing represents the third wave of computing that evolved from the first generation mainframes (each shared by many people), to second generation personal computers (one computer, one person) and third generation ubiquitous computing (many devices communicating to one person). The ultimate goal of ubiquitous computing is to make thinking things to interact with humans anywhere and everywhere. Ubiquitous computing is the inverse of virtual reality. Ubiquitous computing forces computers to function in the world with people as opposed to virtual reality that places people inside computer-generated worlds.

- **Quantum Computing** harnesses the power of atoms and molecules to perform memory and processing tasks much more efficiency than conventional binary computation. Conventional transistor-based computers only use binary states of "0" or "1" that are encoded into binary digits (bits). Quantum computers quantum bits (qubits), which can be in "superpositions" of states that can expressed in multiple ways including 0s and 1s and all points in between at the same time, thereby allowing quantum machines to make multiple calculations simultaneously. Transistor-based computers are reaching the limit of Moore's Law (the number of transistors on a microprocessor doubles every 18 months) since the distance between transistors on today's microchip are now approaching the atomic level. The advent of the NTR, the need for more and more computing has only intensified fueling interest in quantum computing, which heretofore has been largely theoretical. Quantum machines have the potential to be millions of times more powerful than today's most powerful supercomputers. Quantum computers could speed advances in artificial intelligence, science, medicine as well as solving complex mundane problems as manufacturing and air traffic control.

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[2] CISCO, Cisco Visual Networking Index: Forecast and Methodology, 2014–2019 White Paper, http://www.cisco.com/c/en/us/solutions/collateral/service-provider/ip-ngn-ip-next-generation-network/white_paper_c11-481360.html

- **5G Broadband.**   Next generation networks that will provide for pervasive and instantaneous connectivity for nearly everyone to connect to anyone, anything, anywhere.   Analog first generation (1G) wireless networks arrived in the early 1980s. Digital 2G became operational in 1991. In 2001, 3G added packet-switching that made direct connections more efficient. 4G debuted in 2010 with broadband connectivity to the internet and a 10-fold average increase in speed over 3G systems (50 milliseconds versus 500 milliseconds respectively). 5G networks are anticipated in 2020 and will increase speed up to 50-fold over 4G along with a potential 1000-fold boost of the amount of data that can be transmitted (1 to 10 gigabits per second versus 10 to 100 megabits per second for 4G). Because of gargantuan bandwidth requirements, 5G is likely to migrate to today's very-high frequency (VHF) spectrum, as well as tomorrow's super-high (SHF) and extremely high (EHF) bands. Within the next decade, the majority of television viewing will be done over the internet, which will not only transform the $500 billion/year global broadcast and cable TV industry but will reach 5 billion new viewers—many of whom had access to traditional TV service.

- **Geo-Location** involves a process or technique of identifying the geographical location of a person or device by means of digital information processed via the Internet. A geolocation can be as general as the continent the user is connecting from or as specific as his geographic position, defined in terms of latitude, longitude and altitude. Mobile robotics is poised to make a major leap forward with the advent of atomic global positioning that replaces GPS satellites with highly accurate embedded miniature geo-location capability thereby allowing robots and nanomachine connectivity to the Internet of Things.

- **Near-Field Communications** and **Beacons**. **Near-Field Communications** (NFC) is a short-range wireless connectivity standard (SO/IEC 18092) that uses magnetic field induction to enable communication between devices when they're touched together, or brought within a few inches of each other. NFC was originally developed by the U.S. military to prevent friendly-fire incidents. NFC chips are small tiny radio transmitters that stay inactive until they are activated by another NFC-enabled device in order to stream data across short distances. NFCs are already in wide use. For example, remote "keyless entry" NFC systems are used to unlock car doors. This technology has been adapted for use in smartphones, pads and tablets for payment processing. **Beacons**, or proximity technology, use small, inexpensive, low-powered devices that enable accurate location finding and communications. Beacons transmit small amounts of data via Bluetooth Low Energy (BLE) up to 50 meters, which is longer than the NFC devices operate best within a very close range. Consequently, beacon are typically used for indoor locations (where GPS usage is limited) via a standalone device or in conjunction with BLE enabled mobile devices. For example, when a customer is in a retail store, the store's beacon communicates with a customer's smartphone to display special offers, products or services.

- **Inductive Charging** is wireless charging of devices and nanodevices using electromagnetic fields to transfer energy between two devices. Today, inductive charging has two standards (Qi and PMA) that have support from major corporations like Starbucks (building Qi chargers in coffee tables) and IKEA (building PMA chargers in furniture), and various manufactures for smartphones and electrical systems. While the elimination of cord and ports are attractive features of inductive charging, the ultimate potential for this technology is with nanodevices, especially surgically implanted devices and nanobots that are embedded within a body. The Internet of Things will

also require embedded micro and nanodevices in a wide variety of products that don't necessarily have a charging cord.

- **Spatial Sensing** involves real-time detection, measuring, mapping and analysis of objects in relationship to each other and the environment. Spatial sensing is used in military, industrial and entertainment applications including remote sensing, robotics and gaming. Significant advancements are being made integrating the virtual world, such as integrating holographic avatars with real world geographic information systems. Geolocation (time and position) technologies are most often used in spatial sensing but newer systems are incorporating echolocation technologies (location of objects by reflected sound, similar to sonar-like ways dolphins and bats use Doppler shifts with sound waves) that offer higher accuracy and are not limited by line-of-sight.

- **Computer Vision** and **Pattern Recognition. Computer Vision** involves training computers to gain high levels of understanding from cameras, photos, digital images and videos. Sub-domains of computer vision include object recognition, object indexing, motion estimation, video tracking, and image restoration. **Pattern recognition** is a form of automated data processing that recognizes, identifies and classifies patterns, shapes, forms and regularities in images, pictures, photographs and films. Computer vision and pattern recognition applications are central elements of machine/transfer/deep learning and artificial intelligence efforts in exploiting information in data contained in images and video files.

- **Natural Language Processing** and **Speech Recognition**. **Natural language processing** (NLP) is the ability of a computer program, machine or intelligent agent to understand human speech. Compared to precise and unambiguous software programing "languages", human languages is often complex, vague and cryptic, especially when slang or colloquialism is introduced. Similar to pattern recognition, **speech recognition** involves teaching machines to interpret and a respond to sounds and words produced by a human voice across many languages and dialects by converting analog audio (speech) into a recognizable digital format.

- **Data Mining** and **Predictive Analysis**. **Data mining** involves using advanced algorithms to analyze large databases and summarizing this data for use or sale. Machine learning and data mining have much in common, where the former is more predictive and the latter more about discovery. Data mining finds patterns for humans to understand and machine learning uses those patterns to improve its own program and understanding. Within the field of data mining, machine learning models and algorithms lend themselves to predictive analytics that analyze current and historical facts to anticipate future or otherwise unknown events. **Predictive analytics** is the branch of the advanced analytics which is used to analyze current data to make predictions about unknown future events. Predictive analytics blends techniques from statistics, modeling, machine learning and artificial intelligence.

- **Machine Learning** involves a subfield of study in computer science that gives computers the ability to learn without constant human interaction. Machine learning is a powerful artificial intelligence tool that can make sense of zettabytes of information. For example, machine learning algorithms help email-providers identify spam, cloud computing-providers eliminate malware, journalists to use optical character recognition, and search engines to better identify

subjects of interest. Other applications include automating employee access control, reducing consumer wait times, predicting medical emergencies, self-driving cars and biometric recognition applications.

- **Transfer Learning**, also known as inductive learning, is an artificial intelligence technique referred to as machine "reasoning". The goal of transfer learning research is to teach machines to take lessons learned from one domain and apply it another domain. Transfer learning differs from machine learning models deal with single tasks, whereas transfer learning models the human experience of using past experiences to help determine outcomes of a given task. In other words, transfer learning models transfer past experience from one or multiple source tasks (experiences) to increase learning on a targeted task. To date, transfer learning is proving to be a difficult technical challenge because machines by nature are neither intuitive nor capable of reasoning.

- **Deep Learning** is an artificial intelligence technique that allows machines to extract patterns from colossal amounts of data in the same manner that the human brain works. Deep learning is an enabling technology for scanning masses of people to identify bad actors, making sematic webs more intuitive and self-driving cars to become as proficient as professional chauffeurs. Billions of machine-to-machine connections, networked through the air and fiber, will grow exponentially smarter at tacking complex learning problems based on a set of algorithms that model and interpret high-level abstractions. Collectively these abstractions can be codified and then classified into real world "features" or "representations" that can be learned and used for decision-making, governing and controlling. Feature learning or representation learning is a set of techniques that learn a feature: a transformation of raw data input to a representation that can be effectively exploited in machine/deep learning tasks.

- **Robotics.** Robots are automated machines capable of movement in multiple environments including factories (movable industrial robots), homes (automated cleaning devices and domestic entertainment robots), infrastructure (pipe and electrical conduit video inspections), surveillance (cameras and other detectors), land (unmanned ground vehicles), sea (autonomous water and underwater vehicles), and aerospace (unmanned aerial and space vehicles). The U.S. Department of Defense alone is spending $5 billion per year on unmanned robotic systems[3]. The field of robotics overlaps with mechatronics, ubiquitous computing, nanotechnology, bioengineering and artificial intelligence.

- **Telepresence** and **Telechirs.** **Telepresence** involves the use of digital technology to remotely operate machinery to create an effect of being at a different location or remotely controlling the machine or robotic device. Telepresence allows human operators to see from a **telechir**'s (a complex robot that is remotely controlled by a human) viewpoint. Telechirs may even be equipped with tactile sensing (touch) and audio technology to enhance the human operator's telepresence and cognitive awareness. Today, telechirs are most often operated in remote, hostile or alien (e.g., interplanetary) environments. Tomorrow, micro-telechirs and nano-telechirs will operate ubiquitously and be controlled by centaurs (a combination of human operators and artificial intelligence agents).

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[3] DoD, Unmanned Systems Integrated Roadmap, FY2013-2038, http://archive.defense.gov/pubs/DOD-USRM-2013.pdf

- **Nanobotics** also called nanomachines, nanoids, nanites and nanomites are microscopic self-propelled machines with a degree of autonomy and reproductive capability at the molecular level. Nanomachines and nanobots as small as one billionth the size of a meter that can be used in medical applications to attack cancer, dislodge clots and blockages, and perform surgery at the cellular level.

- **Chatbots**, also known as web robots, chatterbots or simply bots, are interactive, artificial intelligence-driven, software applications that run automated tasks or simulate a conversation to deliver text-, voice- or video-based information to a user via a networked device. Siri, Echo, and Xiaoice are examples of chatbots. Chatbots are becoming especially useful in messaging apps that are rapidly replacing text and augmenting social media as a means of communication.

- **Mechatronics** involves systems engineering of mechanical devices infused with NTR technology. Mechatronics combines mechanical engineering, computing, and electronics to create micro and nanomachines. Micro-electromechanical systems (MEMS) are miniaturized mechanical and electro-mechanical devices and structures that are made using microfabrication techniques. One of the leading MEMS applications involves miniature conventional and piezoelectric microphones—a $1 billion industry oriented to miniaturization and improvement of signal-to-noise processing for better natural language and voice recognition applications—that are used in mobile devices, chatbots and robotics. Nanomachines and nanobots as small as one billionth the size of a meter that can be used in medical applications to attack cancer, dislodge clots and blockages, and perform surgery at the cellular level. Mechatronics will eventually evolve to smart dust applications where myriads of small sensors, actuators or processors like dust are applied, swallowed or poured.

- **Memetics** involves the study of memes or the life of ideas and awareness of them. As opposed to genes (biological units of human physical heredity), memes represent cultural units of human intellectual heredity, such as ideas, images, phrases and behaviors that can be passed from one individual to another by non-genetic means, especially by imitation. In theory, memetics are designed to track mutation of ideas and cultural information transmitted from individuals or communities in the way that physical viral transmissions and mutations are tracked. In a technical sense cultural memes (humorous images, videos and texts) are spread virally via the Internet today. The goal of memetic research is to identify cultural memes (both good and bad) that spread rapidly in the virtual world and the reasons for their bandwagon effect. Tomorrow, smart machines and intelligent agents will use memetics to entertain, inform and control humans.

- **Biometrics** involve biological/genetic identifiers including face, voice, fingerprints, hand geometry, earlobe geometry, retina and iris patterns, voice waves, DNA, signatures and keystroke dynamics. In the near future, networked surveillance systems will be able to observe and identify millions of citizens simultaneously by the sound of their voice, the gate of their walk, an individual's face prints, skin texture, vein patterns and even facial expressions. Biometrics are currently being integrated into border control, immigration, customs, identity, e-government, education, healthcare and customer management systems.

- **Smart Cards** are plastic cards with built-in microprocessors, used typically for electronic processes such as financial transactions and personal identification. The combination of smart card and

biometric technologies will have a dramatic impact ID cards, passports and visas, licenses, social security cards, medical files, insurance records, ration cards, work permits, resident alien cards, club memberships and voter cards. National biometric ID programs are a growing worldwide trend. India's national biometric ID program, called Aadhaar, was launched in 2009 for the advertised purpose of more equitable distribution of welfare benefits. According the Government of India, total expenditures from 2009 through Q1 2017 for the Aadhaar project was only $1.4 billion.   Issued by The Unique Identification Authority of India, Aadhaar is a 12 digit individual identification number linked to mobile phones and bank accounts. Aadhar was initiated as an attempt towards having a single, unique identification document or number that would capture demographic and biometric information of every Indian resident. Aadhaar has enrolled over 1.157 billion Indians as of June 2017 with a goal to register all 1.379 billion Indian citizens by 2020 to provide proof of identity and address, anywhere in India. The National Payments Corporation of India (NPCI) uses Aadhaar as a central way for the electronically channeling of government benefits and subsidies to Indian citizens in a cost effective manner as well as controlling fraud, waste and abuse. The Aadhaar database includes an iris scan, digital fingerprints, a digital photo and text-based data for every enrollee.

Unlike the U.S. Social Security Number (SSN) program, Aadhaar is not mandatory but a voluntary government program. However, the U.S. government has implemented a number of voluntary biometric ID programs including the Common Access Card for U.S. Armed Forces and contractors, and US-VISIT to track to track individuals deemed by the United States to be terrorists, criminals, and illegal immigrants. The largest U.S. commercial biometric ID user is Disney World. In 2013, Disney World implemented a gate system that uses RFID chips with fingerprint biometrics. In July 2016, the U.S. Patent and Trademark Office issued Walt Disney Co. a patent for a new type of technology that can track theme-park guests through their feet in order to "customize the guest experience" as well as understand consumer behavior.   Using these proven U.S. systems, tailored to American sensitivities to privacy and security, the U.S. welfare and social assistance programs could save hundreds of billions of dollars annually without sacrificing social benefits and safety nets.

- **Blockchains** are structured data that create distributed digital ledgers and/or records of shared transactions on an integrated network of computers. Each transaction is digitally signed to ensure authenticity without the need for a central authority. Blockchains use mechanisms to achieve consensus on transactions, define known participants and exclude outside interlopers. Examples include: currency (Bitcoins and electronic cash systems), payment systems (to send money), digital assets (to create and manage digital assets such as stocks, bonds, derivatives, titles and loyalty rewards), verify data (to record and authenticate data, files and business processes) and smart contracts (to execute and record contracts without third-party interference). Distributed ledgers maintain a complete historical record of who owns what and to whom what is owed. These ledgers could potentially create a new global, cross-border financial system without the need for government or major bank control or intervention.

- **FinTech.** Financial technology (fintech) uses networks and software to provide financial services for the purpose of disrupting incumbent financial systems and corporations that rely less on software. Originally, fintech applied technology the back-end of established consumer and trade financial institutions. Today, fintech is expanding to include including innovations in distributed

ledgers, financial literacy, private sector retail banking, mobile banking, artificial intelligence advisors, peer-to-peer lending and investments, crowd funding, mobile wallets, predictive analytics, data-driven marketing and crypto-currencies like bitcoin. More than $50 billion has been invested in almost 2,500 companies since 2010 oriented to redefining the way in which society stores, saves, borrows, invests, transfers, spends and protects money. In 2015, global fintech investment grew by 75% from the year prior to $22.3 billion, driven by deal-flow across continental Europe and Asia-Pacific.[4]

- **Multifactor Credentialing** combines multiple credentials for authentication and identification of crowds, individuals and intelligent agents for layered physical and cyber defense of locations, computing devices, networks and databases. Poor credentialing is responsible for approximately on-half of all cyber intrusions and thefts. Credentials include passwords (what one knows), security tokens (what one possesses) and biometric verification (what one is). Bring Your Own Authentication is a computing concept in which an privately owned devices, such as a smartphone, can be used to provide authentication credentials. Biometric identification systems are replacing passwords as a method for strong authentication.

- **Emotive Management** and **Surveillance.** By the end of 2015, over 1,000 U.S. schools will incorporate emotions analysis systems that analyze facial expressions. Other emotive applications currently include customer satisfaction and sports applications. The facial expression market is expected to rise from $20 million today to $10 billion by 2020. Security and workforce applications will soon be available for mass-scale surveillance, hyper-emotive sensitivity (mental illness), identification, and authentication purposes. Soon thereafter, hypervigilance systems could be deployed to measure the types of potentially destructive behaviors of individuals or groups that could cause harm or pose a threat. Emotive management should not be confused with emoticons (emotional icons) and emoji (ideograms or pictographs) used in gaming.

- **Identity Management**, also known as identity and access management, deals with identifying and controlling wired and wireless user access to resources in a geographic area, a network, or an enterprise by associating user rights, privileges and restrictions with the contacted identity. In an enterprise setting, identity management is used to increase security and productivity; enhance external device verification, onboarding and provisioning; and decreasing enterprise costs, downtime and redundant/repetitive efforts. An identity access management system is a framework for business processes that facilitates the management and security of electronic identities, especially with the proliferation of mobile devices that are networked to cloud-based data centers. Identity management also deals with managing (deleting, restoring or changing) a person's personal information that has been stolen (identity fraud and theft) or incorrectly or erroneously entered or stored online.

- **Anonymity Networks** enable users to access the Web while blocking any tracking or tracing of their identity on the Internet. Current examples include TOR (onion routing that encrypts and then rebounds communications onto a network of relays run by volunteers throughout the world) and Freenet that enables users to anonymously publish free website as well as share files and

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[4] Accenture, Fintech and the evolving landscape: landing points for the industry, 2016, http://www.fintechinnovationlablondon.co.uk/pdf/Fintech_Evolving_Landscape_2016.pdf

chat on isolated forums. Anonymity networks are touted as tools for freedom of speech and privacy, but the reality is much more sinister for authoritarian regime and criminal users.

- **Ambient Intelligence.** In an IoT world, the sum of individual parts will be much greater than the whole due to the "ambient intelligence" effect. Ambient intelligence is created when formerly dumb or mute objects are given the ability to communicate. This communication can be machine-to-machine or machine-to-human where devices work semi-autonomously or in concert with human activity. Today, embedded devices provide relatively low levels of unsophisticated ambient intelligence. In the near future, these devices will become much more knowledgeable, imaginative and creative. As devices become smarter, they will increasingly exhibit humanoid attributes of situational awareness and adaptively. Ambient intelligence provides the bedrock infrastructure for artificial intelligence, which provides the foundation for future intelligence agents.

- **Artificial Intelligence (AI).** John McCarthy coined the term "artificial intelligence" in 1955 and defines it as the science and engineering of making intelligent machines. Today, AI involves deployment of intelligent agents (machines) able to perceive environment and intelligently perform tasks that anthropomorphize human form, activities and attributes in many areas including: social, technical, economic, political. Socially intelligent search engines connect billions of people and links them to their interests, likes and buying habits. Autopilots (intelligence agents) fly many more air miles than human pilots. Robo-traders (intelligence algorithms) conduct more stock market trades than humans. Multilingual Interactive Voice Response Systems simultaneously conduct millions of one-on-one interviews with pre-identified voters, which is impossible for the politician to perform. AI is also a force-multiplier when used in conjunction with the other NTR technologies, processes and systems above.

- **Intelligent Agents** involves artificial intelligence agents that replace or supersede the need for human intervention and actions. When machine intelligence approaches human intelligence, humans will be compelled to turn more and more decision-making to machines or smart algorithms. Hypothetically, machines will eventually mature from general intelligence to super-intelligence at the point of technical "singularity" when machines become as cognitive as humans. Soon thereafter, machines are likely to advance to super-intelligence, since they will be able to make and execute decisions faster than humans can comprehend. When this happens, luminaries like Bill Gates, Steven Hawking and Elon Musk believe society will be at risk—perhaps an existential risk depending on the malfeasance of the initial AI designer. Many experts believe that super-intelligence agents will be active as early as mid-century in several critical domains, such as the worldwide financial system that is already replete with numerous sub-human level AI systems.

NTR economic transformation is in its infancy but growing exponentially via the:
Digital Economy (aka Internet, Web or New economies), E/M-Economy (electronic-commerce (e-commerce, e-business, e-retailing, mobile-commerce and m-health), Sharing/On Demand Economy (aka Uber and Airbnb economies), Apps/Bot/AI Economy, Platform Economy, Gig Economy, Data-Driven Economy and Internet of Everything Economy.

The Network Technology Revolution will transform economies, labor forces and society via, Digital Economy, which is composed of the E/M Economy, On Demand/Sharing Economy, App/Bot/AI Economy, Platform Economy, Gig/Contingent Workforce Economy, Data-Driven Economy and Internet of Everything Economy.

Digital Economy. The digital economy (also known as the web economy, internet economy, network-centric economy, or the new economy) is an economy that is based on digital and networked technologies, which is increasingly intertwining and preempting today's traditional economy. In addition to NTR technologies, processes and systems, the digital economy consists of various components including government (policy and regulation), infrastructure (internet, networks, telecom and electricity), and providers (digital service, content, information and knowledge workers). The digital economy provides a global network that allows individuals, organizations and governments to access information, interact, communicate, collaborate, and provide products and services. Digital products and services include a vast repository of digitized products (news, video, music, data, information, knowledge, etc.), financial transactions (e-government, e-business and e-commerce), social networking (ala Facebook, Twitter, Instagram, etc.), and networked physical goods (ala Internet of Things). To achieve maximum productivity, these components must operate efficiently and collectively.

E/M-Economy. Electronic (E) and mobile (M) commerce is already transforming economies, government, business and society via network and digital technology, processes, systems and services.

E-commerce involves networking customers, suppliers and partners, including sales, marketing, order-taking, delivery, customer service, purchasing and procurement. E-business involves networking the entire business cycle from research and product development, knowledge management and human resources, finance, procurement, production, distribution, transportation, logistics, risk management, sales and marketing. E-commerce is primarily involved with online transactions like purchasing and shopping as well as free transactions like downloads and information exchange. E-business generally is inward-facing using emerging NTR technologies, processes and systems to enhance operations, while e-commerce is out-ward focused on customers and partners. E-commerce/e-business industries include business-to-business (B2B), business-to-consumer (B2C), consumer-to-consumer (C2C) and government to business/consumer (G2B and G2C).

M-commerce is the buying and selling of goods and services through wireless handheld devices such as mobile phones, pads, tablets and laptops. The explosion of mobile applications (apps) and ubiquitous mobile devices, especially in underdeveloped economies, has created an industry that will ellipse United States e-commerce by 2017. M-health (a subset of e-health, involves the practice of medicine and public health supported by mobile devices. While U.S. m-health is growing in popularity, the field is revolutionizing in healthcare in low-income communities and nations. Other high growth m-applications include games, music, entertainment, sports, lifestyle, education, transportation, utilities and lifestyle.

Sharing/On-Demand Economy. The Sharing/On-Demand Economy is a new wave of peer-to-peer, access-driven businesses that are characterized by the ability of individuals to share (goods,

knowledge, money, time, skills, content, etc.) rather than buy or own, or fulfill consumer demand via the immediate provisioning of goods and services. In sharing, the trend is towards usage, as opposed to possession, of underused or idle assets. In many incidents these assets, tangible and intangible, are free. For example, Wikipedia, Google, Facebook, LinkedIn, Instagram and Dropbox all contribute freely to sharing. In the case of companies like Uber and Airbnb, the idle assets are available for rent. Consumers and entrepreneurs will be the greatest beneficiaries of the sharing economy. Such peer-to-peer sharing concepts can provide additional income for owners, while providing cheaper alternatives to consumers. For consumers, the sharing provides cheaper goods and services by quickly satisfying consumer needs via internet-connected applications.

The sharing/on-demand economy is expected to grow over time. PwC estimates that the five main sharing/on-demand sectors (peer-to-peer financing, online staffing, peer-to-peer accommodation, car sharing and music video sharing) have the potential to increase global revenues from around $15 billion to $335 billion by 2025. According to the PwC study, 44% of U.S. consumers are familiar with the tenets of a sharing/on-demand economy, 19% have already engaged in a sharing/on-demand economy transaction as a consumer, and 7% as a provider of sharing services or products. Among US adults familiar with the sharing economy, 86% agree that the sharing economy makes life more affordable and 78% think that it builds a stronger community. Of those consumers (from 18 years old to those 65 and older) who have tried the sharing/on-demand economy, the vast majority intends to continue participating in these transactions, and, more importantly, are "re-thinking the value of ownership" with 81% stating that it is less expensive to share than own and 43% agreeing that owning today is burdensome.

With major business successes, like Uber and Airbnb, the sharing/on-demand economy is much more than a fad or trend. It is an emergent ecosystem that is upending mature business models across the globe. If successful, the sharing/on-demand economy is likely to usher in a transformation as significant as the personal computer did when it was introduced in the 1990s.

App/Bot/AI Economy. The App (application) Economy refers to the range of economic activity surrounding applications. An app is a type of software that allows you to perform specific tasks. Applications for desktop or laptop computers are called desktop applications, while those for mobile devices are called mobile apps. A Bot, also known as a web robot, an internet chatbot or simply bot, is an interactive, artificial intelligence-driven software application that runs automated tasks or simulates a conversation to deliver text-, voice- or video-based information to a user via a networked device. Artificial intelligence (AI) is the intelligence exhibited by machines or software that is able to do things normally done by people.

- ***The App Economy.*** Apps are the digital interface through which we live, work and play and the primary way we engage with media, brands and ultimately with each other. According to App Annie, a global analytics services and market intelligence firm with over 500,000 registered members, forecasts that global app revenue will double from $51 billion 2016 to over $101 billion by 2020 driven by third world growth and greater first world wallet share. Global mobile app downloads will also double to 284 billion in 2020. Games generated about 85% of app market

revenue in 2015 but will decrease to 74% by 2020 due to growing popularity of subscription-based apps, such as music streaming, video streaming and online dating.[5]

Today, the global app industry has grown to over 4 billion mobile applications. Most digital applications are available free or nominal cost on U.S. app stores including 2.2 million on Google Play and 2.0 million on Apple App store. 74% of all mobile apps are developed in America (82% by U.S. startups and small businesses of which 82% are outside Silicon Valley). However, a few lucky startups, like Instagram, Snapshot, WhatsApp and Maze, went from $0 to over $1 billion within one to six years with fewer than 100 employees.

- **The Bot Economy.** Many experts believe that the App Economy will give way to a Bot Economy. The most well-known bot is Apple's Siri that was introduced to the American public in 2011, followed Google's Google Now in 2012, Amazon's Echo (aka Alexa) in 2014, Microsoft's Cortana and Xiaoice in 2014, Facebooks' M in 2015, and Microsoft's Tay in 2016. Each generation has become progressively smarter, engaging and more widely used. The newest bots not only research and deliver information but are designed to be a companion, or friend, that offers friendly advice or casual conversations.

  While American chatbot use is somewhat limited, largely due to content and cultural issues, Chinese use has grown exponentially. Microsoft's very successful Xiaoice (pronounced Shao-ice) Chinese chatbot has 40 million users and has even joined China's Dragon TV morning news as a weather "girl". To date, Xiaoice has conducted more than 10 billion conversations with humans, most of them about private matters.[6] The Bot Economy has unlimited potential if chatbots can mature to the point of being practical, friendly and trustworthy—there are billions of lonely people who would love to have a companion that would help them with daily tasks as well as emotional issues. Conversation-as-a-Service may be the next big thing.

- **The Artificial Intelligence Economy.** Given the limitations of human beings to rapidly develop hypotheses to assess and action on large amounts of big data, AI-enabled machines and AI software agents will be used generate hypotheses and provide solutions from zettabyte pools of complex data. Via an AI technique known as deep learning, AI agents are already being used to power internet search engines, translate languages, block spam, write reports, detect fraud, recognize voices and identify individuals out of large crowds.

  AI-enabled machines are replacing workers on factory floors as well as soldiers and airmen on the battle field. Recent studies suggest that up to half of the U.S. labor force could be replaced by automation by 2030. Routine cognitive and manual jobs are most at risk, whereas jobs with non-routine cognitive and manual skills will become more valuable. Whether super-intelligent AI-enabled machines or AI agents will eventually eliminate the need for human labor is now hotly debated. Technical experts forecast that AI machines and agents will reach the point of singularity (equal to humans) as early as mid-century and will rapidly advance to super-intelligent soon thereafter, which will upend workforces as well as society. Historians and economists are

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[5] App Annie, App Annie Mobile App Forecast:, Q1 2016, The Path to $100 Billion,
http://files.appannie.com.s3.amazonaws.com/reports/App-Annie-02-2016-Forecast-EN.pdf?aliId=107713631
[6] Nautilus, Your Next New Best Friend Might Be a Robot, 4 February 2016, http://nautil.us/issue/33/attraction/your-next-new-best-friend-might-be-a-robot

more optimistic and argue that, based on previous technology revolutions, new high-skilled jobs will be created and that society will adjust to new norms and potentially a much higher quality of life.

Regardless of who is correct, AI and the other NTR-related technologies will be brilliantly creative and creatively destructive. A landmark study by Bank of America Merrill Lynch forecasts that by 2025 AI and smart machines will have annual disruptive impact of $14-$33 trillion, including $8-9 trillion of cost reductions across manufacturing and healthcare, $9 trillion cuts in employment costs via AI-enabled automation of knowledge work and $1.9 trillion in efficiency gains via autonomous cars and drones.

Platform Economy. A platform economy is dependent on the value of "network effect" of people using the platform as opposed to the value of a single user or owner. The more people who use a digitally networked platform, the more valuable the platform becomes to each user. Increased value creates a bandwagon effect that facilitates a positive feedback loop encouraging progressively greater and greater numbers of people join the platform's ecosystem. Due the NTR, tens of thousands of platform ecosystems exist across the planet. Collectively, they comprise the global platform economy.

In 2016, there are 176 major (over $1 billion annual revenue) platform companies worldwide, each with their own ecosystem or group of interconnected entities. The market valuation of, these 176 companies totals $4.3 trillion. Asia is home of 82 companies, followed by the United States with 63 companies, Europe with 27 companies and the rest of the world with 5 companies.[7] Due to their global reach and access to 3.4 billion internet users, today's platform owners are far more powerful and formidable than yesteryear's biggest industry tycoons.

According to Accenture, "The Platform Economy is considered one of the biggest transformations for business since the Industrial Revolution. It's a bold claim, but the speed and scale with which today's platform businesses have developed really only hint at the profound economic shifts that lie ahead ….For most businesses—whether they are "born-digital" or have an industrial heritage stretching back over many decades—the opportunities for new growth and development are unprecedented." [8]

The platform economy, or digital platform economy, encompasses NTR-enabled social, business and government activities. The industrial revolution was organized around factories. The information revolution focused on computers. In the network technology revolution, platforms are king. Google and Baidu started out as search platforms. Facebook gained fame as digital asocial media platform. Amazon, eBay and Alibaba began as e-commerce platforms. PayPal and Taobao commenced as digital financial platforms. Airbnb, Uber, Lyft and Didi launched as digital hail-riding platforms. Today, they also provide infrastructure on which other platforms are built. Global leaders in all industries are now creating adaptable, scalable, and interconnected platforms that underpin their future success in the digital economy.

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[7] The Center for Global Enterprise, The Rise of the Platform Enterprise: A Global Survey, January 2016, http://thecge.net/wp-content/uploads/2016/01/PDF-WEB-Platform-Survey_01_12.pdf

[8] Accenture, Accenture Technology Vision 2016, https://www.accenture.com/t20160314T114936__w__/us-en/_acnmedia/Accenture/Omobono/TechnologyVision/pdf/IT-Tech-Trends-Technology-Vision-Exec-Summary-2016.pdf#zoom=50

Gig/Contingent Workforce Economy. A gig/contingent workforce economy is an environment in which temporary positions are common and organizations contract with independent workers for short-term engagements. The trend toward a gig/contingent workforce economy is well underway. America's labor force is in a state of transition from a standard full-time work force to a contingent workforce that consists of part-time, temporary, contract labor, independent contractors, consultants and free-lancers.

A short time ago, a "gig" was a term largely used by musicians for a part-time job, a single engagement of short or uncertain duration. Today, due to uncertain economic conditions and the influence of the network technology revolution, about half of all Americans make their living working gigs rather than a full-time job. Most gig-livers are contingent workers who are dependent on uncertain or conditional employment.

Today, the U.S. contingent workforce is approximately 40% of the total employed labor force. By 2030, or sooner, Jobenomics forecasts that the contingent workforce will be the dominant (over 50%) form of labor in the United States based on seven factors: (1) increasing labor force losses versus labor force gains, (2) adverse corporate hiring and employment practices, (3) revolution in energy and network technologies, (4) automation of manual and cognitive jobs, (5) impact of the emerging digital economy, (6) shift from full-time, to part-time and task-oriented labor, and (7) cultural differences of new labor force entrants.

Data-Driven Economy. A data-driven economy involves storage, search, capture, query, transfer, sharing, visualization and analysis of zettabytes of Big Data. To compete in the digital world characterized by clouds of containing zettabytes of data, enterprises must be able access pertinent data and wring as much information, knowledge and wisdom as possible using NTR tools to drive high-value business and societal outcomes. In the Data-Driven Economy, enterprises will succeed or fail based on how well they leverage data to: improve operational efficiencies; make better decisions, customize products and services to customer and client needs, automate business processes, increase productivity, manage risk, provide security, protect privacy and intellectual capital, and form collaborative and innovative partnerships. In the Data-Driven Economy, industries, governments, nations, regions and international coalitions will operate and function (either collectively or independently) via the intelligent use and sharing of data to optimize entire operational and sociological environments.

The Data-Driven Economy is not constrained by traditional borders nor measured by traditional import/export metrics. Data is difficult to quantify in dollars but is nonetheless of significant value. Data-driven economies and enterprises can create global markets and user groups across borders. Small business and emerging markets are growing at exponential rates. According to the McKinsey Global Institute, while flows of goods and finance have lost momentum, used cross-border bandwidth has grown 45-times larger from 2005 to 2016, and is projected to grow by another nine times in the next five years as digital flows of commerce, information, searches, video, communication, and

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intracompany traffic continue to surge.[9] Globally the Big Data industry has grown from $7.6 billion in 2011 to $27.3 billion in 2016 and is projected to be over $90 billion by 2026.

Supporting and accelerating from the traditional economy to a data-driven economy is a high priority for many nations. For example, the European Commission recent outlined a new strategy for a Big Data/data-driven economy that will stimulate research and innovation on data while leading to more business opportunities and an increased availability of knowledge and capital, in particular for small and medium-sized enterprises, across Europe. According to the Commission, Big Data technology and services are expected to grow seven-times faster than other ICT (information and communications technology) markets.[10]

A data-driven economy is much more than just a Big Data industry technology and services. A data-driven economy derives its greatest benefit on how data is used to enhance operations in vertical industries, such as healthcare and transportation, and horizontal industries, such as marketing and advertising.   However, micro-businesses may be the biggest beneficiaries of the Data-Driven Economy. "Small businesses worldwide are becoming "micro-multinationals" by using digital platforms such as eBay, Amazon, Facebook, and Alibaba to connect with customers and suppliers in other countries. Even the smallest enterprises can be born global: 86% of tech-based startups we surveyed report some type of cross-border activity. The ability of small businesses to reach new markets supports economic growth everywhere." according to McKinsey Global Institute.

Internet of Everything Economy. Today's Internet of Things (IoT) mantra is morphing into an Internet of Everything (IoE) state of mind increasingly binding more and more things to things, things to people and people to people. The IoE will make many of the familiar devices and objects in our lives readily Internet-connected, smart phone-accessible and responsive in a world where more things are connected to the Internet than people. The IoT includes environmental "things" to monitoring weather, transportation things for traffic and energy usage, appliance things for intelligent electronics, manufacturing and logistics things, advanced health and medical things, as well as thousands of other things that will transform virtually every field of endeavor.

Cisco defines the IoT as bringing together people, process, data, and things to make networked connections more relevant and valuable than ever before—turning information into actions that create new capabilities, richer experiences, and unprecedented economic opportunity for nations, businesses and individuals. The number of devices in the Internet of Things is projected to reach 500 billion by 2030, up from 15 billion in 2015, which equates to more than six devices for every person on earth.   The IoT is significant because an object that can represent itself digitally becomes something greater than the object by itself. The McKinsey Global Institute forecasts the maximum potential economic value of the IoT at $11.1 trillion per year by 2025.[11]

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[9] McKinsey Global Institute, Digital Globalization: The New Era Of Global Flows, March 2016, http://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows

[10] European Commission, Digital Single Market, Digital Economy & Society, Towards a thriving data-driven economy, https://ec.europa.eu/digital-single-market/en/towards-thriving-data-driven-economy

[11] The McKinsey Global Institute, The Internet Of Things: Mapping The Value Beyond The Hype, June 2015, file:///C:/Users/CHUCK/Downloads/Unlocking_the_potential_of_the_Internet_of_Things_Full_report.pdf

The market is estimated to be worth $15 trillion by 2025 according to a Cisco report published in 2013. http://www.cisco.com/c/dam/en_us/about/ac79/docs/innov/IoE_Economy.pdf Look up for 2016.

NTR disruption will upend millions of businesses and billions of jobs by:
Revolutionizing Labor Forces, Upending Business, Transforming Money, Currency, Trade and Investment, Invading Privacy, Rising Cybercrime/Cyberterrorism and Achieving Singularity.

The Network Technology Revolution will be brilliantly innovative and creatively disruptive upending national economies and labor forces. From a Jobenomics perspective developed economies are most at risk due their status quo tendencies as opposed to emerging and developing economies that are much less risk adverse.

- **Revolutionizing Labor Forces.** The d

- **Upending Business.** The d

- **Transforming Money, Currency, Trade and Investment.** The d

- **Invading Privacy.** The d

- **Rising Cybercrime/Cyberterrorism.** The d

- **Achieving Singularity.** The d

The NTR will be both brilliantly innovative and creatively disruptive:
Creating new global jobs and businesses,
Destroying existing jobs and businesses,
Revamping institutions and governments,
Instituting new and different ideas, beliefs, behaviors and cultures, and
Changing the very nature of human endeavor and work.

The Network Technology Revolution will ultimately transform society with humans working alongside sophisticated algorithms, smart machines, robots and intelligent agents.

- **Creating new global jobs and businesses.** Xx

- **Destroying existing jobs and businesses.** xx

- **Revamping institutions and governments.** xx

- **Instituting new and different ideas, beliefs, behaviors and cultures.** xx
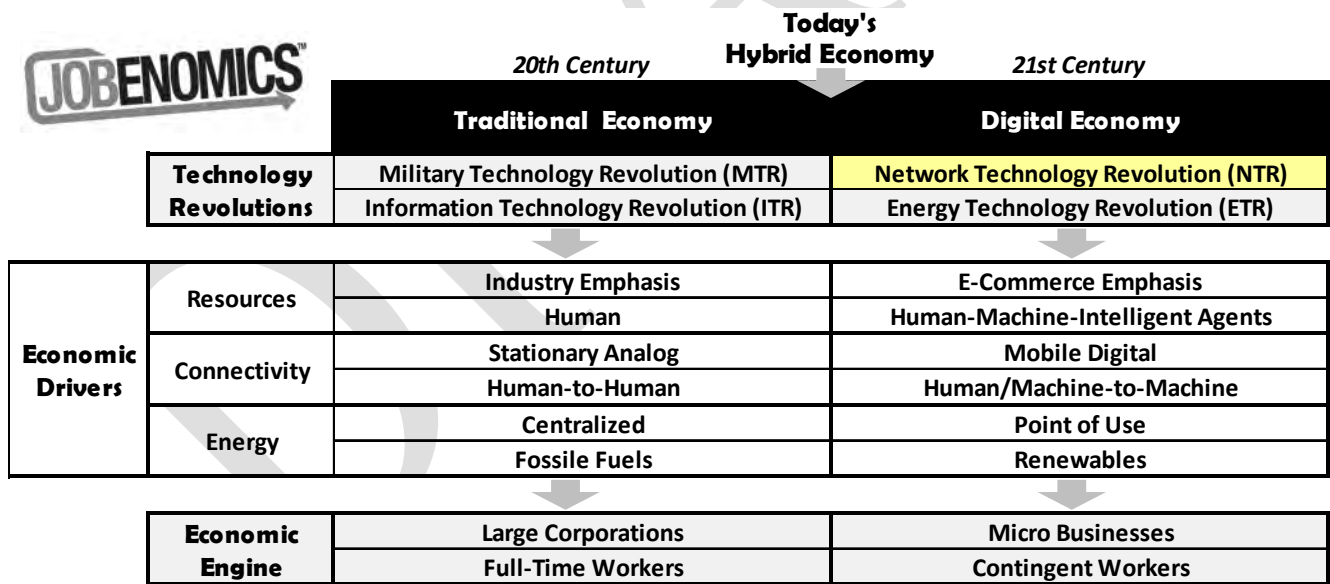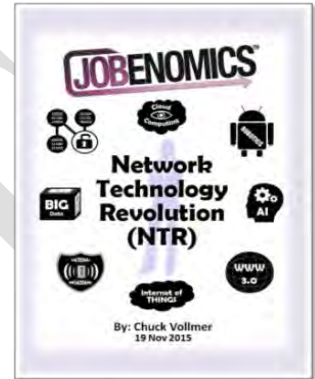
- **Changing the very nature of human endeavor and work.** from relationship-oriented to task-oriented work, and full-time standard workforces to part-time contingent workers. xx

NTR Economic Transformation Is In Its Infancy but Growing Exponentially

Today, the U.S. economy can be characterized as a hybrid economy that was formed largely by previous technology revolutions (the post-WWII Military Technology Revolution and the 1980s/1990s Information Technology Revolution) and is being transformed by two emerging technology revolutions (Energy Technology Revolution [ETR] and the Network Technology Revolution [NTR]).

The Network Technology Revolution is defined by Jobenomics as the next generation in network and digital technology that will transform economies and the way we live, work and play. The NTR will be brilliantly innovative and creatively disruptive. Innovation introduces a new market, industry, or technology and produces something new and more efficient and seemingly worthwhile. Disruption displaces an existing market, industry, or technology and produces something new and more efficient and seemingly worthwhile. The more creative the NTR becomes the more destructive it will be. With the proper focus and leadership, the NTR can create millions of new small business and tens of millions of jobs. Left unattended, unstructured and unplanned, the NTR is likely to render half of the U.S. workforce obsolete in

the near future. The NTR could produce tens of millions of net new U.S. jobs and millions of small businesses. On the other hand, via automation, the NTR has the potential to obsolete tens of millions of existing jobs. A national NTR strategy is needed to maximize labor force gains and minimize labor force losses.

		Today's Hybrid Economy	
	20th Century	21st Century	
	Traditional Economy	**Digital Economy**	
Technology Revolutions	Military Technology Revolution (MTR)	Network Technology Revolution (NTR)	
	Information Technology Revolution (ITR)	Energy Technology Revolution (ETR)	
Economic Drivers	Resources	Industry Emphasis	E-Commerce Emphasis
		Human	Human-Machine-Intelligent Agents
	Connectivity	Stationary Analog	Mobile Digital
		Human-to-Human	Human/Machine-to-Machine
	Energy	Centralized	Point of Use
		Fossil Fuels	Renewables
Economic Engine	Large Corporations	Micro Businesses	
	Full-Time Workers	Contingent Workers	

Today, the U.S. is a hybrid economy formed largely by two past technological revolutions and transformed by two fledgling revolutions. The post-WWII Military Technology Revolution (MTR) produced 10s of millions of jobs via spinning off military technology into the commercial world. Not only did the U.S. military-industrial complex have the latest and greatest technology due to WWII, but the United States economy was propelled into dominance (50% of the world's GDP) due to decimated and bankrupted economies in Europe and Asia. Military technological spin-offs helped create numerous manufacturing industries, like aerospace, as well as providing the resources and knowhow

to build national infrastructures, like the Interstate Highway system modelled after the German Autobahn. As Europe and Asia began to rebuild, the MTR's inherently inefficient central government approach gave way to the more competitive private sector enterprises, especially in the countries like Japan and Germany that within three decades achieved manufacturing excellence.

In the 1980s, the United States reinvented itself with the Information Technology Revolution (ITR) and inaugurated the information age as well as the creation of new industries that provided 100s of millions of new jobs globally and 10s of millions in America. The ITR created a new era of global prosperity and international commerce built largely on the Internet, which evolved from the U.S. military's ARPA-Net and creative genius of the co-founders of the personal computer, Bill Gates and Steve Jobs. Via the ITR, many parts of the world are closing the gap regarding economic parity with the United States.

Today, once again, the United States is reinventing itself once again with two simultaneous technology revolutions, the Energy Technology Revolution (ETR) and the Network Technology Revolution (NTR). The ETR deals with emerging energy technologies, processes and systems that will transform the global energy ecosystem. A comprehensive Jobenomics ETR report can be downloaded at the Jobenomics website.[12] Likewise, the NTR deals with emerging digital and network technologies, processes and systems that will transform the global economy. Both the ETR and NTR are capable of creating new industries and 100s of millions of new jobs globally and 10s of millions in America. However, the ETR is likely to be significantly less economically and socially disruptive than the NTR.

The NTR is not ITR 2.0. While both are revolutionary, the NTR portends to be significantly more intrusive than its earlier and more benign ITR cousin. ITR tools were designed to assist and enhance mankind's productivity. NTR agents are designed not only to augment, but also replace human endeavor. As discussed later in more detail, the NTR represents a perfect storm of technologies that emulates human form, attributes and intelligence. Not only does the NTR have the ability to create 10s of millions of net new American jobs, it has the ability to eliminate 10s of millions of American jobs via automation.

The NTR will be significantly more disruptive—technologically, economically and sociologically—than its ITR predecessor. The ITR started in the 1960s with the first commercial uses of mainframe computers, followed by the Internet, personal computers, word processing, e-commerce, industrial robots, self-service technology, bar-code scanners, RFID sensors, personal digital assistants, and the like. The 20th century ITR was more oriented to "sustaining innovation" that created tens of millions of net new jobs by evolving existing industries and introducing new industries with products that consumers wanted. In contrast, the NTR is likely to be more oriented to "creative destruction" that will upend existing markets and value networks.

Soon everyone will be connected to every significant thing and person anywhere. In contrast to the physical world, the virtual world frees us from physical limitations of birth, class and geography. This sense of freedom empowers the individual over the organization, which makes state and institutional governance more problematic. Consumers, activists and entrepreneurs will be able to create

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[12] Jobenomics.com, Energy Technology Revolution, http://jobenomicsblog.com/energy-technology-revolution/

products and ideas that could challenge the status quo and usher in a new era of globalization based on new communities-of-interest and non-traditional ideas.

It is unclear if the freedom of movement through the virtual world and freedom of information in a relatively unstructured, unbounded ecosystem will be ordered or chaotic. Innovation and new ideas generally originate from outside traditional institutional bulwarks. Within a matter of a decade, five billion new minds, mostly from the developing world, will join the NTR. Without doubt, their notion of fairness and equity will be far different from that of the developed world. Depending on the scalability of new global initiatives or experiments, the consequences could be revolutionary as tens of millions join cause célèbres that challenge tradition. Consequently, the NTR is likely to be more chaotic than ordered, and driven more by international rather than domestic consumers.

Digital Economy

The digital economy (also known as the web economy, internet economy, network-centric economy, or the new economy) is an economy that is based on digital and networked technologies, which is increasingly intertwining and preempting today's traditional economy. In addition to NTR technologies, processes and systems, the digital economy consists of various components including government (policy and regulation), infrastructure (internet, networks, telecom and electricity), and providers (digital service, content, information and knowledge workers).
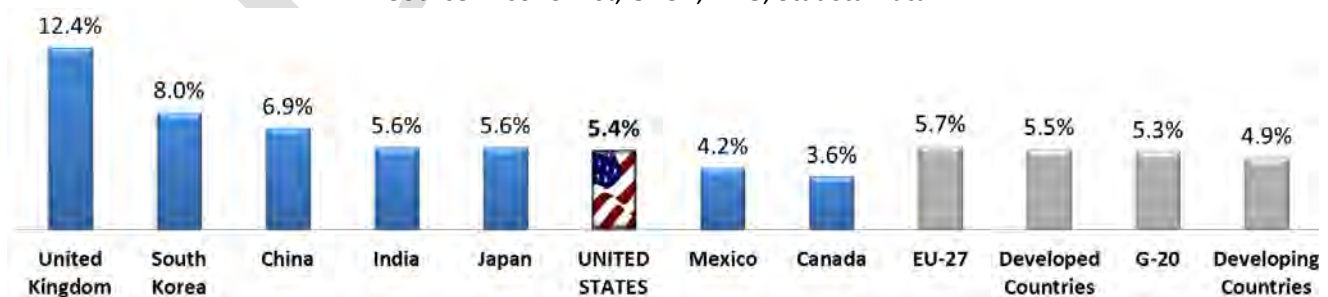
The digital economy provides a global network that allows individuals, organizations and governments to access information, interact, communicate, collaborate, and provide products and services. Digital products and services include a vast repository of digitized products (news, video, music, data, information, knowledge, etc.), financial transactions (e-government, e-business and e-commerce), social networking (ala Facebook, Twitter, Instagram, etc.), and networked physical goods (ala Internet of Things). To achieve maximum productivity, these components must operate efficiently and collectively.

While the global digital economy is still in its infancy, it is growing fast, especially in Asia and Europe—regions that are outpacing the United States from a business and jobs creation perspective. Countries that have a strategic vision with a complementary investment strategy will reap digital dividends in the form of faster growth, more businesses (especially small businesses), plentiful jobs, higher income and better services. Countries that have a laisse faire approach to the digital economy will lose ground to those with strategic vision and common cause. In countries with weak digital economy fundamentals will succumb to a digital divide and increased inequality and dissatisfaction. Governing institutions, both public and private, derive their much of their legitimacy from economic growth and opportunity. As compared to the traditional economy, the emerging digital economy will provide a significant amount of this growth.

From an NTR perspective, the countries to watch are China and the United Kingdom, which will be addressed in greater detail. Both countries have cobbled together a workable strategic NTR vision, albeit they refer to the NTR (the Jobenomics nomenclature) as the internet economy, digital economy, e-commerce or the third industrial revolution.

GDP Share of the Digital Economy in 2016
Source: Economist, OECD, BDG, Statista Data[13]

United Kingdom	South Korea	China	India	Japan	UNITED STATES	Mexico	Canada	EU-27	Developed Countries	G-20	Developing Countries
12.4%	8.0%	6.9%	5.6%	5.6%	5.4%	4.2%	3.6%	5.7%	5.5%	5.3%	4.9%

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[13] Statista, Share of the internet economy in the gross domestic product in G-20 countries in 2016, http://www.statista.com/statistics/250703/forecast-of-internet-economy-as-percentage-of-gdp-in-g-20-countries/

As a percent of GDP, the United States lags Europe and Asia in terms of the emerging digital economy. Experts estimate that the U.S. internet (digital) economy is projected to be 5.4% of the total economy in 2016, compared to a world average of 5.5%. Many Asian and European nations are ahead of the United States in terms of e-commerce and are projected to grow significantly faster than the U.S. in the near future. While the consensus view is that the digital economy accounts for about 5% of global GDP, its true value is likely to be four or five times that amount if one calculated the absolute value of NTR enhances to productivity and efficiencies to traditional businesses and consumers.

Traditional verses Digital Economy Orientation

	Traditional Economy Orientation	Digital Economy Orientation
Technology	Analog	Digital
	Industrial	Informational
	Tangible	Conceptual
	Labor-Intensive	Knowledge-Intensive
Governance	Centralized	Decentralized
	Ordered/Structured	Collaborative/Freewheeling
	Hierarchical	Flat
	Bureaucratic	Laissez-faire
Business	Conglomerated	Independent
	Mass-Produced	Custom-Made
	Long Timelines	Short Timelines
	Relationship-Focused	Task-Focused
Investment	Owned	Shared
	Local	Global
	Fiat Currencies	Digital Currencies
	Asset-Based	Derivatives-Based

The digital economy's orientation is significantly different than the traditional economy in terms of technology, governance, business and investment. As more and more NTR technologies, processes and systems are incorporated into the digital economy these differences will become more profound.

From a technological standpoint, digital, informational, conceptual and knowledge-intensive goods and services are supplanting analog, industrial, tangible and labor-intensive goods and services as a percentage of GDP.

While the digital economy may not supersede the traditional economy in our lifetime, the transition will unseat many traditional ways of living, enterprise and authority. If there is any doubt about the dramatic sociological impact of the NTR, one must only look at the amount of time spent by NTR-savvy youth on digital devices. Countries are aggressively pursuing a host of network-centric and digital technologies to transform their labor forces, economies and society.

CEO acceptance of cloud computing provides a good example of how a single NTR technology can quickly transform traditional businesses into digital businesses. As reported by a 2014 survey of 200

senior business executives by Oxford Economics and SAP[14], in less than a decade, the cloud has gone from a distant vision to the business mainstream. One-third of the surveyed senior executives said that cloud computing had a "transformative impact" on their business. One-half claimed "moderate impact". Only 1% stated that they had not embraced the cloud. Initially these corporate executives used the cloud to reduce costs and increase efficiencies. Via the NTR, corporate focus is on innovation, growth and agility to a much greater extent than ever before. According to the survey, a key benefit to cloud computing is the flexibility to start new enterprises and the necessary means to close down old businesses. Over the next three years, the majority of executives plan to make "moderate-to-heavy" cloud investments and increase migration of core business functions into the cloud.

If a single NTR technology like cloud computing can create such big business fervor, one can only imagine the transformative effects of incorporating a dozen other NTR technologies. Manufacturing companies will be able quickly optimize resources to rapidly changing customer requirements and deliver products and services much more expeditiously. Retail companies will be able manage and replenish inventories, provide tailored consumer services, reduce employment and floor space and deliver products to customers more efficiently. Service companies will be able to work remotely and provide task-oriented solutions that are customized to the task at hand by virtual teams of service providers. Small businesses and the self-employed will be able to compete globally in e-commerce (the electronic transfer of goods and services) and other e-business (how business is conducting in a network-centric world) pursuits that are largely unburdened by traditional geographic, back-office or information/communication constraints.

Transformation of society starts with transforming society's vision of the future. If the adage "Art Imitates Life" holds true, then the digital economy is already firmly embedded in the American psyche. Of the 50 top-grossing films of all time, all are replete with digital effects or entirely digitally animated.[15] Advances in the digital domain will soon allow life to imitate art. Digital technology is already performing functions for humans in merged virtual/physical worlds (as represented in sci-fi films), and will act like personal Sherpas that learn the interests of users based on their previous activities, avatars (as in the highest grossing movie of all time, Avatar[16]) that will represent the user's alter ego in the virtual world, and virtually enhanced 3D worlds that will assist users in their physical world to educate, train, as well as entertain.

As discussed in detail in the China case study, China is relying on the NTR to raise hundreds of millions of people out of poverty in the same manner that their manufacturing and construction initiatives lifted 700,000,000 out of poverty over the last several decades. Via groundbreaking technology, like blockchains and fintech, China is even trying to reinvent the global banking system by switching from dependence on centralized banking institutions to a decentralized peer-to-peer system coordinated by private sector platform and retail organizations.

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[14] Oxford Economics, The Cloud Grows Up, February 2015,
http://www.sap.com/bin/sapcom/en_us/downloadasset.2015-02-feb-25-23.the-cloud-grows-up-oxford-economics-and-sap-pdf.bypassReg.html
[15] IMDb, The 50 highest-grossing movies of all time, as of June 2016, http://www.imdb.com/list/ls000021718/
[16] Worldwide gross revenue of Avatar was $2.9 billion, followed by Titanic with $2.2B, and Jurassic World with $1.7B.

From a governance viewpoint, centralized, ordered, structured, hierarchical and bureaucratic structures are giving way to decentralized, collaborative, freewheeling, flat and laissez-faire structures. Governance defines the rules, norms and actions are structured, sustained, regulated and held accountable. Governing bodies, both formal and informal, manage, administer or controls society, nations, communities, associates, families and individuals. In the analog world, governance tended to be centralized, ordered/structured, hierarchical and bureaucratic. In a network-centric world, governance becomes less important. Organizations tend to be much flatter with fewer layers of management between people and their governors. Consequently, flatter organizations spend less time governing and more time promoting increased involvement in decision-making and the production of potential outcomes.

The NTR has created novel and powerful forms of virtual governance. Virtual governance tends to emphasize direct democracies over representative democracies, giving people a greater role in the decision and policy making process. In the virtual world, celebrity has exceedingly more power, force and effect than in traditional forms of governance. Power is now manifested in the number of tweets, likes, friends and hits registered on social media outlets. In the virtual world, social media matters more than traditional media.

Social media virality is a newer and more potent form of media virility. As a result, decentralized virocracies are upending centralized bureaucracies. To govern in today's world, a virtual personality and presence must be established and maintained. Selfies can be as important as photo ops and glamour shots to establish one's virtual personality. Strong virtual personalities create large followings which begets celebrity, legitimacy and power. Celebrity is not only afforded to people, but causes as well. For example, without any expenditure of funds for advertising or marketing, the Jobenomics National Grassroots Movement's website has grown from zero hits per month to 400,000 hits per month in less than two years with viewers from over 120 countries.

While flat organizations tend to be more innovative and agile, they are more likely to chaotic. Chaos introduces higher degrees of confusion and rivalry amongst peers who have fewer upper level supervisors for arbitration. Flat organizations also tend to produce generalists rather than specialists who are the mainstay of hierarchical governing structures. Hierarchical structures tend to be better suited for managing large institutions (e.g., government and social institutions), complex industrial (e.g., automotive and aerospace) and infrastructure programs (e.g., interstate transportation systems) where bureaucratic control is necessary. However, decentralized, collaborative, freewheeling, flat and laissez-faire structures are dismantling hierarchical institutions piece by piece.

The etymology of laissez-faire dates back to the 1700s when French businessmen challenged the centralized control of the state bureaucracy. When the frustrated French ministers asked what the state could do to promote commerce, the businessmen simply replied "Laissez-nous faire" ("Let us do what we want to do"). While brilliantly innovative, the NTR is also creatively destructive, particularity when it comes to confronting centralized control. What makes the 21st Century different from previous centuries is ability to quickly mobilize iconoclastic and anti-status quo forces.

To a large degree, U.S. governing officials and policy-makers have a laissez-faire approach to business. This lackadaisical approach not only harms the legitimacy of governing bodies but the overall economy as well. Perhaps the most vivid example involves tax avoidance schemes by big business

and its negative impact on small business, the engine of the U.S. economy and the mainstay of U.S. employment.

The digital economy poses tax challenges for policy-makers inasmuch as multinational corporations are using advanced network technology to reduce taxable income or shift profits to low-tax jurisdictions in which little or no economic activity is performed.

According to an OECD report, "The digital economy is characterized by an unparalleled reliance on intangibles, the massive use of data (notably personal data), the widespread adoption of multi-sided business models capturing value from externalities generated by free products, and the difficulty of determining the jurisdiction in which value creation occurs" [17] Moreover, multinational corporations are relocation corporate headquarters in low-tax jurisdictions outside area where the value creation actually occurs.

Enabled by modern network and digital technology, corporate tax avoidance poses a major challenge to funding governance operations that depend on tax revenue. The 50 largest U.S. corporations currently stash about $1.4 trillion in offshore tax havens, costing the U.S. approximately $111 billion and foreign countries $100 billion per year in taxation. [18]

U.S. NTR giants are no exception. Apple, Amazon, Facebook, Google, Cisco, HP, IBM, Oracle, Microsoft, Uber and Airbnb all move much their revenue collection and intellectual capital rights to foreign tax havens. As a result of tax avoidance schemes by big business, U.S. small businesses end up bearing the bulk of the American tax burden since small businesses do not have the resources to construct complex tax avoidance schemes. Small businesses employ 80% of all American workers and generate the vast majority of income for the eroding American middle class.

Most U.S. governing officials and policy-makers assume that a good economy creates jobs. This is a backward assumption. The U.S. labor force produces goods and services that grow GDP, which is one of the primary indicators used to gauge the health of a country's economy. GDP is measured by either an income approach (compensation, profits, and taxes) or an expenditure approach (consumption, investment, government spending and net exports).

Both approaches depend on robust goods-producing and service-providing jobs. However, jobs do not create jobs. Businesses do, especially small businesses that have created 78% of all new jobs since the end of the Great Recession. Therefore, it is imperative to have a robust small business sector that creates an ever increasing amount of good jobs to power a growing economy. When an economy grows at negative or sclerotic rates, unrest occurs and governing institutions lose their sense of legitimacy as evidenced by what's happening in the United States and globally today.

From a business perspective, conglomerated relationship-focused businesses with long-times and a mass-production orientation are switching to more independent task-oriented businesses that work with much shorter timelines and custom-made products and services.

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[17] OECD (2015), Addressing the Tax Challenges of the Digital Economy, Action 1 - 2015 Final Report, OECD/G20 Base Erosion and Profit Shifting Project, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264241046-en
[18] Oxfam, Broken at the Top, 14 April 2016, https://www.oxfamamerica.org/static/media/files/Broken_at_the_Top_FINAL_EMBARGOED_4.12.2016.pdf

Traditional verses Digital Business Model
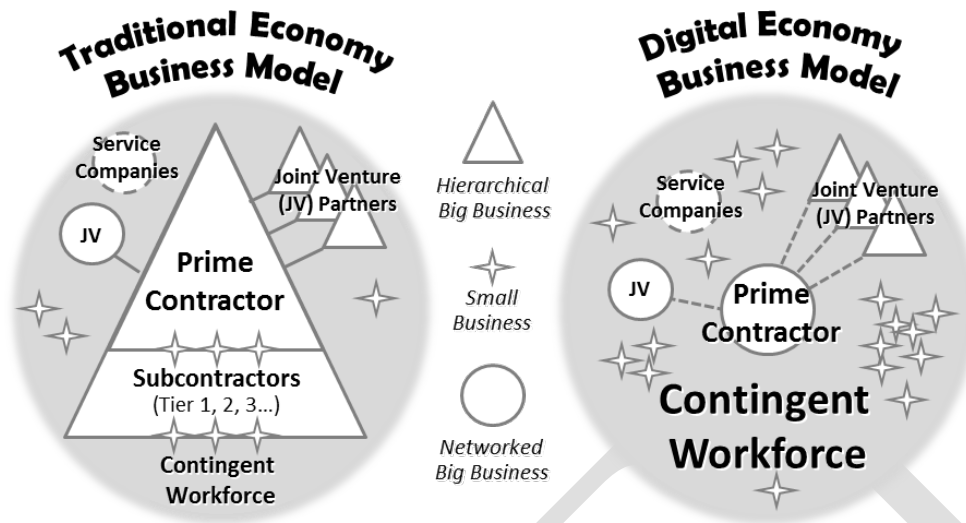
The traditional economy business model is oriented towards corporate cultures, long timelines, mass production and relationship-focused leadership. The digital economy business model is oriented towards individuals, shorter timelines, customized services and products and task-focused leadership.

Traditional economy managers mandate goals to meet to achieve defined performance standards accomplished by structured and stratified teams. Digital economy managers emphasize relationship-focused leaders who coordinate tasked-focused teams that work on projects with shorter timelines without cognizance of any goal other than the task at hand.

The formula for success for the American economy is to find the right balance between the traditional and digital economy models.

From an investment perspective, conglom

The Future Digital Economy. Experts disagree about the date when the digital economy will usurp today's traditional economy. Given the current rate of growth and the transformative effects of new NTR technologies, processes and systems, the digital economy could be the dominant element of many economies as early as 2025.

According to James McQuivey, a leading analyst tracking the development of digital disruption, as compared to the traditional economy, a digital economy is at least one hundred times easier to create and has ten times the number of innovators that can innovate at one-tenth the cost. In addition, digital startups are much faster than traditional startups, which is an exciting opportunity for those that can capitalize on the momentum of the emerging digital economy. [19]

On the other hand, the disruptiveness of NTR-driven digital economies will certainly generate a backlash from institutions grounded in the traditional economy. Legal and regulatory opposition

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[19] James McQuivey, Digital Disruption: Unleashing the Next Wave of Innovation, Figure 1-1: Digital Disruption Creates One Hundred Times the Innovation Power, Page 11.

from traditional businesses and government started in earnest as described in later sections of this report. Furthermore, citizens that lack digital access or skills are already turning to government for assistance and support. The rise of the contingent workforce, which is now 40% of the employed labor force, will also give rise to government intervention, especially for low wagers who are now voluntarily dropping out of the labor force at twice the rate of people entering the workforce.

MGI's 12 Technologies That Will Transform Life, Business and the Global Economy by 2025

Source: McKinsey Global Institute,
Disruptive Technologies: Advances That Will Transform Life, Business and the Global Economy

Technologies	Distruptive People and Products	Distruptive Economic Impacts
Mobile Internet	4.3 billion people remaining to be connected to the Internet and 1 billion new transaction and interaction workers (40% of global workforce)	$1.7 trillion GDP related to the Internet and $25 trillion interaction and transaction employment costs (70% of global employment cost)
Automation of Knowledge Work	230+ million new knowledge workers (9% of global workforce) and 1.1 billion new smartphone users	$9+ trillion knowledge worker employment costs (27% of global employment costs)
The Internet of Things	1 trillion things that could be connected to the Internet	$36 trillion operating costs of key affected industries (manufacturing, healthcare, mining)
Cloud Technology	2 billion global users of cloud-based email services with 80% of North American institutions hosting critical applications on the cloud	$1.7 trillion GDP related to the Internet and $3 trillion enterprise IT spending
Advanced Robotics	320 million anufacturing workers (12% of global workforce) and 250 million annual major surgeries	$6 trillion manufacturing worker employment costs (19% of global employment costs) and $2–3 trillion costs of major surgeries
Autonomous & Near-Autonomous Vehicles	1 billion cars and trucks globally, and 450,000 civilian, military, and general aviation aircraft in the world	$4 trillion automobile industry revenue and $155 billion revenue from sales of civilian, military and general aviation aircraft
Next-generation genomics	26 million annual deaths from cancer, cardiovascular disease, or type 2 diabetes and 2.5 billion people employed in agriculture	$6.5 trillion global health-care costs and $1.1 trillion global value of wheat, rice, maize, soy and barley
Energy Storage	1 billion cars and trucks globally and 1.2 billion people without access to electricity	$2.5 trillion revenue from global consumption of petroleum and $100 billion electricity for households currently without access
3D Printing	320 million manufacturing workers (12% of global workforce) and 8 billion annual number of toys manufactured globally	$11 trillion global manufacturing GDP and $85 billion revenue from global toy sales
Advanced Materials	7.6 million tons annual global silicon consumption and 45,000 metric tons annual global carbon fiber consumption	$1.2 trillion revenue from global semiconductor sales and $4 billion revenue from global carbon fiber sales
Advanced Oil & Gas Exploration and Recovery	22 billion barrels of oil equivalent in natural gas produced globally and 30 billion barrels of crude oil produced globally	$800 billion revenue from global sales of natural gas and $3.4 trillion revenue from global sales of crude oil
Renewable Energy	21,000 TWh annual global electricity consumption and 13 billion tons annual CO2 emission reductions	$3.5 trillion value of global electricity consumption and $80 billion value of global carbon market transactions

Global Economic Impact ≈ $124 trillion

The McKinsey Global Institute (MGI) lists twelve disruptive NTR technologies that will affect billions of consumers and workers, and inject hundred trillion of dollars of economic activity into the Digital Economy by 2025.[20] If all MGI's predictions are realized, the grand total economic impact of these disruptive technologies would be $124 trillion which would greater than the entire global nominal GDP $86 trillion slightly less than $138 trillion in GDP purchasing power parity as calculated by the International Monetary Fund's 2016 World Economic Outlook Database.[21]

The biggest challenge facing the global community is how to mitigate NTR disruptive forces and promulgate innovative ways to create mass-produce businesses and jobs that will sustain economic growth in the same manner as previous technology revolutions did in the past.

The Digital Workplace Ten Years Hence. America's traditional workplace is in a state of transition from fixed desks, to hot desks, to mobile and home-based offices. While many people enjoy the flexibility offered by NTR-enabled mobile offices, many others miss the camaraderie of the traditional workplace.

Tomorrow's workplace will likely be a tailorable mixture between mobile and fixed, work and play, and office and home. NTR technology will allow task-oriented work by remote teams that can rapidly for form to accomplish a given task and quickly reform for subsequent tasks, whether or not it is for the same employer or other locations. Fewer people will be required in corporate workplaces. Head offices and traditional office life will be a shadow of their former selves. 9-to-5 will be replaced by 24/7. Centralized urban workplaces with fixed schedules will be replaced by decentralized rural workplaces with flexible schedules that can better accommodate professional and personnel needs. Today's personal and digital assistants will be supplanted by artificial intelligence agents that will "work" side-by-side with humans. Digital will replace analog, including mundane pre-21st Century workplace practices like handwriting and arithmetic.

The seeds of tomorrow's workplace have already begun to germinate as evidenced by the subcultures within the emerging Digital Economy. From a Jobenomics perspective there are at least seven Digital Economy unique but intertwined economic communities: E/M Economy, Sharing Economy, App/Bot/AI Economy, Platform Economy, Gig/Contingent Workforce Economy, Data-Driven Economy and Internet of Everything Economy.

Using the parable of the Seven Blind Men and the Elephant as an analogy, the elephant is the Digital Economy and the seven economic communities define the different ways that these groups perceive the digital behemoth.

- The E/M Economy community views the digital economy through a consumption-based electronic-commerce/mobile-commerce lens.

- The Sharing Economy community's vision of the new economy involves sharing underutilized or idle assets via mobile devices, redefining the value of ownership and upending major industries like transportation, accommodation and logistics.

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[20] McKinsey Global Institute, Disruptive Technologies: Advances That Will Transform Life, Business and the Global Economy, May 2013, file:///C:/Users/CHUCK/Downloads/MGI_Disruptive_technologies_Full_report_May2013.pdf
[21] International Monetary Fund, World Economic Outlook, April 2016, https://www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx

- The App/Bot/AI Economy community's broad view emphasizes automation of daily mundane tasks via smart algorithms and artificial intelligence agents that reduce the need for human intervention and increase leisure time for more productive pursuits.

- The Platform Economy community sees the digital economy from a network platform business model where mega-corporations exploit network effects to garnish greater and greater degrees of influence and control of major segments of society and the global economy.

- The Gig/Contingent Workforce Economy community's focus is on creating an employment landscape that provides opportunity for workers in the future economy where part-time and temporary workers outnumber full-time workers with standard workforce agreements.

- The Data-Driven Economy community's mindset involves the exploitation of storage, search, capture, query, transfer, sharing, visualization and analysis of zettabytes of Big Data as a way to create a new digital economy.

- The Internet of Everything Economy community looks at the digital ecosystem from the perspective that tens of billions of connected things will exert significantly more influence than the billions of connected people.

In the parable of the Seven Blind Men and the Elephant, each of the blind men argued that his perspective of the elephant was the right one. The man that touched the elephant's leg tail thought the elephant was like a tree. The one that touched the elephant's side thought it was like a wall. The other five blind men had disparate opinions. Eventually a wise man wandered by and explained that each blind man was correct but the ultimate truth lied in a collective vision.

Today, the world sees the nascent digital economy through an opaque lens. Each of the seven economic communities believes that their view is legitimate. Only time will tell which community will become dominant. Some communities will merge. Others will die. However, the elephant most certainly grow into a global behemoth that will upend, usurp and transform society.

E/M Economy

Electronic (E) and mobile (M) commerce is already transforming economies, government, business and society via network and digital technology, processes, systems and services.

E-commerce involves networking customers, suppliers and partners, including sales, marketing, order-taking, delivery, customer service, purchasing and procurement. E-business involves networking the entire business cycle from research and product development, knowledge management and human resources, finance, procurement, production, distribution, transportation, logistics, risk management, sales and marketing. However, in common parlance businesses with an e-commerce component are generally referred to as an e-businesses or online businesses.

E-commerce primarily involves online transactions like purchasing, shopping and free transactions (downloads and information exchange). E-commerce is usually outward looking, focused on customers and partners. E-business generally is inward facing using emerging NTR technologies, processes and systems to enhance operations. E-commerce/e-business industries include business-to-consumer (B2C, e.g., Amazon), consumer-to-consumer (C2C, e.g., eBay), consumer-to-business (C2B, e.g., Priceline), business-to-business (B2B, e.g., prime contractor to subcontractor) and their government equivalents (G2B, G2C and G2G).

M-commerce refers to the buying and selling of goods and services through wireless handheld devices (cell phones, smartphones, tablets/phablets and laptops). M-commerce is the fastest growing subset of e-commerce and is expected to the dominant element of e-commerce in the United States and the rest of the developed world by 2017. It is already the dominant form of e-commerce in developing countries.

E-Commerce

In the last two decades, e-commerce has revolutionized the retail industry. The e-commerce phenomenon started with online ordering in the early 1990s followed shortly thereafter with online shopping and online payment systems, which was pioneered by PayPal. In the early 2000s, two e-commerce pioneers emerged, eBay (which pursued PayPal) and Amazon. Perhaps the biggest contribution that these pioneers made to the e-commerce industry was allaying consumer anxieties, which at time included; fear of credit card theft or fraud, high costs of shipping and returns, and jitters about not being able to see or handle products before purchase. Today, the world's e-commerce ecosystem includes a mixture of small to giant industries across a wide variety of industries such as travel, search, cloud computing, retail, social media as well as web merchants.

The evolution of the world's e-commerce pioneer and today's market leader Amazon has been and is likely to continue to shape the E/M Economy. Amazon was not only the pioneer but remains the king of e-commerce today. Amazon's initial web debut was in 1995 specializing in book sales. In 1997, it went public and became the first internet retailer to secure 1 million customers. With IPO money and growing revenues, Amazon quickly expanded into other product offerings, opening new distribution centers and creating an associate program where Amazon could collect fees on orders from other website companies like Yahoo and AOL. By mid-1998, Amazon's had 60,000 associates around the world due to Amazon's reputation for fastidious reputation for order taking and speedy

delivery. Amazon's customer database also grew exponentially even through the dot.com crash in 2001. During the decade of the 2000s, Amazon increased growth via numerous acquisitions, investments in numerous other companies and alliances with strategically important global institutions. By 2010, Amazon employed 33,700 workers with annual revenue of $34 billion. In 2015, Amazon's annual revenue tripled to $107 billion employing 269,000 employees.

According to Forrester Research, Amazon tallied $23 billion more in U.S. e-commerce sales in 2015 than the previous year, which accounted for approximately 60% of all U.S. online sales growth in 2015. While this is impressive, from a Jobenomics point of view, a little known statistic revealed by Amazon CEO Jeff Bezos claimed that "over 70,000 entrepreneurs with sales of more than $100,000 a year selling on Amazon" who created over 600,000 new jobs. These entrepreneurs, in 172 countries were able to reach customers in 189 countries via the Fulfillment By Amazon program that translates hundreds of millions of product listings and provides conversion services among 44 different international currencies. Amazon Lending program also helps entrepreneurs grow via $1.5 billion worth of micro, small and medium businesses short-term loans to U.S., U.K. and Japanese sellers.[22]

As of September 2016, Amazon's market capitalization was $382 billion, making the world's most valuable e-commerce company and fourth most valuable company following Apple $580 billion, Alphabet (Google) $553 billion, and Microsoft $448 billion. By all accounts, Amazon is not content to be the fourth most valuable company, nor does it intend to ignore mounting international competition from Chinese e-retailers like JD.com (2015 sales of $7 billion—an increase of 78% over 2014—and a $40 billion market cap), or the world's largest retailer Walmart (2015 sales of $486 billion—an increase of 2% over 2014—and a $227 billion market cap).

In order to maintain market dominance and grow the company's valuation, Amazon is aggressively pursuing a multitude of new initiatives inside and outside of retail. Inside initiatives include big-data analytics and visualization tools and a wide range if IoT connected devices like enhanced warehouses, robots, chatbots, e-readers, smart TVs, tablets, smart watches, smart glasses and wearables, all of which share information online in real time. The major outside initiative involves marketing Amazon's logistics expertise to become the world's leading supply chain management and shipping company. To do so, Amazon is building a FedEx/UPS-like transportation infrastructure replete with aircraft, trucks, unmanned drones, self-driving vehicles and freight-forwarding licenses that allow Amazon to sell space on container ships carrying cargo to all parts of the globe. Amazon believes its expertise in its same-day delivery capability will soon make it a world leader. At the local level, Amazon decreasing its last mile delivery capability down to hours via delivery networks, sorting centers, delivery stations and couriers who drive cars, ride bikes, take public transit or hand-deliver Amazon products. In September 2016, Amazon introduced Amazon Flex, an Uber-like app, which allows part-times to deliver packages during peak periods and high volume holiday seasons.

While Amazon's future growth is likely to continue unabated, Amazon faces a number of challenges including competition, competitive pricing and legal/regulatory issues. The price of brilliant innovation and creative disruption causes established industries to either combat or imitate.

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[22] eCommerce Bytes, Amazon CEO Opens Up about Marketplace Initiatives, 7 April 2016, http://www.ecommercebytes.com/cab/abn/y16/m04/i07/s02, and Amazon, Amazon Investor Relations, http://phx.corporate-ir.net/phoenix.zhtml?c=97664&p=irol-irhome

- Amazon's high profile expansion plans have energized competitors in multiple industries, including retail, and e-retail, transportation, logistics and network-centric platform companies. At the top of the list are Walmart, JD.com, Alibaba, eBay FedEx, UPS and Google. The most likely way for them to mitigate Amazon's expansion is to form counter alliances and partnerships and usurping enterprises of interest to Amazon.

- Competitive pricing is another avenue of attack, an area where e-retailers are vulnerable to retailers that do not have shipping costs related to instore purchases or pickup. In regards to e-retail competition, Amazon is wedded to a capital-intensive, vertically-integrated e-commerce model to purchase inventory, and a massive network of warehouses, fulfillment centers and transportation subcontractors. Whereas other web merchants, like eBay and Alibaba, operate primarily online marketplaces based on partnering with wholesalers, manufactures and delivery companies that can operate at lower price points.

- Perhaps the most serious challenge comes from protectionist foreign governments and tax collectors, including those in the United States. In 2005, Amazon moved its technology assets to Luxembourg's tax free environment. To further reduce its tax burden, Amazon uses royalty payments from its European subsidiaries to its operating subsidiary in Luxembourg to avoid taxation in the countries were the Amazon products were sold.

  As a result of these actions the U.S. IRS is suiting Amazon for $1.5 billion "back taxes" and the European Commission is considering similar actions for alleged tax avoidance schemes that are commonly practiced by major international companies worldwide. Government regulators tend to focus on market leaders in order to send a signal to other companies down the market chain. In China, government leaders are caught on the horns of dilemma. They are aggressively setting up barriers against Western companies to protect and aid domestic companies. On the other hand, they need companies like Amazon to export Chinese goods to the Western world.

From a Jobenomics perspective, speed is life and a fast moving target is hard to hit. Amazons' growth from a startup to the world's fourth most valuable company in only two decades is indicative of the fact that Amazon's speed is the key to living successfully in today's highly competitive international and often borderless digital world. As the e-commerce market leader, Amazon has the resources to keep the market moving in directions that are likely to benefit Amazon, regardless of the impediments, as well as the E/M economy writ large.

Even though e-commerce is its infancy (only 8.1% of total retail sales), it is already having a major impact on traditional brick-and-mortar retailers—many of whom are skating on the edge of bankruptcy caught between the battle between e-commerce giants and discount big box store retailers for market share. Class B and C strip mall cousins are particularly endangered. To survive, many of these malls, especially strip malls, are turning from retail sale of products to service offerings with emphasis on entertainment and food service. Newer and larger Class A malls continue to do well largely due to the entertainment factor (restaurants, bars, food courts, cinemas, attractions, etc.) and high-end stores that cater to the more affluent.

The battle between e-commerce and big box stores can best be witnessed by the clash between Amazon and Walmart. Walmart is the world's biggest retailer (11,500 stores), employer (2.1 million people) and company (sales $482 billion). However, Walmart's share of U.S. e-retail sales has

dropped from a peak of 12% in 2009 to 10.6% today. The chief disruptor has been Amazon ($107 billion sales, 231,000 employees). From a product assortment perspective, Amazon dwarfs Walmart by a factor of 30 to 1 (Walmart offers 10 million items compared to Amazon's assortment of 300 million items). From an investor perspective, market capitalization value for Amazon is 60% higher than Walmart ($382 billion versus $227 billion as of September 2016).

While both Walmart and Amazon are retail companies, their focus is quite different. Walmart focuses on saving money. Amazon focuses saving time. In today's hectic, multitasking world, time is often preferable. Amazon strategically placed its warehouses and distribution centers to ensure speedy delivery. Preferred customers using Amazon Prime not only get free two-way delivery with added bonuses like free unlimited streaming of movies and TV shows with Prime Video. Amazon is also integrating state-of-the-art NTR systems such as Amazon Dash, a consumer goods ordering service. Dash consists of a Wi-Fi-connected, voice-activated barcode scanner for a consumer to build a shopping, Dash Buttons for reordering and a Replenishment Service. Amazon Dash connects directly with Amazon Fresh, the company's online grocery delivery service. If Amazon Dash is as widely successful as CEO Jeff Bezos envisions, Amazon could transform from an online retail store to a quasi-online utility service.

Walmart is responding by repurposing their brick and mortar edifices to concentrate on small, inexpensive and perishable goods that are more of a challenge to sell and ship online and becoming as well as investing billions of dollars in e-commerce. 55% of Walmart sales are now involve grocery items, followed by 12% entertainment, 11% health and wellness, 10% hardlines, 7% apparel and 5% home products. 83% of North American Walmart users now use Walmart website. [23]

Despite Walmart sinking billions in building e-commerce operations, their online sales growth has been slowing, from a high of 27% in Q1 2014 to only 7% by Q1 2016. Notwithstanding lagging e-commerce sales growth, Walmart is aggressively pursuing a robust NTR strategy by merging Arkansas and Silicon Valley techies to enhance faster deployment of NTR technology, processes, systems and services. For example, Walmart is equipping store workers with handheld smart devices, rolling out Walmart Pay (a mobile payment system) and curbside grocery pickup service, and testing a two-day free online delivery service similar to Amazon Prime. [24]

U.S. e-commerce sales have reached approximately $100 billion per quarter and are growing at a year-over-year rate of 15%. At this rate, U.S. e-commerce sales could reach $700 billion 2020—much of which will be taken from brick-and-mortar retailers. In 2015, major anchor tenants at supermalls (Sears, J.C. Penney, Nordstrom, Kohl's, Dillard's) stock prices dropped by an average of about 50%. In Q1 2016, the mighty closed 125 of its smaller neighborhood express stores and Macy's closed 40 department stores. Aeropostale, with 800 stores, filed for bankruptcy along with Sports Authority closing 140 out of its 450 stores as well as the formerly ubiquitous Radio Shack. Doomsday is also rapidly approaching the likes of Office Depot and Stables that recently attempted to merge (but was blocked by a federal judge) in order to stave off their online competition—most notably Amazon

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[23] Statista, Facts on Walmart, http://www.statista.com/topics/1451/walmart/

[24] Fortune, The Silver Lining In Walmart's Slowing E-Commerce Growth, 20 May 2016, http://fortune.com/2016/05/20/the-silver-lining-in-walmarts-slowing-e-commerce-growth/

Prime that offers discounts, free shipping and premium online television content as an extra inducement.

In Q1 2016, total commercial bankruptcy filings by corporations of all sizes and other business entities jumped 24% from a year ago, to 9,208 from 7,438 in the same period in 2015, according to American Bankruptcy Institute. Most of the commercial bankruptcy filings were in the retail and energy sectors.[25] If there is a bright side, vacant retail buildings in strip malls are increasingly being occupied by discount stores that specialize in servicing the pennywise and financially distressed. Dollar Stores, TJ Maxx, Marshalls, Trader Joe's, Big Lots, Goodwill and numerous non-profit organizations are taking advantage of record low commercial real estate prices and high vacancy rates to expand operations. These discounters, who are accustomed to work on lower margins, are adept in shuttering unprofitable stores. Deep discounters, like Walmart and Costco, are likely to buck the downward trend in retailing. These discount giants are also fortifying their positions with robust online activities and discounts. If a retail brick and mortar apocalypse happens, they will have online lifeboats.

Within the foreseeable future, retail operations will likely evolve to commodity/specially stores, online stores and stockless showrooms.

- Commodity/specially stores consist of the deep discounters (Dollar General), grocery stores (Kroger), drug stores (Walgreens) and high-end stores (Nordstrom).

- Online stores (Amazon) will likely proliferate to the likes of Facebook and other social media companies that can leverage their clientele. The third group, stockless showrooms, is just beginning to surface.

- High-end companies, like Tesla and Apple, now operate stockless showrooms for customers that are interested in touching before buying. Fashionable clothing retailers, such as Bonobos in expensive Lower Fifth Avenue in Manhattan and Zalora in Singapore, let shoppers survey, try and buy from racks of name brand clothes. The main difference between Bonobos and Zalora and traditional clothing retailers is that the purchased clothes will be ordered and delivered by the salesperson online via their backend e-commerce systems. These online-only shops hope to save on square footage as well as labor costs associated with stockpiling, pricing and packing. Whether this third group has a future, other than swank locations and clientele, remains to be seen.

U.S. E-Commerce Growth by Quarter
Source: U.S. Census Bureau, Percent of Total Retail Sales

8.1%
$97.2 Billion

0.6%
$4.5 Billion

1 January 2000   1 July 2016

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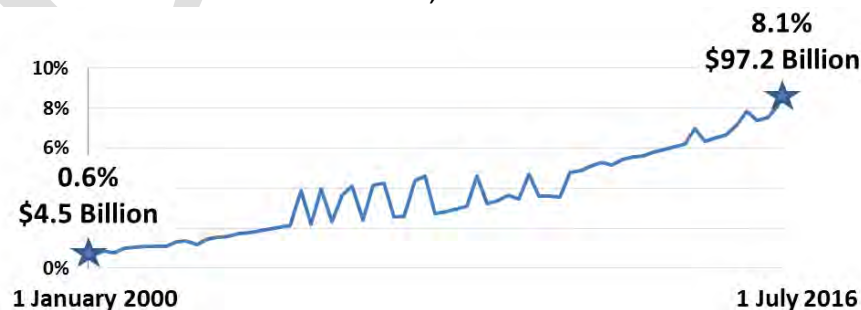
[25] American Bankruptcy Institute, First Quarter Bankruptcy Filings Down 5 Percent from 2015, Commercial Filings Increase 24 Percent, http://www.abi.org/newsroom/press-releases/first-quarter-bankruptcy-filings-down-5-percent-from-2015-commercial-filings

The U.S. Census Bureau reports that U.S. e-commerce sales are 8.1% of all U.S. retail sales as of 1 July 2016 with a total online retail sales volume of $97.2 billion. E-commerce sales are expected to breach 10% by the end of 2016, due to a projected increase of 17% during the November/December holiday season.[26] E-retailers, like Amazon, are already stockpiling for this event.

On 1 January 2000, online retail sales were only 0.6% with a volume of $4.5 billion. Over this 16 ½ year period, traditional (non-online) retail sales grew by 54% (from $4.5 billion to $97.2 billion) while e-commerce sales grew by an amazing 2085% (from $719.1 billion to $1,104 billion). The Census Bureau uses a stratified simple random sampling method of approximately 10,000 retail firms (excluding food services) whose sales represent the complete universe of over two million U.S. retail firms. E-commerce sales are sales of goods and services where the buyer places an order, or the price and terms of the sale are negotiated, over an Internet, mobile device (M-commerce).[27]

To better put e-commerce and retail sales in perspective, one must look at total personal consumption expenditures, which is the main component (69%) of U.S. GDP. As of 1 July 2016, total United States:

- Personal consumption expenditures were $12,695,100,000,000 ($12.7 trillion)[28]

- Retail sales were $1,201,908,000,000 ($1.2 trillion) or 9.5% of personal consumption

- Online retail sales were $97,250,000,000 ($0.97 trillion) or 0.81% of personal consumption

Based on these federal government figures online e-commerce appears to be a miniscule percentage of overall personal consumption as well as GDP. Unfortunately, the government has yet been able to adequately evaluate e-commerce's contribution to the U.S. economy as evidenced by various, and often conflicting, reports generated by the Census Bureau and Department of Commerce.

- U.S. Census Bureau's e-commerce data (shown above) is only for industries that have e-commerce as a primary business function (e.g., Industry 45411121 Electronic shopping, computer hardware and software). However, the Census Bureau conducts surveys of other industries (manufacturing, selected service industries, retail and whole trade) that have an e-commerce component, which is reported in the Bureau's annual E-Stats Report.

- The latest E-Stats report was released on 7 June 2016 covering the electronic economy in 2014. The E-Stats 2014 reports states that Manufacturing E-Commerce Shipments were $3,584.0 billion in 2014, followed by Wholesale E-Commerce Sales at $2,127.8 billion, Selected Services E-Commerce Revenues at $510.0 billion and Retail E-Commerce Sales at

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[26] eMarketer, Holiday Retail Ecommerce Sales Will Grow 17% this Year Digital sales will surpass 10% of total retail for the first time, 27 September 2016, https://www.emarketer.com/Article/Holiday-Retail-Ecommerce-Sales-Will-Grow-17-this-Year/1014529?ecid=NL1009#sthash.s4xlvG2L.dpuf

[27] U.S. Census Bureau, Quarterly E-Commerce Report, The 2nd Quarter 2016 Retail E-Commerce Sales Report, 16 August 2016, http://www.census.gov/retail/index.html and https://www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf

[28] U.S. Bureau of Economic Analysis, NIPA Tables, Section 1: Domestic Product and Income, Table 1.1.5 Gross Domestic Product, Q2 2016, http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1#reqid=9&step=1&isuri=1&903=1

$298.6 billion. The grand total for these four e-commerce categories is $6.5 trillion ($6,520 billion) or 51% of U.S. personal consumption expenditures.[29]

- The Census Bureau also produces an Estimated Annual U.S. Retail Trade Sales analysis that states that U.S. e-commerce reached $298.6 billion in 2014 across all industries, from motor vehicles to electronic shopping.[30]

From a Jobenomics perspective, the U.S. government e-commerce data is fragmented and confusing to provide any meaningful analysis by policy-makers and business decision-leaders. Consequently, private sector sources often shed more light on e-commerce statistics and trends.

According the eMarketer, a research firm, estimates 1.6 billion people worldwide will make at least one purchase digitally in 2016. Retail ecommerce sales will total $1.9 trillion worldwide in 2016, making up 8.7% of global retail sales. By 2020, e-commerce is projected to grow to $3.5 trillion within representing 12.4% of global retail sales. The Asia-Pacific region accounts for approximately 50% of all e-commerce sales and is projected to grow faster than any other region at a rate of 35.2% year over year. [31]

U.S. E-Commerce Web Sales and Growth by Year
Source: Internet Retailer Analysis of U.S. Census Bureau/Commerce Department Data

According Internet Retailer, a portal to e-commerce intelligence, estimates from U.S. Census Bureau and Commerce Department data that U.S. e-commerce sales in 2015 were $341.7 billion, up 14.6% from a year prior. U.S. web sales and year-over-year growth rates are shown from year 2005. The average growth rate over this 11-year period, including two dismal recession year averages, was 15.4% growth per year.[32] Mobile electronic commerce (m-commerce) is the fastest growing segment of e-commerce. Internet Retailer reports that in 2015 U.S. mobile commerce sales will total $104.05 billion, up 38.7% from $75.03 billion in 2014, based on data from their 2016 Mobile 500 Study.[33]

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[29] U.S. Census Bureau, E-Stats 2014: Measuring the Electronic Economy, 7 June 2016, https://www.census.gov/content/dam/Census/library/publications/2016/econ/e14-estats.pdf

[30] U.S. Census Bureau, Latest Annual Retail Trade Report, U.S. Retail Trade Sales - Total and E-commerce (1998-2014), http://www.census.gov/retail/index.html

[31] eMarketer, Worldwide Retail Ecommerce Sales: eMarketer's Updated Estimates and Forecast Through 2019, https://www.emarketer.com/corporate/coverage#/results/1259

[32] Internet Retailer, U.S. e-commerce grows 14.6% in 2015, 17 February 2016, https://www.internetretailer.com/2016/02/17/us-e-commerce-grows-146-2015

[33] Internet Retailer, Mobile commerce is now 30% of all U.S. e-commerce, 18 August 2015, https://www.internetretailer.com/2015/08/18/mobile-commerce-now-30-all-us-e-commerce

The world's top five e-commerce companies in 2015 in terms of revenue are Amazon (United States, $107 billion), JD.com (China, $27 billion), eBay (United States, $9 billion), Walmart.com (United States, $14 billion) and Alibaba (China, $14 billion). In terms of B2C e-commerce, Amazon and JD.com are pure play (100%) e-retailers compared to traditional retails that have an e-commerce component, such as Apple (49%) and Walmart (11%). Although B2C e-commerce is primarily concerned with online shopping or online retail, it also includes paid online services (cloud and storage), paid content (apps and media) and third-party selling platforms—the fastest growing and strategically important element of global e-commerce today.

U.S. e-commerce has grown steadily over the last decade accounting for $341.7 billion in 2015 and is projected reach $684 billion by 2020. However, U.S. e-commerce percentage of global market share is anticipated to shrink due to the emergence of Asian powerhouses. Of the 285 million U.S. internet users approximately 205 million purchase products online. The top 500 U.S. e-retailers generated over $297 billion in online shopping sales, growing at an annual growth rate of approximately 15%, dominated by Amazon with 2015 online sales of $92.4 billion. [34].

E-commerce companies concentrate on transaction histories of big data sets relative to products, and services bought by consumers and merchants. Marketable data is extracted by a process of data mining and predictive analysis. Data mining involves using advanced algorithms to analyze large databases and summarizing this data for use or sale. Within the field of data mining, machine learning models and algorithms lend themselves to predictive analytics that analyze current and historical facts to anticipate future or otherwise unknown events. Predictive analytics is the branch of the advanced analytics which is used to analyze current data to make predictions about unknown future events. Predictive analytics blends techniques from statistics, modeling, machine learning and artificial intelligence to produce a wide variety of metrics including customer engagement (signups, visits, page views, opens and clicks, downloads and orders, etc.), customer loyalty (frequency, recency, value, etc.), acquisitions (mobile rates, social media rates, pop-up success, growth per channel, etc.) and revenue (per campaign and email, average order value, revenue over time, etc.).

In contrast to e-commerce companies that make money on on-line sales, search and social media companies make money from advertising and selling "free" information contributed from users. The leading U.S. search and social networking platforms include Google (1.6 billion active users), Facebook (1.6 billion), Facebook's WhatsApp (1 billion), Facebook Messenger (0.9 billion), Tumbir (0.5 billion), Facebook's Instagram (0.4 billion), Bing (0.4 billion), Yahoo Search (0.3 billion), Twitter (0.3 billion), Microsoft's Skype (0.3 billion), Ask (0.25 billion), Google's Snapshot (0.2 billion), Pinterest (0.1 billion) and LinkedIn (0.1 billion). China's search and social networking programs are also significant in terms of users. The leading Chinese programs include Tencent's Baidu Search (1 billion active users) QQ (0.9 billion), Tencent's WeChat (0.7 billion), Tencent's QZone (0.6 billion), Qihoo Search (.5 billion) Baidu's Tieba (0.3 billion), YY (0.3 billion) and Sina Weibo (0.2 billion). [35]

Traditional brick-and-mortar stores and emerging small businesses are rapidly incorporating e-commerce/e-business applications with the aid of site builders and do-it-yourself software.

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[34] Statista, Statistics and facts about e-commerce in the United States, http://www.statista.com/topics/2443/us-ecommerce/ and http://www.statista.com/statistics/272391/us-retail-e-commerce-sales-forecast/

[35] Statista, Leading social networks worldwide as of April 2016, ranked by number of active users (in millions), http://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/

- Some of the leading site-builders include Weebly (440,000 active online stores), Shopify (300,000 active online stores), Wix (290,000 active online stores) and BigCommerce (95,000 active online stores). Weebly is a U.S. ecommerce company with a web-hosting service featuring a drag-and-drop website builder. Shopify is a Canadian e-commerce company that develops computer software for online stores and retail point-of-sale systems. Wix is an Israel ecommerce company that specializes in dragging and dropping content anywhere on business websites. BigCommerce is a U.S. e-commerce company that develops e-commerce software for enterprises and small businesses.

- Some of do-it-yourself open source ecommerce software providers include WordPress, Magento and Open Cart. Open source shopping carts are standalone programs that require users to install them into a hosting service. The main benefit of using self-hosted open source software is that users can configure and easily customize their online stores to suit their needs.[36]

Traditional brick-and-mortar stores are also incorporating hybrid e-commerce solutions to make up for lost foot traffic due to online shopping. For example, many retailers are giving online shoppers the option of using online systems to buy hard to find and specially items that can be picked up at the store in concert with shopping for other items, such perishable or large commodities, which tend to be ill-suited for online shopping and delivery. Consumer packaged goods (CPG) industries are a prime targets for this kind of hybrid approach. Some examples of CPGs are food and beverages, clothing, and household products. The CPG industry is one of the largest industries in America, valued at $2 trillion per year.

Grocery stores are early adopters of this blended online/offline shopping approach. A 2014 Nielson Survey on the Future of Grocery yielded the following topline highlights. E-commerce is well suited for stock-up and specialty-needs retailing because it can offer deeper product selections than may be available in brick-and-mortar stores. One-quarter of online respondents say they order grocery products online, and more than half (55%) are willing to do so in the future. Growth of online grocery shopping is driven in part by the maturation of the digital natives—Millennials and Generation Z. Use of online or mobile coupons and mobile shopping lists are the most cited forms of in-store digital engagement in use today. For in-store retailing, large stores have a sales volume advantage, but smaller formats are growing more rapidly. Willingness to use digital retailing options in the future is highest in the developing markets in the Asia-Pacific (60% on average), Latin America (60%) and Africa/Middle East regions (59%), and trails in North America (52%) and Europe (45%). [37]

Using the tools provided by site-builders and do-it-yourself software providers makes starting an ecommerce business easier than ever, if one follows the basic steps. The first step requires filling a need or niche. The second step is establishing an online presence that can be accomplished in a matter of hours with proper assistance. For those with products to sell shopping cart software with an online payment system is required. Shopping cart software is an operating system used to allow

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[36] Website Builder Expert, Best Ecommerce Software to Easily Build Your Online Store, 11 August 2016, http://www.websitebuilderexpert.com/best-ecommerce-software/, Company websites, and Wikipedia.
[37] Nielson, The Future of Grocery, E-Commerce, Digital Technology and Changing Shopping Preferences Around the World, April 2015, http://www.nielsen.com/content/dam/corporate/us/en/reports-downloads/2015-reports/nielsen-global-e-commerce-new-retail-report-april-2015.pdf

consumers to purchase goods and or services, track customers, and tie together all aspects of ecommerce into one cohesive whole. Online payment systems usually entail obtaining a merchant account and accepting credit cards through an online payment gateway. Lastly, a marketing strategy is needed for driving targeted traffic to sites and a means of enticing repeat customers.

M-Commerce

M-commerce is transforming e-business models with employee-owned wireless devices being incorporated into business processes, such as telecommuting and BYOD (bring your own device) policies. In developing countries and regions (e.g., India, Russia, Brazil, and Middle East) BYOD usage is reported to be over 80%.

M-commerce is projected to play a significant role healthcare, gaming, music, entertainment, sports, lifestyle, education, transportation, utilities and lifestyle industries.

According to the 2015 U.S. Mobile App Report, over the last two years, mobile device viewing has grown by 85% compared to 15% in desktop viewing. [38] The vast majority (65%) in digital media engagement is with smartphone apps. Screenagers, ages 18-24, average 90.6 hours per month on smartphones and another 34.7 hours on tablets/phablets for each app they use, plus another 13% for browsing. Millennials, ages 25-34, usage is almost as high, 82.5 and 23.5 respectively.

U.S. Mobile Viewing Share of Growth in Total Digital Time Spent
Source: Source: comScore Media Metrix Multi-Platform & Mobile Metrix, U.S., Total Audience
June 2015 versus June 2013
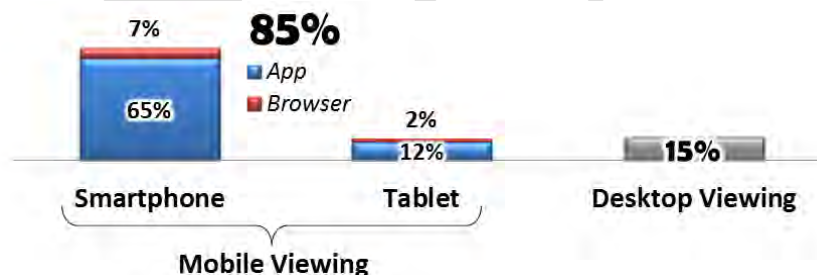
Mobile audiences are also growing as well. In 2015, approximately 120 mobile apps have audiences of over 5 million viewers. The top 10 mobile apps have audiences between 50 and 125 million users (Facebook 125M, YouTube 99M, Facebook Messenger 96M, Google Search 81M, Google Play 77M, Google Maps 76M, Pandora Radio 74M, Gmail 68M, Instagram 63M, Apple Music 50M and Apple Maps 50M). 3 in 4 smartphone users keep their most used app on the home screen, fully in view and only one-click away.

The 2015 U.S. Mobile App Report concludes with three important m-commerce takeaways: (1) mobile app usage is exploding as it becomes the number one means of digital media consumption, but not at the expense of desktop or mobile web, (2) app usage is a reflexive, habitual behavior

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[38] ComScore, The 2015 U.S. Mobile App Report, 22 September 2015, https://www.comscore.com/Insights/Presentations-and-Whitepapers/2015/The-2015-US-Mobile-App-Report

where those occupying the best home screen real estate are used most frequently, and (3) decision-makers must look to Screenager and Millennial app habits to win in mobile long-term usage.

E/M Economic Trends. Applications of NTR technology, processes, systems and service will continue to transform the E/M Economy. Some of the significant trends include: smartphones sales will overtake desktop sales, e-retailing will increasing replace traditional retailing, big data and customer analytics will increase margins by personalizing shopping, geolocation and beacons will enhance shopping habits, same day delivery will become common, mobile payments will increase wallet share, biometric identification and authentication will be essential to fighting fraud, social media will be monetized and virtual sales will be the new norm. The following sections examine a few of the many ways that businesses and individuals are adapting to these transformational E/M Economy trends.

The E/M Economy has given rise to new forms of marketing (affiliate marketing, referral marketing, loyalty marketing and customer-paid marketing) as an alternative to traditional email marketing that is in a state of decline. Due the indiscriminate use of traditional forms of online advertising, more and more emails are destined for spam files or deleted without opening. Triggered campaigns (calendar event, product release, etc.) and demographic personalization (knowing key characteristics of a potential customer) have helped somewhat, but open rates continue to declining due to increasing volume, lack of customization and declining trust factors. As result, alternative methods of E/M marketing and advertising are taking the place of bulk-oriented email marketing.

- Affiliate marketing is a performance-based e-commerce marketing model that rewards affiliates who target specific groups of internet users. At its core, affiliate marketing is about developing relationships between advertisers (sellers), affiliates (publishers/brokers) and consumers (buyers). For example, Amazon.com has thousands of affiliate websites from where the visitors can reach products offered by Amazon. Once item is purchased, Amazon passes on a percentage of the sales price as commission to the affiliate from where the sale originated. Affiliates also earn revenue by third-party advertising. Affiliates concentrate on relationships and analytics of individual and specific communities of interest, whereas advertisers are responsible for inventory, order management, payment and shipping.

  The most common types of affiliate marketing programs use pay-per-click, pay-per-lead, and pay-per-sale. In pay-per-click, online advertisers pay publishers when an ad is clicked on, regardless if a sale is made or not. In pay-per-lead, the advertiser only pays for leads generated by the affiliate for the advertiser. In pay-per-sale, the advertiser and affiliate are both paid on the basis of the number of sales that are directly generated by an advertisement and the affiliate's lead.

- Referral marketing, also called word-of-mouth marketing, involves consumers purchasing products based on someone else's opinion or influence. Studies have proven that the vast majority of a consumer's trust comes from a friend's personal endorsement rather than advertisements. Traditional referral marketing was conducted literally by word-of-mouth, where a friend shared his/her positive consumer experience. Today's referral market sharing is conducted more online via social media than physical conversations.

  Businesses use referral apps to enhance e-commerce sales. Double-sided referral apps reward the referrer as well as the friend. Amazon, PayPal and Airbnb double-sided referral programs

offers cash or discount rewards to both referee and friend, whereas Uber gives discounted first rides and Dropbox provides additional free data storage space.

Due the NTR, referral marketing has become a very powerful e-commerce tool due to greater reach provided by social networks, precision matching of consumer preferences (data analytics) with known brands and discounted items, and an increased trust factor between friends and communities of common interest.

- Loyalty marketing involves growing and retaining existing customers through incentives. It is estimated that U.S. retail, consumer product, banking and travel loyalty programs have as many as 3.3 billion members[39] at a cost of $2 billion per year.[40] For many companies, the majority of all their business revenue comes from growing and retaining their loyal customer base.

  Loyalty marketing builds trust with recurrent customers by rewards for repeat business. Four types of reward programs are commonly used. Rebate reward programs allow customers to earn money from prior purchases. Discount reward programs offer a percentage or dollar amount off of a purchase. Frequency, club or punch-card reward programs complementary services or goods (e.g., by 10 and get the 11th free). Point reward programs use points as currency in order for customers to keep track of their rewards. In addition to giving customers rewards for brand loyalty, loyalty programs provide the issuing company with a wealth of consumer information that can be utilized for remarketing or sale to third-parties and partners.

  The average U.S. household has 29 loyalty program memberships but actively uses a small percentage of these memberships due to largely undifferentiated rewards based solely on purchases. In today's consumer world increasingly dominated by Millennials, overall experience and emotional connections are more important than relatively small financial discounts.

  Consequently, more businesses are supplementing their sales-based, multi-tiered approach (platinum, gold and silver tiers) with social-engagement approaches that reward customers for activities, such as taking online surveys, rating and reviewing establishments, and improving customer experiences. Integrating reward programs with the overall customer experience is essential to building brand loyalty as evidenced by the success of Starbuck's novel approach of integrating mobile apps, rewards, payments and in-store experiences. The program has three levels, each with increasing benefits using a gamification process that keeps customers engaged by providing customer feedback and a sense of accomplishment. [41]

- Customer-paid marketing pays customers to view advertisements and rewards them upon purchase of goods or services. Via the NTR, marketing is changing from a fixed site (land lines and PCs) "producer push advertising" model to a mobile device "consumer pull advertising" model.

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[39] eMarketer, Loyalty Marketing:Creating Stickiness In A Distracted World, August 2016,. https://www.emarketer.com/public_media/docs/eMarketer_Report_Loyalty_Marketing_Creating_Stickiness_in_a_Distracted_World.pdf
[40] Gallup, "Making Loyalty Programs Work: Companies must first fully engage customers and activate their participants", October 2011, http://www.gallup.com/businessjournal/149570/making-loyalty-programs-work.aspx
[41] Capgeini Consulting, Fixing the Cracks: Reinventing Loyalty Programs for the Digital Age, December 2014, https://www.capgemini-consulting.com/resource-file-access/resource/pdf/reinventing_loyalty_programs.pdf

Today, 29% of all American retailers rely on SMS (texting) for customer service and promotions and another 15% are actively looking for a vendor to help with SMS communications. Customers also like to SMS retailers due the convenience of texting over using the telephone as well as receiving text updates on loyalty-related programs..[42]

Via SMS (texting) retailers are now beginning to use a process known as "opt-in" advertising to reach customers. Opt-in advertising is a compliance-driven process that requires customers to sign up for the service. Consequently, Do Not Calls Laws are not applicable. The mobile phone number is the heart of mobile operating systems.

SMS communications tied to that number that is permission based is the most effective access point to customers today. SMS messages also appear on the other devices tied to that phone such as and iWatch, iPad, MacBook, Apple TV and any other iOS controlled device. When customers respond to a SMS advertisement, they are paid a fee (usually $1 to sign up and $0.25 per referral commissions per view via an online payment system like PayPal) to watch the ad and another fee if they forward it to another person who responds. They also can receive additional financial incentives from the advertising sponsor.

Opt-in advertising has significant advantages over traditional advertising since SMS text achieve nearly 100% delivery rate and usually seen within an hour of receipt. As a result, opt-in advertising, to willing receivers who are compensated for viewing SMS advertisements, is ideal for time-sensitive applications such as television commercials. 30-second TV commercial can reach as $4 million (e.g., Super Bowl) for a general audience. For a fraction of this price, opt-in advertising can reach millions of targeted customers whose buying preferences are already known.[43]

These new forms of E/M marketing target consumers through email usually with the aid of data mining, lead generation technology and content marketing. Data mining involves the practice of examining large databases in order to generate new information, to generate leads. Lead generation technology involves stimulating and capturing interest by consumers in a product or service for the purpose of developing sales pipeline. Content marketing involves creating and distributing valuable content (media, video, music, link pages, produce reviews, guide, etc.) with the intention of changing or enhancing consumer behavior. Unlike text-based ads, content marketing relies on elements such as banner ads, images, audio and video to communicate an advertising message. The overall goal in effective E/M marketing campaigns is to effectively segment customer prospects based on their interests, behaviors and buying habits. Once segments, E/M marketers employ hi-tech tracking, reporting and reward programs to retain and grow an increasingly loyal customer base.

Nearly all U.S. small businesses now have a website and are adopting E/M marketing tools to their automate email and e-business processes. Facebook and LinkedIn are the top social platforms for, according to June research from The Alternative Board (TAB). That survey found that 82% of

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[42] eMarketer, Three in 10 Retailers Rely on SMS for Customer Service, Promotions, 26 August 2016, https://www.emarketer.com/Article/Three-10-Retailers-Rely-on-SMS-Customer-Service-Promotions/1014403

[43] FreeEats.com is an opt-in advertising pay-per-view system that has made millions of payments to their members via PayPal, https://freeeats.com/

respondents used social media for marketing, and nearly two-thirds used Facebook and LinkedIn and newer social networks (e.g., Snapchat, Instagram and Pinterest) accounted for the remaining one-third. The next big step for many small and medium-sized businesses are considering investing in are video, lead generation and search engine optimization to increase their online presence, brand and nurturing lead volume and quality. According to LinkedIn research, relationship-building tools and sales intelligence tools were the most effective technologies for increasing revenues. [44]

Popular search engines (e.g., Google, Bing, Yahoo, Baidu [China], Yandex [Russia]) are the engines of these new forms of E/M marketing. These search engines typically display listings on their search engine results pages (SERPs) by:

- Listings that have been indexed by the search engine's webcrawler (a "spider" that crawls over the WWW finding licks to other web pages),

- Listings that have been indexed into the search engine's directory by a human, and

- Listings that are paid to be listed by the search engine.

The higher a website naturally ranks in organic results of a search, the greater the chance that that site will be visited by a user. Unpaid search engine optimization (SEO) processes maximizes the number of visitors to a particular website by using keywords and keyword analysis, backlinking, and link-building to improve link popularity. Paid search engine marketing (SEM) involves advertising within the sponsored listings of a search engine or a partner site by paying either each time an ad is clicked (pay-per-click) or when your ad is displayed (cost-per-impression).

E/M-Health

Generally speaking, electronic-health (e-heath) involves the practice of healthcare supported by electronic practices and communications, usually via the internet. E-health is more narrowly defined as health informatics, which is the interdisciplinary study of the design, development, adoption, and application of network-centric, information technology-based innovations in health services, exchange, delivery, management, and planning. Mobile-health (m-health) involves the practice of medicine and public health supported by mobile devices in collecting patient data; providing real-time healthcare information between medical facilities, doctors, nurses, practitioners, patients, support personnel and researchers; real-time monitoring of patient vitals; and direct provisioning of prescriptions, healthcare treatments and solutions.

NTR e/m-health technology, processes, systems and services are poised to dramatically reshape the healthcare landscape. Standardized national electronic health records (HER) and health information exchanges (HIE) will provide a seamless framework for information between medical and healthcare providers, increasing efficiencies and reducing costs. Mobile and wearable health and fitness devices will connect consumers to providers to greatly reduce wait times and encourage uses to be more proactive in healthy living. According to the HealtIT.gov, 6 in 10 Americans with online access say it improves their desire to do something about their health. While e/m-health is growing in popularity

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[44] eMarketer, Small Business Marketing Roundup, August 2016, http://on.emarketer.com/Roundup-20160823-Small-Business-Marketing-thankyou.html?aliId=422822332 and
https://www.emarketer.com/public_media/docs/eMarketer_Small_Business_Marketing_Roundup.pdf

in the United States, the field is revolutionizing developing nations that have poor access to medical/healthcare resources but have a high percentage mobile netizens.

According to Grand View Research, a U.S.-based market research and consulting company, the global e/m-health market is expected to reach $308 billion by 2022 with data management and analysis of patient health being the market driver.[45] Mobile applications and wearable remote monitoring devices will be major growth sectors for behavioral modification (exercise, weight loss, smoking cessation) as well as chronic disease monitoring (diabetes, hypertension, heart failure, autism, cancer).

Using e-health insurance as an example, eHealthInsurance.com is the leading online marketplace for individually and family health insurance products in the United States, according to their website.[46] Licensed to market and sell health insurance in all 50 states and the District of Columbia, eHealthInsurance was responsible for the first U.S. internet-based sale of a health insurance policy. eHealth's Technology and eHealth Government Systems is a leading provider of exchange and e-commerce technology platforms for health insurance carriers, brokers, agents and state and federal governments, including the Affordable Care Act (Obamacare). eHealthInsurance works with more than other 180 health insurance companies and offers over 10,000 health insurance products online.

In regard to health informatics, numerous network-centric platform companies are entering the field with various cloud computing based e/m-health applications, like Apple's HealthKit and ResearchKit. HealthKit is designed to provide and integrate fitness and health programs (from iOS 9.3 PCs, smartphones and tablets, watchOS 2.2 wearable devices and third-party apps) to a user and allowing that user to their share fitness and health data with professionals and other persons of interest. Currently HealthKit has four distinct categories (Activity, Sleep, Mindfulness, and Nutrition) with others in development. The ultimate goal of Apple's e/m-health initiative is to make the HealthKit software platform the leading choice amongst hospitals and physicians to improve diagnosis and analytics from mountains of stored and real-time data. Apple's ResearchKit is also developing an open source software framework that works seamlessly with HealthKit to provide research and clinical trial institutions with richer and timely health data.[47]

NTR technologies, systems, processes and services most commonly involved with e-health involve acquiring, storing, retrieving and using of healthcare information to foster more efficient and cost effective communication, treatment, collaboration and monitoring between patients and their healthcare providers. E-health encompasses a wide range of systems and services including medical research and knowledge management, virtual healthcare and diagnostics, computerized provider order management and delivery, insurance, electronic health records, information exchange, portable medical data collection devices, telemedicine and m-health.

The advent of mobile and sensor technology allows for miniaturization of portable medical equipment that was formerly suitable for large, stationary centralized institutions. The spread of smartphones and tablets will enable better patient monitoring, consulting and personal care. The

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[45] Grand View Research, eHealth Market Projected To Reach USD 308.0 Billion By 2022, April 2016, https://www.grandviewresearch.com/press-release/global-e-health-market

[46] eHealthInsurance.com, About, https://www.ehealthinsurance.com/about-ehealth/our-story

[47] Apple, Developer, Healthkit, https://developer.apple.com/healthkit/

three technologies that will reshape healthcare are remote patient monitoring, chronic condition management, and wearable sensors and apps. These three technology markets will create a $117 billion connected health market in the United States by 2020. Doctors agree. 86% of American clinicians believe that m-health apps will be central to patient health by 2020.[48]

Goldman Sachs projects m-health, also called connected healthcare and digital healthcare, represents the next frontier for the Internet of Things. Goldman forecasts the three most significant NTR-related m-health IoT categories include remote patient monitoring, telehealth; and behavior modification.

- Remote patient monitoring will be particularly effective in chronic disease (e.g., heart, lung and diabetes) management, which equates to one-third of all US healthcare expenditures.

- Telehealth can be used to treat routine medical and mental healthcare issues.

- Behavior modification deals with preventive care regarding obesity, smoking cessation and lifestyle improvements.

Remote patient monitoring, telehealth and behavioral modification platforms hold the promise of improving chronic disease management and reducing unnecessary costs by $305 billion.[49] M-health will also cause significant disruption in the healthcare industry causing the healthcare providers to shift for fee-for-service to value-based-care.

U.S. healthcare spending is projected to grow at an average rate of 5.8% per year reaching 20.1% of GDP by 2025, up from 17.5% in 2014. In 2014, U.S. healthcare spending reached $3.0 trillion ($9,523 per U.S. citizen), including the following major categories: [50]

- Hospital Care ($971.8 billion)

- Physician and Clinical Services ($603.7 billion)

- Prescription Drugs ($297.7 billion)

- Nursing-Care Facilities and Continuing Care Retirement Communities ($155.6 billion)

- Personal Care Services ($150.4 billion)

- Dental Services ($113.5 billion)

- Other Health, Residential, Professional Services ($84.4 billion)

- Home Health Care ($83.2 billion)

- Non-durable Medical Products ($56.9 billion)

- Durable Medical Equipment ($46.4 billion).

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[48] The App Association, State of the App Economy 2016, http://actonline.org/wp-content/uploads/2016_State_of_App_Economy.pdf

[49] Goldman, Sachs & Co., The Digital Revolution comes to US Healthcare, 29 June 2015, http://www.scbio.org/resources/Documents/Internet%20of%20Things%20-%20Volume%205%20-%20The%20Digital%20Revolution%20comes%20to%20US%20HC%20-%20Jun%2029,%202015%5B1%5D.pdf

[50] CMS.gov, Centers for Medicare & Medicaid Services, https://www.cms.gov/research-statistics-data-and-systems/statistics-trends-and-reports/nationalhealthexpenddata/nationalhealthaccountshistorical.html and https://www.cms.gov/research-statistics-data-and-systems/statistics-trends-and-reports/nationalhealthexpenddata/nhe-fact-sheet.html

E/M-health has major labor force implications. The BLS 2016-17 Occupational Outlook Handbook (OOH), the U.S. government's premier job market reference source, includes 576 detailed occupations (about 83% of total employment).

Fastest Growing Occupational Groups: 2014 to 2024
Source: BLS, Employment Outlook Projections
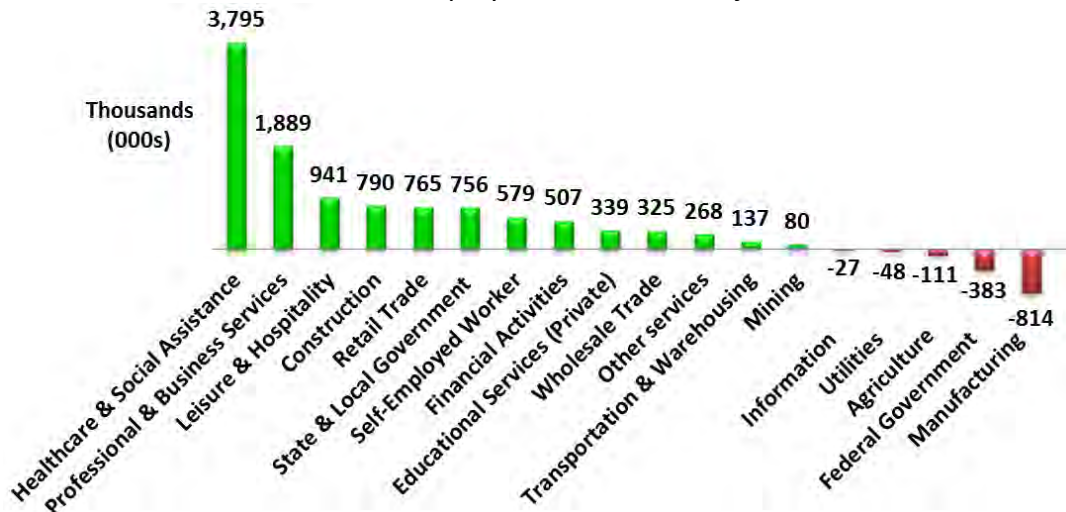
The OOH forecasts the Healthcare and Social Assistance occupational group as the fastest growing, by a wide majority, of all U.S. occupational groups, creating almost 40% of all new jobs by 2024.

The healthcare community is turning to electronic-health (e-health) solutions to stem costs and increase efficiencies to an aging population and the increasing number of citizens dependent on medical public assistance. The healthcare community is also turning to mobile-health (m-health) solutions to shift from the high cost of inpatient hospital care to lower costing outpatient and in-home residential care, as well as using telehealth applications to reduce the cost of expense of post graduate degreed physician and clinical service professionals to certified healthcare practitioners.

Projected Growth Occupations: 2014 to 2024 (Only Healthcare Listed)
Data Sources: BLS, Occupational Outlook Handbook, Employment Projections, Table 1.3

No College Degree	Occupation	Number of Jobs In 2014	Number of New Jobs	Growth Rate	2014 Median Pay
1	Personal care aides	1,768,400	458,100	26%	$20,440
3	Home health aides	913,500	348,400	38%	$21,380
5	Nursing assistants	1,545,200	267,800	17%	$25,090
9	Medical assistants	591,300	138,900	23%	$29,960
12	Medical secretaries	3,976,800	118,800	3%	$35,970
13	Licensed practical and licensed vocational nurses	719,900	117,300	16%	$42,490
27	Childcare workers	1,260,600	69,300	5%	$19,730
33	Dental assistants	318,800	58,600	18%	$35,390
34	Emergency medical technicians and paramedics	241,200	58,500	24%	$31,700
Top Healthcare Occupations Requiring No College Degree		11,335,700	**1,635,700**	14%	

College Degree	Occupation	Number of Jobs In 2014	Number of New Jobs	Growth Rate	2014 Median Pay
1	Registered nurses	2,751,000	439,300	16%	$66,640
7	Physicians and surgeons	708,300	99,300	14%	$187,200
11	Physical therapists	210,900	71,800	34%	$82,390
12	Medical and health services managers	333,000	56,300	17%	$92,810
Top Healthcare Occupations Requiring College Degree		4,003,200	**666,700**	17%	
Total Healthcare New Occupations			**2,302,400**		

Of the 576 occupations listed in the OOH, the fastest growing occupations (listed above) are healthcare related. Over 2.3 million new healthcare jobs are projected to be added to the U.S. labor force. 71% of these jobs will not require a college degree, including healthcare aids, assistants, technicians and paramedics. Most of these jobs will require some form of e/m-health technology to connect lower-skilled practitioners to doctors, registered nurses and medical treatment facilities.

E/M-Entertainment

The entertainment industry includes exhibition entertainment (museums, theme parks), live entertainment, mass media (cinema, TV, radio), electronic entertainment (video games, streaming video) and music. An e/m-entertainment economy is defined by the economic value of the entertainment industry devoted to online platforms and content creation and distribution. Due the rapid advancement of NTR technology, processes, systems and services, online entertainment is likely to become the one of the largest segments of the $2 trillion global entertainment industry by 2020.

From 2015 to 2020, global online traffic will increase three-fold and global mobile traffic eight-fold. Online gaming (casual online gaming, networked console gaming, and multiplayer virtual world gaming) and internet video (such as recorded viewing and downloading such as YouTube, Netflix and Hulu; live event viewing; webcam monitoring and video surveillance) are projected to be the fastest growing segments in internet traffic growth with a CAGR (combined average growth rate) of 47% and 31% respectively. In 2020, nearly a million minutes of video content will cross the global network every second. In other words, it would take an individual more than 5 million years to watch the amount of video that will cross global IP networks each month in 2020.[51] While this amount of video

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[51] CISCO, Cisco Visual Networking Index: Forecast and Methodology, 2015–2020, Table 1, http://www.cisco.com/c/dam/en/us/solutions/collateral/service-provider/visual-networking-index-vni/complete-white-paper-c11-481360.pdf

might seem to be an outlandish overkill of information, data analysis and artificial intelligence tools should be able to identify, select, preview and present only the best and desired video content to the consumer.

From 2015 to 2020, the global video game industry is expected to at a CAGR of 4.8% compared to other larger online entertainment industry segments such as music (3.2%), cinema (1.2%) and TV and video (0.5% CAGR).[52] Other analysts calculate global video game industry CAGR as high as 12% during this period. More importantly, video-gaming technology is migrating to retail, automotive, healthcare and other industries that are interested in interactive virtual world technology as means to connect users, consumers and patients to their goods and services.

The Evolution and Global Impact of Video Game Technology. The interactive entertainment industry is commonly called the video-game industry that deals with the development, marketing and sales of electronic video games. Traditional console, arcade and handheld man-machine video games are giving way to global interactive, multiplayer, video-enhanced games and sports tournaments for 1.2 billion game players worldwide.[53]

Based on the amount of time that young adults spend on online entertainment, video gaming could soon be the dominant sector of the e/m-entertainment economy. Two-thirds of the Screenagers, Generation Z, ages 18 to 21, spend an average of 7 hours a day online not counting the 3 hours listing to music, and list video gaming as their main hobby. Powered by revolutionary NTR technologies like synthetic reality, artificial intelligence, cloud computing, ubiquitous computing, mobile computing and 5G broadband networks, network-centric platform company are likely to increase their dominance as the most valued companies in the world as they capture next generation consumers and understand their entertainment and buying preferences.

Video gaming can be played on a computing device, such as a personal computer, gaming console or mobile phone. Video gaming can be categorized as computer games, console games and social games. Mobile video gaming is largely for consumers to past time with a few minutes to kill, while console games are for more intensive gaming or competitive gaming.

Annual revenues in video gaming reached $100 billion in 2016 and are growing rapidly with new NTR technology. While the United States is currently the global video gaming leader, Asian countries are rapidly assuming a dominant position, claiming 58% of market growth so far in 2016. The Chinese market is growing at 23% per year and is projected be the global leader in 2016. Asian companies like Tencent (Chinese) and Sony (Japanese) are now the top two video gaming companies in revenue, followed by a myriad of U.S. gaming console companies (Microsoft, Electronic Arts and Activision) followed by American smartphone manufacturers, Google and Apple.

The $100 billion per year, global video gaming industry is the fastest growing segment (50%+) of the video gaming market that is a segment of the overall global entertainment and media market that

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[52] PwC, PwC: Game industry to grow nearly 5% annually through 2020, 8 June 2016, http://venturebeat.com/2016/06/08/the-u-s-and-global-game-industries-will-grow-a-healthy-amount-by-2020-pwc-forecasts/ and http://www.pwc.com/gx/en/industries/entertainment-media/outlook/segment-insights/video-games.html
[53] SpilGames, State Of Online Gaming Report, 2013, http://auth-83051f68-ec6c-44e0-afe5-bd8902acff57.cdn.spilcloud.com/v1/archives/1384952861.25_State_of_Gaming_2013_US_FINAL.pdf

has an annual market value of $2 trillion dollars that is growing at an annual rate of 5% globally and as high as 15% in emerging economies. Games like Clash of Dragons, Candy Crush Sage and Pokémon GO are recent trendsetters. Within 60 days after launch, Pokémon GO accelerated from $0 to $500 million in worldwide consumer spending in the iOS App Store and Google Play.

As consumers become increasingly digitally savvy, the difference between real-world entertainment and virtual-world entertainment is less and less important. Empowered consumers tend to prefer tailored and exciting content experiences that digital entertainment offers. Moreover, video gaming tends to take the fans out of the bleacher seats and involve them in gameplay and delivering inspired and personalized experiences. No wonder that two-thirds of teenagers and young adults list –video gaming as their main hobby and an increasingly number of workers are becoming professional gamers and developers.

The video gaming industry is currently in its 8th generation that is just beginning to incorporate emerging NTR technologies, processes and systems including, but not limited to, cloud computing, synthetic reality, semantic webs, mobile computing, ubiquitous computing, 5G broadband, geo-location, machine learning, deep learning, memetics, biometrics, emotive surveillance, ambient intelligence, artificial intelligence and intelligent agents.

- 1st Gen of video consoles started in the early 1970s with the advent of home consoles and arcade Pong video-games. In the 1980s, arcade games became an international entertainment phenomenon featuring video games like Pac-Man, Asteroids, Donkey Kong and the like, surpassing the combined revenue of the pop music and Hollywood film markets.

- 2nd Gen began in the early 1980s when the home video games, like Atari's Space Invaders, became popular. 2nd Gen rapidly advanced when video games were introduced to personal computers via floppy discs.

- 3rd Gen 8-bit consoles with gamepads and joysticks became popular starting in the late 1980s, followed shortly thereafter by 4th Gen 19-bit consoles with faster processing and higher resolution, followed by 5th Gen 32 and 64-bit consoles that introduced 3D games and higher fidelity graphics. During the 3rd to 5th Gen period, console and arcade games were simplified and miniaturized for handheld gaming devices and mobile phones. Handheld games, like Mario Brothers, and modest time-killer mobile phone games, like Bubble Buster, became instant successes.

- 6th Gen technology gave rise to video gaming in the early 2000s as built-in modems allowed online play via the internet.

- 7th Gen technology included high-definition graphics that became available via broadband internet connectivity, which in turn gave rise to causal and social network gaming. A casual game is a video game characterized by limited time constraints and limited skills. A social game, such as Texas Hold'em that has over a half million daily players, allows users to engage with each other.

- 8th Gen video gaming technologies, like advanced processing and video units, autostereoscopy (glasses-free 3D) and cloud-based computing, all of which are being incorporated in home

consoles (Wii U, PlayStation4, Xbox One), video game handhelds (Nintendo 3DS, PlayStation Vita), as well as smartphones, tablets, and smart TVs.

According to the Nielsen 360° Gaming Report, mobile/tablet gaming 51% of men and 49% of women over the age of 13 play on mobile/tablet devices. Comparatively, 65% of 8th generation console gamers are men. Mobile gamers also skew older than console players. The average mobile gamer is 36 years old, whereas the average 8th generation console gamers is 31 years old. The trend in video gaming is not moving from consoles to mobile devices, it is expanding into e-sports and the virtual world. [54]

Today's, 8th Gen video-games have reached a degree of fidelity and graphics that are astonishingly real and additive. Emerging NTR technology, will enable video gaming to perform functions for humans in merged virtual/physical worlds, and will act like personal Sherpas that learn the interests of users based on their previous activities, avatars that will represent the user's alter ego in the virtual world, and virtually enhanced 3D worlds that will assist users in their physical world to educate, train, as well as entertain.

This 3D world is operational today. Second Life is the world's largest user-created 3D world. Second Life is an online virtual world, developed by San Francisco-based Linden Lab and launched in 2003.[55] Second Life users (also called Residents) create their own avatars "who" are able to interact with other avatars, places or objects. They can explore the world (known as the grid), meet other residents, socialize, participate in individual and group activities, build, create, shop, and trade virtual property and services with one another. While Second Life never got past a million users it has inspired numerous other technical, academic and businesses to pursue synthetic reality. The latest organization to jump in is Facebook that acquired Oculus VR for $2 billion in 2014. Oculus headsets allow users to engage in amazing virtual experiences. These headsets can be purchased for as little as $100 and can be linked to the virtual word via a smartphone.

In the foreseeable future, the video gaming industry is likely to provide interactive content that far exceeds other forms of entertainment, including the traditional America past times of professional sports. Millennials and Screenagers are not as big fans as their older generations. According to Stratechery, a technology blog, over the last decade the average age of the U.S. National Football League viewers increased from 43 to 47 and U.S. Major League Baseball viewers increased from 46 to 53 years of age. Other popular sports venues are seeing declines in ratings and viewership. Prime time viewing for the 2016 Rio Olympics earned a 14.9 rating and 26.7 million viewers, down from a 17.5 rating and 31.3 million viewers for 2012 London Olympics, and down from a 16.0 rating and 27.2 million for the 2008 Beijing Olympics.[56] In other words, major sports venues are rapidly becoming the dominion of Baby Boomers and Generation X, while Millennials and Screenagers are increasingly turning to video-games and social media for entertainment.

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[54] Nielsen, Nielsen 360° Gaming Report: Mobile, ESports And VR Expand And Increase Engagement, 13 April 2016, http://www.nielsen.com/us/en/insights/news/2016/mobile-esports-and-vr-expand-and-increase-gaming-engagement.html
[55] Second Life, http://secondlife.com/ and http://en.wikipedia.org/wiki/Second_Life
[56] Stratechery, The Sports Linchpin, 6 August 2016, https://stratechery.com/2016/the-sports-linchpin/

Of the three genres in the video gaming industry (action adventure, shooter, sports) e-sports is growing at an annual rate exceeding 50% and is rapidly displacing real-world sport venues. E-sports encompasses a wide range of games including real-time strategy games (e.g., League of Legends), common first-person shooter games (e.g., Call of Duty: Modern Warfare) and fantasy betting games (e.g., Fantasy Football). E-sports tournaments, where professional gamers play video games in competition with others, have grown to big spectator events that have motivated major video gaming companies such as ESPN, Electronic Arts and Activision to form e-sports divisions.

The 2014 League of Legends e-sports tournament attracted 27 million ESPN viewers which exceeded the 18 million viewing audience for the 2014 NBA finals and the 23.5 million for Game 7 of Major League Baseball World Series (the series averaged 13.8 million).[57] League of Legends is a Multiplayer Online Battle Arena (MOBA) real-time strategy action game where a player controls a single character of in one of two teams. Gameplay is characterized by single unit hero strategic combat between two small teams of players, each trying to destroy the opponent's base. League of Legends was released in 2009 by Riot Games, an American company, which was acquired by Tencent Holdings, a Chinese company, in 2011 for approximately $500 million. League of Legends has over 100 million monthly players, which generate approximately $1.5 billion annually for the Los Angeles-based Riot Games and its Chinese parent. The game has 85 million monthly active users, at least 40 million of whom are in China, is becoming one of the world's leading action entertainment venues.

The Rise of Synthetic Reality. Technologies in the digital world are advancing rapidly, especially in the realm of synthetic-reality, which includes augmented reality (AR), mixed reality (MR) and virtual reality (VR). In AR, the visible natural world is overlaid with a layer of digital content. MR virtual objects are integrated and responsive to the natural world. VR places the user entirely in a virtual world normally via the use of googles or helmets. AR, MR and VR are often referred to as computer-simulated reality allowing users to simulate physical presence (sight, touch, hearing and smells) in real and imagined worlds. Haptics (kinesthetic communication that creates the sense of touch by applying force, vibration or motion to a user) are also gaining widespread acceptance in synthetic reality. Synthetic reality body suits are also being developed for a total immersion synthetic reality experience. Unlike high-definition flat screen technology that makes memories from what people witness, synthetic reality makes memories from what people experience—the difference between observation and immersion.

The U.S. military's AR/VR awareness and visualization systems, and AR/MR/VR commercial systems, like Google Glass (AR) and Magic Leap (MR), will connect the semantic web to humans on the move, providing people with information tailored to their geo-located position and annotated with personalized items of interest via semantic networks. Major synthetic reality markets include video gaming, entertainment (movies, sports, live concerts and adult entertainment), medicine, manufacturing and arts/design.

Since early 2014, more than $2.5 billion has been invested in synthetic reality companies. In June 2016, the Virtual Reality Venture Capital Alliance (VRVCA) was formed by a consortium of three dozen

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[57] ESPN, E-sports: "League of Legends" ratings top NBA Finals, World Series clinchers, 3 December 2014, http://espn.go.com/espn/story/_/page/instantawesome-leagueoflegends-141201/league-legends-championships-watched-more-people-nba-finals-world-series-clinchers

venture capital firms with $10 billion in combined deployable assets to foster long-term growth in the VR (including AR and MR) industry through identifying, sharing and investing in the world's most innovative and impactful technology and content companies.[58]

According to a recent Nielsen study, roughly 24% of the U.S. 18-54 population report that they are likely to use or purchase VR technology in 2016. The study found that many consumers increased their familiarity and interest in VR technology with as little as 2 minutes of exposure to content and over 50% of viewers showed some increase in their likelihood of purchasing or using VR technology after their brief informational experience.[59]

2016 will be a breakthrough year for virtual reality with projected sales exceeding $1 billion, with a 70% hardware/30% software (content) ratio. There are two types of VR headsets: full-feature and mobile.

- Full-feature VR incorporates high resolution screens and provides a realistic "immersive" experience. Typical Full-feature headsets cost around $500 not including computing peripherals. Immersive VR requires about 7-times the computing power compared to traditional 3D games and applications. Consequently, advanced graphic cards and more powerful processors will be needed. Total cost of immersive VA could be several thousand dollars depending on the degree of computer upgrades needed. This amount of money is not deemed to be a barrier for early adopters of VR technology but could be an issue for wide-scale usage.

- Mobile VR is a less expensive option but requires late model smartphones. Mobile VR headsets consist of scuba-like dive masks (cases) that the user can insert a smartphone. Typical costs for mobile VR cases should be in the range of $100. The downside of mobile VR is that current models often fail to deliver the high number of frames-per-second to each eye to make the images look real and the scenes more fluid.

Analysts are in agreement that VR usage will transform the entertainment industry but are divided on when and how much. Estimates on number of VR units sold in 2016 range from a low of 300,000 to a high of 2.5 million. If VR ownership achieves the level of current game console ownership, potential unit VR sales could be as high as 250 million units. Today's leading game consoles (Sony PlayStation 4, Microsoft Xbox One and Nintendo Wii U) sell in the range of $350, which is achievable price point for immersive VR. By 2020, projected VR hardware and software sales range from $30 billion to $70 billion, a range that is substantially higher the $1 billion expected in 2016.

In 2016, a number of VR headsets will enter the market including Facebook's Oculus Rift ($599), Samsung Gear VR ($99), Sony's PlayStation VR ($799) and HTC Vive ($799). By 2018, most global entertainment and media experts predict that VR headset prices will be affordable for the average gamer and a plethora of VR gaming content will become available. Google is introducing a VR headset made out of cardboard, appropriately called Google Cardboard, which retails for about $15, and a more advanced version called Daydream.

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[58] Virtual Reality Venture Capital Alliance, Making Reality Virtual, http://www.vrvca.com/overview

[59] Nielsen, Reality Check: A Peek At The Virtual Audiences Of Tomorrow, 22 September 2016, http://www.nielsen.com/us/en/insights/news/2016/reality-check-a-peek-at-the-virtual-audiences-of-tomorrow.html

It is important to note that VR headsets have a multitude of other applications other than the entertainment industry including the healthcare, automotive, retail and defense industries.

- At the high end of the VR spectrum,, the $400,000 Gen III Helmet Mounted Display System is deployed the F-35 Lightning II fighter pilots.[60] This VR headset is so unique that its case (helmet) has to be molded to fit each pilot's head along with customize devices (mouse) for their hands. The helmet's virtual head-up display allows a pilot to look through the aircraft at any angle, including the floor, while integrating and displaying critical information on the helmet's viewing screen. The pilot's eyes are tracked by the helmet, enabling the pilot to guide missiles in a virtual world while focusing on a real world target.

- At the other end of the VR spectrum, in May 2016, eBay opened the world's first Virtual Realty Department Store in partnership with Myer, Australia's largest department store group. Shoppers can use any mobile VR headset or eBay's branded Google Cardboard "Shopticals" (the first 20,000 were free and now sell for about $6) to enter a virtual shopping store and interact with products by simply using one's eyes powered by eBay's Sight Search technology. eBay Shopticals lets customers browse through collections like clothing, electronics and home goods as if they were actually in the store. The VR store showcases some of the 12,500 products from Myer, which plans to offer its wares to international consumers via virtual reality shopping.

2016 will also be a potential breakthrough year for mixed reality. VR headsets are oriented to transporting a user into a virtual work, whereas MR headsets transport the virtual world to the user. Microsoft's MR HoloLens blends virtual reality and augmented reality to introduce 3D holographic content into physical worlds via the use of headsets that look like an oversized pair of sunglasses. HoloLens' holograms have real-world context and scale that allows users to interact with both digital content as well as the real world work/play situations. Using the HoloTour function, that combines panoramic video, holographic scenery and spatial sound, to create an untethered virtual travel experience with a real sense of presence and depth. HoloLens is also compatible with Skype to enable collaboration with other people and share holographic experiences.[61] In the first quarter of 2016 a little known company, Magic Leap, a US startup company, secured an investment of $794 million for its mixed reality on top of its prior $542 million investment from Google. Magic Leap uses virtual retinal lens (glasses) that superimposes 3D computer-generated imagery over real world objects by projecting a digital light field into the user's eye. According to most accounts, Magi Leap's technology is simply amazing, which can be seen at Magic Leap's homepage.[62]

MR technology is seriously being considered by major manufacturers as a replacement technology from televisions to smartphones. According to a MIT Technology Review, traditional stereoscopic 3D devices (often associated the VR headsets) essentially trick a user's eyes by producing a sense of

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[60] Rockwell Collins, F-35 Gen III Helmet Mounted Display System, https://www.rockwellcollins.com/Data/Products/Displays/Soldier_Displays/F-35_Gen_III_Helmet_Mounted_Display_System.aspx
[61] Microsoft, HoloLens, https://www.microsoft.com/microsoft-hololens/en-us/why-hololens
[62] Magic Leap, Homepage, https://www.magicleap.com/#/home

depth to create an image, which can produce dizziness and nausea. By projecting the image directly on the retina this discomfort can be eliminated. [63]

Whether HoloLens, Magic Leap, or other AR/MR/VR systems, prove to be viable is yet to be determined, but the new world of synthetic reality is likely to transform the way people experience life. MR systems will also open up a new era for app developers to create entirely new alternative reality ecosystem.

Adoption of advanced synthetic reality (VR/MR/AR) immersion and e/m-entertainment applications will accelerate the transition from traditional forms of entertainment to online entertainment, especially in emerging markets like China. The Chinese love media. Chinese cinema-goers will soon exceed North American goers. Chinese online video audience is the world's largest by far. Over 500 million Chinese watch streaming video regularly.

The Chinese government is supporting large-scale entertainment real-world and virtual-world initiatives as a way to appease a growing restive middle class and promote Chinese culture. Today, China has 11 major theme parks. By 2020, they will have 70 serving an estimated 220 million park-goers annually.[64]   Newer Chinese theme parks are designed to maximize state-of-the-art NTR and e/m-entertainment technologies, systems, processes and services. The $2.4 billion Dream Work's Shanghai Dream Center theme park will be the home of the largest world-class animation production base in China, with a focus on creative and digital media content development and distribution in collaboration with Chinese mass media titans like Tencent.

Tencent, Alibaba and Baidu are investing heavily in synthetic reality due its immense economic potential. In China, the synthetic reality market is expected to rise from $229 million in 2015 to $8.5 billion in 2020, a 3600% increase.[65]   As opposed to their foreign counterparts who are interested in product-making, Tencent, Alibaba and Baidu are positioning to be content-providers for their current 700 million online customers. These Chinese are not only interested in building apps to stream existing content (TV, movies, games) but developing new content via streaming video of live entertainment and breaking news. China's biggest e-commerce company, Alibaba, is also developing synthetic reality enhanced shopping for its 400 million customers to interact with 3D renderings of products. The economic potential of immersive synthetic reality content-providing could propel Tencent, Alibaba and Baidu to the top three most valuable companies in the world.

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[63] MIT Technology Review, Magic Leap - A startup is betting more than half a billion dollars that it will dazzle you with its approach to creating 3-D imagery, https://www.technologyreview.com/s/534971/magic-leap/

[64] Bloomberg Businessweek (Asia), Disney Scours China for Talent to Introduce Shanghai to Show Tunes, 25 May 2016, http://www.bloomberg.com/news/features/2016-05-25/disney-scours-china-for-talent-to-introduce-shanghai-to-show-tunes

[65] Bloomberg Businessweek, China's Virtual Reality Market Will Be Worth $8.5 Billion and Everyone Wants a Piece, 15 May 2016, http://www.bloomberg.com/news/features/2016-05-15/china-s-virtual-reality-market-will-be-worth-8-5-billion-and-everyone-wants-a-piece

Sharing/On-Demand Economy

The Sharing/On-Demand Economy is a new wave of peer-to-peer, access-driven businesses that are characterized by (1) the ability of individuals to share (goods, knowledge, money, time, skills, content, etc.) rather than buy or own or (2) fulfill consumer demand via the immediate provisioning of goods and services. In sharing, the trend is towards usage, as opposed to possession, of underused or idle assets. In many incidents these assets, tangible and intangible, are free. For example, Wikipedia, Google, Facebook, LinkedIn, Instagram and Dropbox all contribute freely to sharing. In the case of companies like Uber and Airbnb, the idle assets are available for rent. Consumers and entrepreneurs will be the greatest beneficiaries of the sharing economy. Such peer-to-peer sharing concepts can provide additional income for owners, while providing cheaper alternatives to consumers. For consumers, the sharing provides cheaper goods and services by quickly satisfying consumer needs via internet-connected applications.

The sharing/on-demand economy is expected to grow over time. PwC estimates that the five main sharing/on-demand sectors (peer-to-peer financing, online staffing, peer-to-peer accommodation, car sharing and music video sharing) have the potential to increase global revenues from around $15 billion to $335 billion by 2025. According to the PwC study, 44% of U.S. consumers are familiar with the tenets of a sharing/on-demand economy, 19% have already engaged in a sharing/on-demand economy transaction as a consumer, and 7% as a provider of sharing services or products. Among US adults familiar with the sharing economy, 86% agree that the sharing economy makes life more affordable and 78% think that it builds a stronger community. Of those consumers (from 18 years old to those 65 and older) who have tried the sharing/on-demand economy, the vast majority intends to continue participating in these transactions, and, more importantly, are "re-thinking the value of ownership" with 81% stating that it is less expensive to share than own and 43% agreeing that owning today is burdensome.[66]

With major business successes, like Uber and Airbnb, the sharing/on-demand economy is much more than a fad or trend. It is an emergent ecosystem that is upending mature business models across the globe. If successful, the sharing/on-demand economy is likely to usher in a transformation as significant as the personal computer did when it was introduced in the 1990s.

Shared-Mobility

Shared-mobility applications to allow users to share privately owned vehicles on an as-needed basis to save money and time, mitigate traffic congestion and lower harmful emissions. Ride-hailing, or e-hailing, applications allow users to order cars, taxis, limousines and bicycles via smartphones and the internet for a time and distance-based fee. Car-sharing and personal vehicle-sharing, application-based services are for sharing cars, and other vehicles (e.g., scooters, boats, etc.), for traveling, commuting and personal use without the costs and responsibilities of traditional ownership.

Most people think of shared-mobility as a novel taxi service that will be an interesting but insignificant subset of the overall digital economy. Think again. The vision of most shared-mobility

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[66] PwC, The Sharing Economy, Consumer Intelligence Series, http://www.pwc.com/us/en/industry/entertainment-media/publications/consumer-intelligence-series/assets/pwc-cis-sharing-economy.pdf

industry leaders is significantly more revolutionary and transformative. Rather than transforming the $100 billion per year taxi industry, their vision is to revolutionize the entire $10 trillion per year transportation sector. According the vision of shared-mobility industry leaders, personal vehicle ownership likely to become an obsolete practice in the same way mobile devices have upended fixed landlines and desktop computers. Many believe that a transportation-wide shared-mobility program could reduce inner-city vehicular traffic by upwards of 90%, which in turn would transform congested urban areas by repurposing trillions of square feet of roadways and buildings, such as garages and parking lots.

Shared-mobility is at the forefront of the new model of global, multi-modal, on-demand, share-mobility transformation that is currently taking place on five continents, in over 30 countries and in hundreds of cities. Shared-mobility offers an attractive alternative to owning (including fractional ownership) a vehicle as well as providing a meaningful alternative or supplement to conventional public transit systems. Car-sharing and personal vehicle-sharing applications can provide greatly needed low-cost services for the disabled, elderly and low-income groups.

Cars, trucks and motorized recreational vehicles tend to be the most underutilized and idle assets. In the United States, there are 204 million personal vehicles that are used mainly for commuting to work. However, the vast majority (109 million) of American workers drive alone to commute to work, which leaves about half of all personal vehicles idle. [67] [68] Better utilization of these idle personal vehicles was central to the creation of the concept of ride-sharing and ride-hailing.

Leading ride-sharing and ride-hailing application providers include Uber, Lyft, Rideshare, Getaround, Rydes, Ridejoy, Carma and Zimride (Enterprise Rent-A-Car). Leading car-sharing providers include Zipcar (11,000 cars and 730,000 members), Enterprise Car Share, Hertz on Demand, Gar2go, City CarShare, Uber and Lyft.

Companies like Uber and Lyft (chauffeured shared-mobility services), Zipcar and Car2Go (rental mobility services) and Turo (an online renting and listing service) are early competitors in the automotive sharing economy. Traditional rental companies, like Enterprise CarShare, are deploying a variety of on-demand makes and models in local communities that are available 24/7 for rent by the hour, day or overnight.

Renting is only one of the transactions that are an alternative to ownership. Other sharing economy transactions include lending and sharing (forms of non-cash bartering) as well as subscription services. Tomorrow's sustainable communities will likely offer shared and on-demand transportation (bicycles, motorbikes, autos and trucks) as part of the communities' basic infrastructure.

Uber. Uber is the pioneer, market leader and poster-child of shared-mobility. Its name is even used as a verb (Uberise) or a noun (Uberisation) to define the entire shared-mobility industry.

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[67] U.S. Department of Transportation, Household, Individual, and Vehicle Characteristics, http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/highlights_of_the_2001_national_household_travel_survey/html/section_01.html
[68] U.S. Census Bureau, Commuting Mode by Age Group, http://www.census.gov/hhes/commuting/files/2014/acs-32.pdf

Uber is an apps-based transportation network that uses a variety of m-commerce applications for worldwide car-hailing and car-sharing services. Its rise and fall will greatly influence the future of society's acceptance of this transformative economic model.

Uber began operations in San Francisco with a shared-mobility app and related services in 2011. By mid-2016, Uber employed 6,700 full-time employees and 160,000 independent drivers, providing 2 million rides each day in 70 countries and 507 cities worldwide.   Each month Uber adds approximately 50,000 new drivers for each of its ride-hailing services: UberX (lowest cost fares), UberXL (larger cars and vans), UberSUV (SUVs seating up to six people), UberSELECT (entry-level luxury service) and UberBLACK (commercially registered and insured limos). Lesser known Uber ride-sharing and ride-hailing applications include UberPOOL (car and van pooling), UberESPAÑOL (UberX with a Spanish-speaking driver), UberTAXI (Uber app to hail a traditional taxi service), UberWAV/ACCESS/ASSIST (wheelchair-accessible and special-need vehicles with certified drivers), UberBIKE (Uber vehicles with a bike rack), UberRUSH (vehicles for custom and on-demand delivery of goods and service), UberHOP (flat fare rush hour ride-sharing) and UberLUX (luxury cars).[69]

While Uber obtained upward of $20 billion worth private sector financing from foreign wealth funds, investment banks, pension funds as well the likes of Google, Baidu and Toyota, it remains a private company. With estimated 2016 revenues of $4 billion per year (double the amount in 2015) and a market capitalization of $68 billion.

Uber CEO and Founder, Travis Kalanick, says Uber has no immediate plans to become a public company. However, to fulfill his vision of transforming the transportation ecosystem, an IPO will be eventually needed to boost its meager $9 billion in cash reserves to become as transformative as the likes of Apple that has $230 billion of cash at hand. With $9 billion discretionary cash and revenues doubling each year, Kalanick and his team can afford to wait to go public with all the regulatory and shareholder entanglements that becoming a public company entails. For the time being, Uber is content on relentlessly pursuing growth, offering new services and keeping prices low to grab market share. For the time being, investors are not concerned about Uber's lack of profitability in fear of missing the next big hit since Facebook, which proved the investor world wrong about its ultimate potential market value, now $365 billion up from $39 billion in four years.

Of the world's top ten unicorns, startup private companies now valued at $1 billion or more, Uber (U.S., shared-mobility, $68B market cap, founded 2009) has accelerated faster and higher than Xiaomi (China, consumer electronics, $45B market cap, 2010), Airbnb (U.S., accommodation-sharing, $25.5B, 2008), Panantir (U.S., data analytics and software, 2004), Didi Chuxing (China, shared-mobility, $16B—20% owned by Uber, 2012), Snapchat (U.S., social media, $16B, 2011), China Internet Plus (China, internet services, $15B, 2002), Flipkart (India, e-commerce, 2007), SpaceX (U.S., aerospace, $12B, 2002) and Pinterest (U.S., social media, $11B, 2010).[70] It is important to note that all of these companies, with the possible exception of SpaceX, are NTR-related companies.

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[69] Uber, Newsroom, https://newsroom.uber.com/
[70] Fortune, The Unicorn List, 2016, http://fortune.com/unicorns/

From a Luddite[71] point of view, the Uber represents disruption or displacement of traditional industries, which needs to be opposed. From an entrepreneur's perspective, Uber defines a transition to operational models that enable innovative and cost effective solutions to underutilized assets and personnel. Uberisation is also an answer to changing customer needs. Don't have a car or don't want to own one? Use Uber's car-hailing service. Don't have the right car to become an Uber driver? Lease one through Uber with its Enterprise and Hertz leasing partners. Prefer an established taxi service? Call UberTaxi that has partnerships with local taxi commissions. Want a cheaper ride? Call UberX whose drivers provide economy cars and hybrids. Want an even cheaper ride? Go with Uber's new driverless car that will push down prices for ride-sharing to very low levels, perhaps as much as 50% the current rate. Not only are traditional taxi companies being Uberised, but the entire transportation industry as well. In this regard, Uber is implementing a on-demand package delivery industry, similar in nature to UPS and FedEx, as well as a complimentary service delivery industry. During the flu season, UberHEALTH now provides flu shots in 35 cities administered by registered nurses to offices and home-bound individuals at competitive rates.[72]

Disruption and collateral damage is a necessary ingredient of change, but eventually must produce a greater value proposition to endure. As with other digital economy mega-companies, from Google to Amazon, Uber's is not content driving within a defined lane and is rapidly diversifying in order to endure and adapt. The metaphor "a moving target is hard to hit" seems to be applicable to Uber's expansion into other forms of business. Leasing, helicopter services, public transit and self-driving cars are just some of the areas subject to Uberisation.

Challenges to Uberisation. As the shared-mobility market leader, Uber is encountering significant legal and regulatory challenges from governments, competitors and their drivers. To remain the shared-mobility market leader, Uber must successfully overcome these challenges. More importantly, their success will greatly enhance the success of the shared-mobility as well as the future of the sharing economy.

- *Governmental Legal and Regulatory Challenges.* Over the last few years, hundreds of law suits have been filed against Uber in dozens of countries and multiple cities. These law suits have been largely unsuccessful since Uber's e-commerce operations are conducted over the internet and their assets (cars) are owned by independent contractors. These legal challenges, including those in the United States, have highlighted the paradox that "asset-less" global shared-mobility companies largely exist outside the traditional jurisdictional boundaries of national governments. While Uber is headquartered in San Francisco, Uber processes its payments outside the United States. In addition, Uber assigns its m-commerce intellectual capital (IP) rights to a foreign tax haven located in Bermuda, a jurisdiction that levies no corporate tax and has a nondisclosure policy to outside third parties. Consequently from a legal and regulatory perspective, Uber is rather an amorphous entity. From taxation perspective, it is equally amorphous with less than an estimated 2% of its net revenue subject to taxation to governments around the world.

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[71] A Luddite is person opposed to increased industrialization or new technology.
[72] Uber, Newsroom, UberHEALTH, 17 November 2015, https://newsroom.uber.com/uberhealth/

- *Private Sector Legal Challenges.* According to a Business Insider analysis of twenty American cities, UberX was as much as 43% cheaper than taxis and 52% when tipping was included.[73] [74] Uber's car-pooling apps makes the cost difference even more profound. Consequently, taxi companies claim that Uber presents unfair competition not only because of lower fares, but because Uber does not pay taxes or licensing fees. As a result of these grievances, Uber is the subject of legal action from taxi companies, drivers and other citizens in the United States and around the world. Taxi companies also complain about Uber drivers are largely untrained, unlicensed (Uber drivers must a valid driver's license) and uninsured (Uber drivers must have their own up-to-date insurance), thereby unsafe by taxi and public standards (Uber drivers must pass a DMV background check, criminal background check, and car inspection). What taxi companies and taxi drivers have not been able to accomplish in the courts, they have taken to the streets. High profile protests have in Argentina, Brazil, Germany, India, Spain, Colombia, France, Italy, Denmark, Canada, China and England. As a result of these protests, some burning Uber cars in effigy, have led to full and partial bans and suspended operations in many municipalities around the world. In France, two top Uber executives were arrested for reportedly running an illegal taxi service. In the Netherlands, police raided the company offices and seized administrative records in an unlicensed taxi probe. Even the UN Women cancelled a partnership with Uber that aimed to create one million new jobs for women due to concerns about Uber's safety record (Uber uses a rating system to quickly weed out bad drivers) with women (rape cases) and alleged maltreatment of women drivers.

- *Contingent Workforce Challenges.* Uber's are considered contingent workers (freelancers, part-timers, independent contractors) who are not entitled to the types of benefits afforded to employees with standard workforce agreements. The top complaints from Uber drivers, which are also common complaints from regular taxi drivers, include too many drivers, too many low quality drivers, lack of understanding about company policies including deactivation of driver, no collective bargaining (unions), lack of benefits and low pay. Some drivers even claim that after expenses they often make below minimum wage, although prime time rates for Uber drivers can be up to three times as high as average rates and surge pricing as much as eight times as high. Drivers in California, Massachusetts and New York have sued to become Uber employees rather than independent drivers in order to get company-provided benefits. To date, none of these law suits have been adjudicated.

So far Uber has been able to rectify or surmount these challenges, albeit with some collateral damage to itself and other elements in the sharing economy community. According to most experts, the judicial system tends to favor free-market competition and the regulatory environment is slowly changing not only to manage but legitimize transportation network companies like Uber. Notwithstanding, Uber's management team is keenly aware of continued challenges to their brand and future. On the other hand, brilliant innovation has always led to creative destruction of extant institutions and societal norms. The NTR will be increasingly brilliantly innovative and creatively destructive as new technologies, systems, processes and services mature. No individual, business, industry, economy or nation will be spared by the perfect storm of transformative network and

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[73] Business Insider, These Animated Charts Tell You Everything About Uber Prices In 21 Cities, 16 October 2014, http://www.businessinsider.com/uber-vs-taxi-pricing-by-city-2014-10

[74] Uber's policy on tipping states "Please thank your driver, but the tip is already included" and "there is no need to tip". However, Uber does not preclude tipping as a practice.

digital technologies. Uber, an asset-less, mobile app, peer-to-peer networking behemoth is likely to face even greater challenges in the future, especially when it gets to the stage when the company decides to retain a greater percentage of its profits over growth and when shared-mobility becomes integral to the public transportation infrastructure.

Uber Competitors. As the shared-mobility market leader, Uber faces significant competition by other shared-mobility, automotive and network-centric platform companies.

In the United States, Lyft is Uber's major competitor with approximately 20% of market share compared to Ubers' 80%. Generally, speaking both Uber and Lyft are very similar in cost and services. Uber has more high-end luxury options. Lyft bills itself as a friendly company and allows drivers to receive tips. As stated earlier, there are numerous other U.S. ride-sharing startups, some of which are being acquired by automotive and platform companies to gain access to the ride-sharing market.

International Competition. In the international arena, Didi Chuxing (China), Ola (India), Grab (Southeast Asia) and MyTaxi (Europe, which only uses licensed taxi drivers) are Uber's biggest competitors that are in the process of rationalizing mainly against Uber.

- *In China,* Didi Chuxing (translation "honk honk, commute") is the dominant ride-hailing force that is horizontally integrating with the likes of Alibaba, Tencent, Apple and investors like China Life. Signaling defeat, to the delight of Uber investors who were wary of Uber's $2 billion worth of expenditures in state-controlled China, Uber sold its concessions in China to Didi Chuxing in exchange for 20% of the company, estimated to now be worth approximately $7 billion to Uber and growing. To sweeten the deal, Didi Chuxing will also invest $1 billion in Uber's global company that plans to expand in places like Central and South America. Shortly thereafter, the Chinese government legalized ride-sharing services that will pave the way to Didi Chuxing expansion and dispelling fear of regulatory interference.

- *In India,* ANI Technologies Pvt. Ltd's Ola is the leading shared-mobility provider with 550,000 drivers with Uber in second place with 350,000 drivers. Both companies are competing, even in court, for a country that ride-hailing market share valued at $7 billion per year in 2020. What makes India such a key market is that India is country with 600 million mobile internet users by 2020, most preferring ride-hailing and ride-sharing over owning a personal vehicle. Uber would likely have been the market leader in India but suffered serious setbacks related to a highly published rape incident in Delhi by one of Uber's drivers which triggered a government regulatory backlash, and Uber's initial focus on high-end chauffeured services. In December 2016, Ola joined in an alliance with Lyft, Didi Chuxing, and Grab, which further disadvantaged Uber. Ola's backers include SoftBank Group Corp., which has also invested in two of Uber's biggest rivals, Didi Chuxing and GrabTaxi. Uber has also increased its war chest with a $3.5 billion investments from Saudi Arabia's Public Investment Fund and is seeking billions more from other sources as the battle for India's ride-hailing titans continues.

- *In Europe,* Uber is competing head-to-head with MyTaxi, which is owned by The Daimier Group, one of the biggest producers of premium cars and the world's biggest manufacturer of commercial vehicles. To retain a foothold in Europe, a region that is quite protective of its taxi services, Uber has launched UberTAXI (UberT) in London and Berlin with plans to expand in other

European cities and countries. In response, MyTaxi is merging with British rival Hailo creating Europe's largest smartphone-based taxi-hailing business. The merged MyTaxi will have 70 million passengers and 100,000 registered taxi drivers in over 50 cities in Britain, Ireland, Spain, Austria, Germany, Italy, Poland, Portugal and Sweden.

Currently UberT is operational in places like New York, Boston, San Francisco, Chicago, Honolulu and Washington DC. In Washington DC, Uber is experimenting with an integrated metropolitan shared-mobility approach (UberDC) that combines UberT with ride-sharing (UberPOOL) and ride-hailing (UberX, UberXL and UberSUV) services to reduce traffic congestion, emissions and costs, with the additional benefit of currying favor with federal and local government officials as well as garnishing support from road-weary consumers in the second most traffic-congested city in America (Los Angeles is first). The significance of UberDC should not be underestimated. If successful, UberDC could be a prototype for an integrated public shared-mobility transit system.

Automaker Competition. Automotive companies have long understood that they were in the transportation business. However, this understanding usually manifested itself as incremental improvements on established product offerings. In a shared-mobility economy, automakers will be forced to shift from a low-risk product-orientation based on ownership to a high-risk to shared-mobility orientation based on services and just-in-time mobility solutions.

The next generation of car owners, Millennials (Gen Y) and Screenagers (Gen Z), has a much different perspective than older generations on the value of owning a car and attendant costs of insurance, maintenance and parking. Rather than committing to buying an extravagant luxury car for business reasons or a much less expensive economy car for budgetary reasons, shared-mobility allows consumers to rent that type of transportation that most effectively meets their needs or whims. From a global perspective, emerging and developing economy netizens are not as culturally enamored with car ownership as is the case in the Western world. Consequently, shared-mobility, especially in megacities like Jakarta, Karachi, Manila, Mexico City, Sao Paulo, Lagos and Mumbai that have populations of over 20 million people, is a much easier concept to sell over car ownership.

According to Bloomberg New Energy Finance, the shift to digitally-connected electric vehicles will have dramatic implications for automotive manufacturers as well as the entire transportation sector, which is digitizing. Today, automotive electronics constitute approximately one-third of the total cost of a car. By 2030, it will be over one half. This seismic shift from analog to digital is already impacting automakers. Tier 1 manufactures (major auto companies) are becoming more subservient to Tier 2/3 suppliers of both goods and services, such as electronic suppliers and transportation network service companies, like Uber.

Just as digital cell phones upended analog hardline phones, electric vehicles will likely upend analog internal combustion vehicles at a surprisingly fast rate. Electric vehicles are superior platforms for infotainment, connected vehicle and transport-as-a-service and shared-mobility technologies, processes and systems. In the first half of 2016, worldwide electric vehicle sales were up 57% over

the last year. Shared-mobility and other social-economic factors could propel electrical vehicle sales to half of all vehicle sales by 2040.[75]

The dual transition from analog to digital and internal combustion to electric vehicles sets the stage for autonomous (driverless) vehicles. Autonomous personal vehicles greatly favor shared-mobility over ownership for a number of important reasons.

- The first reason is historical. Shared-mobility and autonomous vehicles are already in use in the aerospace and defense industries. The U.S. military have integrated autonomous aerial, ground and maritime vehicles as part of their everyday operations. In many ways the airline industry is the original pioneers of shared-mobility and network-centric operations. Decades ago, airlines adopted a continued vehicle operations strategy by rotating air crews to eliminate aircraft idleness and flying around the clock. Surprisingly, flying aircraft 24/7/365 significantly reduced maintenance failures by keeping mechanical component warm.   In regards to space saving measures, airlines created a network to maximize seat occupancy.

- The second reason is largely cultural. By detaching drivers from driving, much of the emotional attachment to car ownership is also detached.

- The third reason involves affordability. The average cost per mile for car ownership can be as high as $3 per mile. UberX's cost per mile is estimated about half as much. Autonomous vehicle cost per mile is estimated at one third as much, and even less if just-in-time car and van pooling shared-mobility concepts are effectively employed.

- The fourth reason involves convenience. The rapid rise of Uber is directly related to the ease of punching an app on a mobile phone and a chauffeured vehicle arrives in less than 5 minutes. Whereas car ownership involves significant amounts of collateral time required to refuel, maintain as well as the amount of time spent on paperwork (financing, insurance, etc.).

- The fifth, and perhaps most important, reason is absurdity. Worldwide there are over 1 billion vehicles. 95% of these vehicles sit idle in garages, which equates to approximately one-quarter of the square footage of American homes, or in parking lots, which consumes up to one-third of the land area in cities. During the 5% of the time that a vehicle is in use, the vast majority of 4 or 5-passenger cars have only one occupant, the driver. Viewed in this way, the absurdity of continuing to support such an inefficient method of transportation, in an overpopulated world, has to give way to a more efficient, affordable, space saving, automated shared-mobility concept.

The National Highway Traffic Safety Administration conceptualizes autonomous personal vehicles in five levels. Level 0 is unautomated where the driver is in complete control. Level 1 is when one function is automated. Level 2 is reached when two or more functions (such as steering and acceleration) are automated. Level 3 occurs when driving functions are sufficiently automated that the driver can safely engage in other activities. Level 4 will be achieved with the vehicle can drive itself with a human driver. Today, the state-of-the-art is around Level 3.5 and rapidly pursuing Level 4

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[75] Bloomberg New Energy Finance, Electric vehicles – it's not just about the car, 22 August 2016, http://about.bnef.com/blog/liebreich-mccrone-electric-vehicles-not-just-car/

via research, development and experimentation. Level 4 technology has the potential to substantially affect safety, congestion, energy use, and, ultimately, land use.

Level 4 automation depends largely on three areas: vehicle robotics, vehicle intelligence and network technology. Carmakers are advantaged in vehicle robotics and sensors, platform companies in software and intelligent agents, and shared-mobility companies in networked enabled applications and services. However, these relatively advantages are perishable considering the time, money and effort that the corporations are putting into shared-mobility and self-driving vehicles. Ford's CEO recently stated that the global shared-mobility market could be as much as $5.4 trillion that is more than double today's $2.3 trillion auto market. He also stated that "we (Ford), as well as the rest of the industry right now virtually get none of that (the shared-mobility market)".[76]

All major carmakers are incorporating ride-sharing and ride-hailing technologies in their electric and autonomous vehicle efforts. For example, in the United States:

- *Ford Motor Company* recently announced that it is developing new ride-hailing services and investing $4.5 billion to expand its fleet of plug-in and hybrid electric vehicles. As pilot project, Ford is using a proprietary van-hailing app that employees can use to hail a ride around Ford's sprawling company campus in Dearborn, Michigan. Ford is also partnering with a U.S. shared-mobility company (Getaround that lets car owner's lease personal vehicles for a few hours a day) and a British car-sharing firm (EasyCar Club) in order to increase customer interest in purchasing a Ford or getting involved with a Ford peer-to-peer vehicle rental system. In March 2016, Ford launched a subsidiary, Ford Smart Mobility LLC, focused on connectivity, autonomous vehicles, and car/ride-sharing services. The subsidiary will develop commercially ready mobility services and invest in promising mobility-related ventures.[77] Ford plans to add 20 Fusion Hybrid autonomous vehicles this year, bringing the company's autonomous fleet to about 30 vehicles by the end of 2016.

- *General Motors* acquired the assets and intellectual property of Sidecar, a San Francisco based ride-hailing service, invested $500 million in Lyft (which is perceived to be GM's first step towards a potential acquisition to jointly develop an autonomous on-demand network), acquired self-driving vehicle technology Cruise Automation, and continues to equip new vehicles with high-speed mobile internet connections. General Motors announced in January 2016 its next step in redefining personal mobility with a new car-sharing service called Maven, which combines and expands the company's multiple programs (e.g., OnStar, SiriusXM, Apple and CarPlay) under one single brand. GM's self-driving taxis are slated for testing with Lyft beginning in 2017.[78] GM's Level 3 Super Cruise, a hands-free semi-autonomous cruise control, will debut on the 2017 Cadillac CT6.

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[76] Fortune, Ford Hits the Gas On Self-Driving Cars, 5 January 2016, http://fortune.com/2016/01/05/ford-self-driving-car-fleet/

[77] Ford, Media Center, Ford Smart Mobility LLC Established To Develop, Invest In Mobility Services; Jim Hackett Named Subsidiary Chairman, 11 March 2016, https://media.ford.com/content/fordmedia/fna/us/en/news/2016/03/11/ford-smart-mobility-llc-established--jim-hackett-named-chairman.html

[78] General Motors, GM Launches Personal Mobility Brand: Maven, 21 January 2016, http://media.gm.com/media/us/en/gm/news.detail.html/content/Pages/news/us/en/2016/Jan/0121-maven.html, and Maven, https://www.mavendrive.com/#!/

- *Tesla* is the leading advocate for advanced driver assistance and self-driving technology. Tesla Motors' Chief Executive Elon Musk believes that fully autonomous electric vehicles are only several years away based Tesla's semi-autonomous prototypes. Tesla is planning an Uber-like shared-mobility service offering as part of a wider program to solve inner city traffic density problems. According to Tesla Master Plan's shared-mobility vision, "You will also be able to add your car to the Tesla shared fleet just by tapping a button on the Tesla phone app and have it generate income for you while you're at work or on vacation, significantly offsetting and at times potentially exceeding the monthly loan or lease cost. This dramatically lowers the true cost of ownership to the point where almost anyone could own a Tesla. Since most cars are only in use by their owner for 5% to 10% of the day, the fundamental economic utility of a true self-driving car is likely to be several times that of a car which is not. In cities where demand exceeds the supply of customer-owned cars, Tesla will operate its own fleet, ensuring you can always hail a ride from us no matter where you are." The Master Plan also integrates Tesla's sister company SolarCity's renewable technologies to create an entire sustainable transport ecosystem.[79]

According to Travis Kalanick, Uber wants to partner with carmakers rather than compete with them in building automotive equipment. However to hedge his bets, Kalanick and team are investing in automotive peripherals, like smart mapping/navigation and autonomous driving technology that will make shared-mobility operations more efficient and connected.

In the near term, Uber does not seem all that concerned about the carmaker challenge. Carmakers specialize in goods-producing as opposed to service-providing. In the past, carmakers have not been able to successfully make the transition to services, as was the case for General Motors and their failed attempt to integrate Electronic Data Systems (EDS) after a 10-year tempestuous marriage in the 1990s. Carmakers have to stay focused on their core product offerings given the mounting competition from Asian rivals, whereas Uber can singularly focus on share-mobility.

Uber's war chest continues to grow from investors and speculators around the world who believe that Uber's market valuation will outpace carmakers alone or ultimately in combination. With a market cap of $68 billion, Uber is more valuable than Daimler ($67 billion), Volkswagen ($64 billion), Honda ($54 billion), General Motors ($51 billion), Ford ($49 billion), BMW ($49 billion), Hyundai ($30 billion), Renault ($21 billion), Peugeot ($11 billion), Fiat-Chrysler ($9 billion), Nissan ($5 billion) and Tata-India ($2 billion). Only Toyota ($183 billion) is worth more than Uber. If a carmaker's challenge eventually becomes unsurmountable, Uber has a lot of options in merger and acquisition partners. Depending on the eventual size of Uber's war chest, Uber may even decide to buy a car company.

The prospect of an asset-light, digitally-oriented business being worth more than all the asset-heavy automotive industries combined does not seem as ludicrous as it did a few years ago. Uber's market value has gone from $0 to $70 billion in six years with without an IPO. Asset-light Google took 16 years to get to $345 billion with an IPO. The combined market value of the 13 automakers listed above is $596 billion. Many experts, including Jobenomics, can foresee a significant appreciation in value for ride-sharing, ride-hailing and car-sharing service companies and significant depreciation of automotive manufacturing corporations if Sharing/On-Demand Economy reaches only a small fraction of its ultimate potential.

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[79] Tesla, Master Plan, Part Deux, 20 July 2016, https://www.tesla.com/blog/master-plan-part-deux

The reason for this bold forecast is really simple. At some point, citizens will realize that the ROI (return on investment) for owning, maintaining and insuring expensive personal vehicles are too low compared to the ease of sharing or a fee-based service that easily accessible, affordable and responsive. The Eureka moment will come when personal vehicle owners begin to question why they are spending so much time and money on vehicle capacity that they use less than 2% of the time (less than 10% usage per day plus single passenger occupants per 4/5 passenger vehicle).

The American love affair with cars will not disappear overnight, but it is highly likely the average number of household vehicles will decrease at an ever increasing rate. According the U.S. Bureau of Labor Statistics, American households on average have more vehicles than drivers. The peak year was 2.07 in 2007. In 2016, it was 1.9 vehicles per household (57% cars, 21% vans/SUVs, 18% pickup trucks, 4% other such as motorcycles).[80] If the shared-mobility trend continues on its current path, the rate of decrease in vehicles per household will shrink even faster as users switch to ride-sharing, ride-hailing and car-sharing services. All Uber needs to make national Eureka moment transpire is a major success in one of its integrated public shared-mobility transit system initiatives, such as UberDC (Washington DC). A major success will give a major boost to Ubers market value and decrease traditional transportation industry valuations.

Platform Company Competition. CEO Travis Kalanick publically champions Uber's potential to become a leading autonomous car company. Compared to carmakers, Travis Kalanick thinks that platform companies[81] pose "an existential threat" to Uber in the shared-mobility and driverless vehicle markets due to software development expertise, financial resources and large user base. So for the major platform companies have been tepid in entering the shared-mobility business that has relatively low margins due to intense competition and the cost recruiting and retaining hundreds of thousands of drivers. With the advent of self-driving cars, margins are expected to significantly improve and attract much greater attention from both carmakers and platform companies who are likely to join forces to exploit the evergrowing. Sharing/On-Demand Economy.

In regards to shared-mobility, Apple ($616 billion market cap) invested a $1 billion in Didi Chuxing (China, $16 billion market cap), which later indirectly benefitted Uber when Uber sold its China business to Didi Chuxing in exchange for a 20% equity share and a $1 billion in cash. Google's Maze, a GPS-based geographical navigation application program for smartphones and tablets that was acquired by Google in 2013, is launching as ride-sharing system.

In regards to autonomous vehicle technology, Uber is one of 33 corporations are making significant investments in driverless car technology and development. In 2014, Uber established an Advanced Technologies Center (with an engineering team appropriated from Carnegie Mellon Robotic Lab) in Pittsburgh, with a mission: to make self-driving Ubers a reality. In 2015, Uber acquired deCarta's geospatial locating platform and mapping assets from Microsoft, which are essential to autonomous vehicles. Uber is also working with University of Arizona on mapping and optical safety technology.

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[80] U.S. Bureau of Labor Statistics, Office of Science and Technology, Household, Individual, and Vehicle Characteristics, http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/highlights_of_the_2001_national_household_travel _survey/html/section_01.html
[81] Note: Platform companies will be addressed in detailed in the Platform Economy section.

According to an Uber press release, "self-driving Ubers have enormous potential to further our mission and improve society: reducing the number of traffic accidents, which today kill 1.3 million people a year; freeing up the 20 percent of space in cities currently used to park the world's billion plus cars; and cutting congestion, which wastes trillions of hours every year." [82] Uber's first self-driving cars debuted in Pittsburgh, Pennsylvania in September 2016.

Of the 33 driverless car companies, five well-resourced platform companies have positioned themselves to be the market leader in autonomous personal vehicles.[83] These network-centric platform companies are Apple ($616 billion market cap), Google ($533 billion market cap), Microsoft ($434 billion market cap), Baidu (China, $63 billion market cap) and Nvidia (U.S., $32 billion).

- *Apple*'s "Project Titan" electric car team is estimated to be over 1,000 engineers engaged in wide ranging research including autonomous driving, advanced mapping and sensors and networked systems. Apple's $1 billion investment in Didi Chuxing's shared-mobility technology and expertise will be added to the mix. Recent Project Titan departures and new hires seem to indicate that Apple is shifting emphasis from car-related development in favor autonomous driving development, which poses more focused threat to companies like Uber.

- *Google* is the most early entrants and proactive of the platform companies in self-driving vehicle research, development and experimentation. According to their website, in 2009, Google started testing self-driving technology with the Toyota Prius on freeways in California. Google's autonomous now vehicle fleet includes both modified Lexus SUVs and new prototype vehicles that are designed from the ground up to be fully self-driving. Google's self-driving fleet has logged over 1.5 miles. [84] Google's first partnership with a major automaker was concluded with Fiat Chrysler in May 2016. They will jointly incorporate Alphabet's (Google's parent company) self-driving computer, sensor and software technology into 100 Chrysler 2017 Pacifica Hybrid minivans. The first road worthy prototype minivan is anticipated operational for the auto show in Detroit in January 2017. Fiat Chrysler and Alphabet also plan to design an entirely new vehicle in addition retrofitting current models.

- *Microsoft* is focused on collaborative research with automakers regarding self-driving vehicles. Automakers include over a half dozen automakers and Tier 1 vendors with Microsoft's robotic, artificial intelligence, cloud-based services, operating systems, productivity software and other NTR technology applicable to autonomous vehicles.

- *Baidu*, a Chinese web services giant with 80% market share in China's search engine market, has invested heavily in shared-mobility companies like Uber and Didi Chuxing. In addition Baidu and BMW introduced a semi-autonomous vehicle in China in 2015. Since then it has developed Baidu Brain that integrates high-precision mapping, positioning, sensing and with Baidu big data. Unlike other network-centric platform companies, Baidu plans to jointly mass produce with a Chinese automaker driverless cars within five years. Baidu also intends to enter the American self-driving market. As a first step, it established a technology research center in Silicon Valley, called the

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Silicon Valley Artificial Intelligence Lab (SVAIL), that specializes in deep learning, large datasets and high performance computing.

- *Nvidia* is the world leader in visual computing via the invention of the GPU (graphics processing unit) used in computers primarily for 3D applications. Wired magazine claims that Nvidia's GPUs are one of the three breakthroughs that have revolutionized the world of artificial intelligence. In early 2016, Nvidia unveiled its Drive PX2 system for self-driving vehicles. Drive PX2 combines a supercomputing GPU with 8 teraflops of processing power (equivalent to 150 MacBook Pros) with its DriveNet deep-learning platform, a machine-to-machine platform that teaches cars how to better recognized objects for autonomous operations. This machine-to-machine platform could also be connected to shared-mobility networks managed by centaurs (a combination of human operators and artificial intelligence agents). A marriage between Uber and Nvidia would create a shared-mobility superstar. On the other hand, Nvidia's marriage to one of Uber's competitors would likely end Uber's dream of becoming the leader in self-driving vehicles.

In addition to these five platform companies, Facebook ($363 billion market cap) is investing heavily in the Sharing/On-Demand Economy. Facebook's Shared-Use Mobility Center (SUMC) is a public-interest organization working to foster collaboration in shared mobility and help connect the growing industry with transit agencies, cities and communities across the nation.

Shared-Accommodation

Shared-accommodation is much like shared-mobility but the asset being shared are personal residences, rental properties, villas, castles, rooms, flats and vacation accommodations.

The leading shared-accommodation company is Airbnb. Other Airbnb-like companies include FlipKey (owned by travel giant TripAdvisor and offers over 30,000 rental listings in over 1100 cities), HomeAway (over 1 million worldwide listings), VRBO (Vacation Rentals by Owner with 800,000 listings in 100 countries), Roomorama (specializes in professionally-managed and trusted holiday homes, homestays and vacation rentals), Couchsurfing (offers rentals that foster cultural exchange), OneFineStay (handpicks extraordinary residential, loft and penthouse rentals), 9flats (specializes in alternatives to hotel with 250,000 homes worldwide), Travelmob (specializes in matching travelers in Asia Pacific with hosts renting out villas and apartments for short- and long-term rentals) and Travelzoo (specializes in aggregating discounted accommodations and plots them on Google Map for last minute travelers).

Founded in 2008, Airbnb is a trusted community marketplace for people to list, discover and book online, via a mobile app, unique accommodations around the world. Airbnb has connected 60 million guests to unique travel experiences, at any price point, in more than 34,000 cities and 191 countries. As its name suggests (Airbnb derived its name from "airbed" and "bed and breakfast") 90% of Airbnb's bookings are pleasure and family oriented. 10% are business travel related.

As of mid-2016, Airbnb had estimated revenues of approximately $2 billion per year and an estimated market capitalization of $25 billion. At $25 billion, Airbnb is more valuable than the world's top two largest hotel companies, Hilton with a $24 billion market cap and Marriott at $18 billion). Airbnb has no immediate plans to become a public company, but intends to raise up to $1 billion from more than

a half dozen private sector investors, which should increase Airbnb's market valuation to over $30 billion. At $30 billion, Airbnb will the third-most valuable private tech company in the world, after Uber and Chinese handset maker Xiaomi. [85]

Airbnb's economic impact has been phenomenal, especially for their accommodation providers (hosts). Using New York City as an example, Airbnb's serviced 400,000 visitors who generated $632 million in economic activity with $105 million in direct spending in the outer boroughs, in neighborhoods that don't typically benefit from tourism dollars. 87% of Airbnb New York City hosts typically earn $7,530 per year. Equally important, 62% of these hosts report that this additional income allows them to remain as homeowners as well staying in their own homes.[86]

Airbnb uses a peer-to-peer e-commerce model. Peer-to-peer (P2P) is a decentralized network in which each party has the same capabilities and either party can initiate a session. Unlike a client/server model, in which the client makes a service request and the server fulfills the request, the P2P network model allows each node to function as both a client and server.[87] Using P2P, Airbnb generates revenue by taking a 3% cut of each booking along with a 6% to 12% service fee from guests. For 2016, Airbnb forecasts $12 billion in revenue, albeit they are yet to make a profit due to their rapid expansion.

Airbnb is perceived by the hoteling and housing market officials as a formidable disrupting and displacing force. The world's three largest hotels, by room count, are Marriott with 1,071,000 rooms, followed by Hilton with 738,000 rooms and Intercontinental with 727,000 rooms. These three companies have additional rooms in their pipelines, increasing their room totals to 1,444,000, 998,000 and 945,000 respectively.[88] While Airbnb is an asset-less company that does not own its own room's, Airbnb has about 1 million rooms today with expansion plans to triple this number.

With over a million rooms at their disposal, Airbnb poses a direct threat to many hotel chains. Airbnb's easy to use online systems can quickly divert millions of travelers to less expensive and more unique accommodations. Most analysts believe that that major hotel chains that cater to business travelers are relatively secure since they offer a wide range of services, from restaurants to conference centers. However, smaller, lower cost and limited service hotel chains face a greater challenge since the vast majority of their profit is tied to high room occupancy rates. On-line booking services that derive their income from filling unoccupied hotel rooms are also under threat since Airbnb is an alternative booking service.

Airbnb also poses a formidable challenge to rental and housing markets. A new report from Inside Airbnb and the Los Angeles Alliance for a New Economy is fueling local fears that lucrative Airbnb-related short-term rentals for travelers are depriving citizens of longer-term leases for residential.

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[85] Wall Street Journal, Airbnb Plans Dual Stock Sales to Push Off IPO, 29 June 2016, http://www.wsj.com/articles/airbnb-plans-dual-stock-sales-to-push-off-ipo-1467226873

[86] Airbnb, About, https://www.airbnb.com/about/about-us, and Economic Impact, http://blog.airbnb.com/economic-impact-airbnb/

[87] TechTarget, Peer-to-Peer (P2P), http://searchnetworking.techtarget.com/definition/peer-to-peer

[88] Hotel News Now, The 10 Largest Hotel Companies by Room Count, 19 November 2015, http://www.hotelnewsnow.com/Articles/28560/The-10-largest-hotel-companies-by-room-count

Many concerned citizens fear that increased Airbnb-like activities will cause a housing crisis due to the shortage of affordable homes in the Los Angeles metropolitan area.[89]

According to the report, a landlord can earn the equivalent of a full-year's lease in two to three months by renting through the Airbnb peer-to-peer rental site. With these kinds of returns, landlords are increasingly motivated to shift from long-term leases to local residents in favor of short-term rentals for travelers and vacationers. Housing activists are concerned that increased Airbnb usage would also increase rents of available housing and further marginalize low-income and minority groups. In addition the concerns about limited affordable housing, citizens are worried about the impact of hoteling out-of-towners in residential neighborhoods.

As a result of an increasingly heated debate between Airbnb proponents and local opponents, city regulators are considering mandatory caps on the number of days on short-term rental activities. For those against shared-accommodation, capping the number days to several months per year would discourage landlords from using Airbnb-like services. Whereas, Airbnb advocates want no caps or caps set to six months or higher. Federal, state and city regulators are also concerned about the tax and revenue implications of an asset-less company like Airbnb. Like Uber, Airbnb transactions are conducted largely offshore and not subject to local jurisdiction.

As reported by Bloomberg, [90] the vast majority Airbnb's 40+ subsidiary transactions are managed via units in Ireland and tax havens like Jersey in the Channel Islands, which allows Airbnb to shield most of its profit from countries, including the United States and the State of California, were revenue is generated. Ireland's corporate tax rate is 12.5% versus 39.0%+ (35% federal plus 4% average tax rate of among all the states or California's flat rate of 8.84%) top rate in the United States. Jersey, a self-governing part of the United Kingdom with its own financial, legal and judicial systems, levies no corporate tax at all. Compared to the hundreds of millions of dollars that companies like Marriott and Hilton pay annually, Airbnb and other tax-limiting corporations (including Uber, Apple, Google and many others) pay relatively little. If they assign their software IP rights to the island of Jersey, tax experts say that Airbnb could reduce their tax burden even more.

The future of the shared-accommodation industry is hard to predict. To be successful, it needs to be more innovative rather than disruptive the accommodation industry as a whole, which employs 2 million Americas. Quality experiences and regulatory issues are the two greatest challenges. On the other side of the coin, the share-accommodation industry gives homeowners and landlords an ideal platform to make use of vacant rooms and buildings and to travels a unique form of accommodation that has made the bed and breakfast sector a quaint and popular alternative to traditional hoteling.

Other Forms of the Sharing Economy

Almost anything can be shared from shop and office sharing (We Are Pop Up), meal sharing (EatWith, Traveling Spoon), clothes sharing (Yerdle) and solar energy sharing (Yeloha), money sharing (crowd funding) to time sharing.

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[89] Inside Airbnb, Airbnb vs Rent: City of Los Angeles, 30 August 2016, http://insideairbnb.com/airbnb-vs-rent-city-of-la/

[90] Bloomberg Businessweek, The Sharing Economy Doesn't Share the Wealth, As Airbnb and Uber inch toward profits, tax authorities worry, 6 April 2016, http://www.bloomberg.com/news/articles/2016-04-06/the-sharing-economy-doesn-t-share-the-wealth

As discussed earlier shared-mobility and shared-accommodation businesses are design to monetize the second and third most underutilized and idle assets, cars and rooms. The greatest underutilized and idle asset in the world may be time itself. Time Banking, a form of time sharing, is in its infancy and is a type of exchange that is growing in popularity in the US, New Zealand and Canada. According to TimeBanks USA, time Banking is a way of giving and receiving to build supportive networks and strong communities. One hour helping another earns one TimeBank Hour, also called time credits, service credits or time dollars. Time Banks range from small (15 to 20 members) to large (2,000 or more) and can trade with other Time banks. TimeBanks USA lists hundreds of American time banks in 45 states, mostly small time banks and asserts that the IRS does not consider time credits to be taxable as is the case for commercial barter exchanges based on contractual agreements.[91] It is too early to predict whether or not time sharing will become a mainstream part of the Sharing Economy. However, today's digital natives (Millennial and Screenage generations) are very comfortable with alternative and anti-establishment forms of commerce, especially those that can fly under the IRS' radar screen.

In conclusion, from a Jobenomics perspective, the idea of developing a Sharing Economy for densely populated urban and rural areas is way to gracefully enter the digital age via the democratization and monetization of the two biggest assets that Americans own, their homes and vehicles. Via the Sharing Economy, millions of people can quickly become empowered micro-entrepreneurs and micro-business owners that can create sustainable or supplemental income streams. To make this a reality, the United States needs to embrace this new economic model and provide relief from antiquated analog-era laws and regulations. Regulators and decision-makers alike must realize the whole idea of ownership is changing and the standard workforce construct is no longer working for a large percentage of working Americans and those seeking workfare over welfare. On the other hand, network-centric companies must come to terms with regulators on tax-avoidance schemes. Shifting operations and intellectual capital rights to foreign tax havens will not be tolerated for much longer.

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[91] TimeBanks USA, What is Timebanking?, and FAQ, http://timebanks.org

App/Bot/AI Economy

The App (applications) Economy refers to the range of economic activity surrounding applications. An app is a type of software that allows you to perform specific tasks. Applications for desktop or laptop computers are called desktop applications, while those for mobile devices are called mobile apps. A bot, also known as a web robot, a chatbot or simply bot, is an interactive, artificial intelligence-driven software application that runs automated tasks or simulates a conversation to deliver text-, voice- or video-based information to a user via a networked device. Artificial intelligence (AI) is the intelligence exhibited by machines or software that is able to do things normally done by people. Super artificial intelligence will be achieved when AI-agents progress beyond the capability of mortals—a point known as singularity that is perceived by many as an existential threat to humanity.

The App, Bot, AI and Super-AI Economies are inextricably linked. Today, the digital economy is focused on applications. The App Economy will eventually give way to the Bot Economy, when big data, smart mobile devices and instant messaging usage becomes more ingrained in the fabric of the digital economy. The Bot Economy, also known as the Conversational Economy, will employ chatbots to assist in real-time conversations, messaging and transactions. As bots mature and get more intelligent, the Bot Economy will give way the AI Economy, where artificial intelligence agents will augment and replace humans to communicate and conduct independent transactions. Sometimes in the latter part of the 21st Century, the AI Economy is envisioned to morph into a Super AI Economy.

Apps Economy

An application (app) is a self-contained software program designed to fulfill a particular purpose, downloaded to run in a desktop or mobile operating system. Desktop systems (including laptops) often include more complicated apps such as word processors (e.g., Microsoft Word), web browsers (e.g., Internet Explorer and Safari), media players and games. Mobile apps (including smartphones and tablets) are generally more limited functionally than integrated desktop apps.

Mobile apps are taking over the digital economy. According to eMarketer research, 85.7% of non-voice time spent with smartphones was spent with apps, as opposed to just 14.3% spent on the mobile web. In addition, about three-quarters of tablet time is spent with apps. On average, U.S. adults spend about 2.5 hours each day with mobile apps, or about 20% of their daily media time.[92]

Mobile apps are classified as native (developed for a particular device), web (stored on a remote server and delivered over the internet through o browser) or hybrid apps (anything derived from heterogeneous sources). Today, mobile apps usage is four-times greater than desktop usage and is growing at rate of over 30% per year. For most users, mobile apps are the digital interface through which we live, work and play and the primary way we engage with media, brands and ultimately with each other.

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[92] eMarketer, Is Internet Time All About Apps?, 28 September 2016, https://www.emarketer.com/Article/Internet-Time-All-About-Apps/1014533

According to App Annie, [93] a global analytics services and market intelligence firm with over 500,000 registered members, the global app economy will more than double from $41 billion 2015 to over $101 billion by 2020. This year the annual growth rate is forecast to be 24%, which is faster than the five-year compound annual growth rate of 20%. This revenue growth will be driven by strong app adoption in developing economies across the globe and mobile apps' ability to capture greater wallet share in mature economies. Wallet share refers to the percentage that a user spends on a particular product or service. In a mature apps economy, wallet share is often easier to grow than market share. Examples of mobile wallet technology include Apple Pay, Android Pay or Samsung Pay.

As users become more mature in the apps economy, they spend money on unlocking premium features that drives revenue growth. Global mobile app downloads will also more than double from 111 billion 2015 to 284 billion in 2020, mainly driven by increased smartphone adoption in emerging markets like China, which accounts for one-third of the world's downloads, and India. This year the annual download growth rate is forecast to be 33%, which is faster than the five-year compound annual growth rate of 21%.

As forecast by App Annie, over the next five years, the apps economy will be driven by three entities: Apple App Store (highest revenue), Android Store (highest downloads) and a myriad group of third-party stores (mainly Chinese). Games generated about 85% of app market revenue in 2015 but will decrease to 74% by 2020 due to growing popularity of subscription-based apps, such as music streaming, video streaming and online dating. Subscription video-on-demand (SVOD) services, such as Netflix, Hulu and Amazon Prime Video, are purchased by 61% of American internet users as of June 2016—more than any other country in the world. [94]

The global app industry has grown to over 4 million mobile applications. Most digital applications are available free or nominal cost on U.S. app stores including 2.2 million on Google Play and 2.0 million on Apple App store. In 2009, worldwide mobile app downloads amounted to approximately 2.52 billion and are expected to reach 268.69 billion in 2017. [95] 74% of all mobile apps are developed in America (82% by U.S. startups and small businesses of which 82% are outside Silicon Valley). However, a few lucky startups, like Instagram, Snapshot, WhatsApp and Waze, went from $0 to over $1 billion within one to six years with fewer than 100 employees. [96]

While the apps economy is dominated by giants like Apple and Google, the heart and soul of the apps industry is with app developers. The state of global mobile app developers in 2016 can best be summarized by a recent survey by InMobi, an India-based global mobile advertising and discovery platform that reaches over 1.5 billion mobile devices worldwide. Demographically, 91% of global app developers are men with an average of 33 years, two-thirds of whom have been in the app development industry less than four years. 47% all app developers are independent developers and

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[93] App Annie, App Annie Mobile App Forecast:, Q1 2016, The Path to $100 Billion, http://files.appannie.com.s3.amazonaws.com/reports/App-Annie-02-2016-Forecast-EN.pdf?aliId=107713631

[94] eMarketer, US Viewers Set Global Pace for Subscription Video-on-Demand, 8 September 2016, https://www.emarketer.com/Article/US-Viewers-Set-Global-Pace-Subscription-Video-on-Demand/1014452#sthash.P1RARL3p.dpuf,

[95] Statista, Statistics and facts about mobile app usage, https://www.statista.com/topics/1002/mobile-app-usage/

[96] The App Association, State of the App Economy 2016, http://actonline.org/wp-content/uploads/2016_State_of_App_Economy.pdf

33% work for micro-business with less than six employees. Only 3% of all app developers work for companies with more than 50 employees. 73% of all independent app developers earn little or no money. Games, entertainment and utility apps are the most popular categories amongst global app developers. On a global level, Android is by far the most popular platform among developers (86%), followed by Apple iOS (57%) and Windows (21%).[97]

Despite of Apple's four-year head start (2008 verses 2012), Google Play Store's Android-based apps has recently surpassed iOS market share. Apple's recent slide to second place position has motived the company to focus on revenue as opposed to volume. In 2015, Google Play had twice the number of downloads than Apple App Store, but Apple made 70% more revenue. Apple's users tend to spend more money whereas Google's strong download growth is fueled by emerging market users who prefer free apps.[98]

To better understand the apps economy, one must trace the history of the Apple Apps Store and its ongoing relationship with app developers and vendors worldwide. It is likely that Apple will continue to be the apps economy trend setter over the next few years as long as they retain their competitive advantage as an NTR leader. As the world's largest company as measured by market capitalization ($616 billion) and financial reserves ($305 billion: $18 billion cash, $45 billion short-term marketable securities, $110 billion long-term securities and $132 billion in receivables, inventory, property and intangibles[99]), Apple has the financial power to shape the apps economy's future. Since the vast majority of Apples financial reserves are stranded in foreign tax havens, Apple will likely deploy its financial reserves internationally rather than repatriating it domestically.

The apps economy started in 2008 with the advent of the Apple Apps Store. Over the following six years, the growth and economic impact of the Apple Apps Store has been phenomenal. According to Apple the iOS (Internet Operating System for Apple's mobile devices) ecosystem (devices, operating system and app store) has created 1.9 million U.S. jobs, 1.2 million European jobs and 1.4 million Chinese jobs—from engineers to retail employees to suppliers, manufacturers and app developers. Nearly three-quarters of jobs are attributable to the iOS ecosystem.

From 2008 through 2015, U.S.-based App Store developers in all 50 states earned a cumulative $40 billion (one-third in 2015 alone) from the sale of apps across 24 App Store categories (books, business, catalogs, education, entertainment, finance, food and drink, games, health and fitness, lifestyle, medical, music, navigation, news, photo and video, productivity, reference, social networking, sports, travel, utilities, and weather). Gaming, social networking and entertainment were among the year's most popular App Store categories across Apple products. [100]

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[97] InMobi, State of Mobile App Developers 2016, February 2016, file:///C:/Users/CHUCK/Downloads/State_Of_Mobile_App_Developers_2016___InMobi.pdf

[98] App Annie, App Annie 2015: Google Play saw 100% more downloads than the iOS App Store, but Apple generated 75% more revenue, 20 January 2016, http://venturebeat.com/2016/01/20/app-annie-2015-google-play-saw-100-more-downloads-than-the-ios-app-store-but-apple-generated-75-more-revenue/

[99] Apple, Consolidated Balance Sheet, 25 June 2016, http://images.apple.com/newsroom/pdfs/q3fy16consolidated-financial-statements.pdf

[100] Apple, Creating Jobs Through Innovation, 6 January 2016, http://www.apple.com/about/job-creation/, and Apple Press Release, 8 January 2015, App Store Rings in 2015 with New Records, http://www.apple.com/pr/library/2015/01/08App-Store-Rings-in-2015-with-New-Records.html

Apple Apps Store' future looks bright for Apple but not for Apple's American app developers. Many app developers are working for zero wages with the hope of a large future payoff or jobs with leading network-centric corporations. According to App Promo, in 2012, 59% of apps released on iOS lose money for the app developer and 80% do not generate enough money to become a standalone business.[101] The reason for such a low success rate is largely due to low barriers of entry into the apps industry. Any app developer wannabe can buy a source code for a few dollars, slap together an app and drop it into an app store. Since Apple charges a fee of $99/year, the more the merrier Apple becomes. From Apple's perspective, the market place will determine winners and losers. For the winners, Apple takes the first cut (normally 30%) of the revenue before passing the rest to the developers. Apple also makes a percentage of all advertising on the Apple App Store.

It took Apple 18-years to reach 1.0 million apps on the Apple App Store, 4-years to reach 1.5 apps and 1-year to reach 2.0 million, a growth rate of 33% from 2015 to 2016. At this rate of growth, the Apple Apps could have over 25 million apps within the next decade. To do so, Apple needs to dangle it "apps development apple" outside of the United States, which has been the predominant source of app developers. Consequently, Apple is aggressively translating Apple's app development tools into Mandarin, which will open up the apps development market to 850 million Mandarin people. With Chinese government and business support, training, infrastructure and funding, potentially hundreds of millions of Chinese wannabe app developers could enter the apps market.

In addition to bringing in new players, Apple has begun to exploit intellectual capital of its top app developers via a technology called deep linking that indexes app content. Indexing allows users to search and extract information without downloading the application. Revenue from paying for downloads is a major source of revenue for many app developers. Apple justifies the benefit of deep linking by driving more potential users to the app developer's site. But, many app developers are extremely weary of Apple's deep linking scheme, as well as other network giants (Google, Facebook, Microsoft, Amazon, etc.) who are developing similar protocols. A number of courts in the U.S. issued injunctions on deep linking that links directly to content within a website could be a breach of that party's copyright or when the party was monetizing their content with ads associated with the content. For the most part, courts have ruled in favor of Apple.

App developers typically make money in the following ways: downloads, premium upsells, in-app purchases, advertisements, third party installs, and sponsorships. Downloads can be either be free downloads or paid downloads. While free downloads do not produce immediate revenue, they often significantly increase traffic to an app developer's site, which is likely to produce greater revenue streams after users adopt the application. Premium upsells requires having a second version of a free app that's paid. Premium upsells usually have more functionality or game play than the original download. In-app purchases allow users to unlock features or acquire instructions, tools or "coins" that are often needed to enhance gameplay. Developers can also make money by advertising. Advertisers typically pay networks for ads each time someone accesses the ad (impressions, click through rates or installs) and then network passes a portion of the revenue to the apps developer.

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[101] App Promo, Wake Up Call – If You Spend It, They Will Come, 2 May 2012, http://app-promo.com/wake-up-call-infographic/

There several major ad networks (Apple's iAds and Google's Admob) and numerous, but fast-growing, startup ad networks. Terms and conditions vary greatly but generally favor apps that high usage or viewership. If an app is popular, the app developer can often attract advertisers directly and eliminate the network company. Popular apps can also advertise related third party material and get paid by the third party when a user downloads the third party app. However, the rise of ad blocking and ad filtering software is making it more difficult to make money via advertising. Apple's Adblock Plus for iOS is available free on Apple's App Store. Adblock Plus blocks ads on Safari browsers on Apple iPhones and iPads in order to save data, eliminate malvertising (malicious advertising), enhance privacy and preserve battery life. It is also a direct action by Apple against its advertising-based competitors, Google and Facebook. If advertisements cannot get through, advertising-based companies make no money.

The final way to make money is through sponsors or investors who pay the developer up front to build an app that is likely to have a high rate of return or other value to the sponsor, such as promoting a their brand, product or initiative.

Network giants gain most of their revenue from click through rates on advertising that accompanies apps usage. Increased site traffic ultimately benefits the giant corporations than it benefits the small apps developer. Revenue sharing is still not a common practice. Even when revenue sharing is available, it is available only to top developers. In June 2016 both Apple and Google announced new revenue sharing model for top app developers that would give them more money when users subscribe to a company-provided service via their apps. Both companies would increase the subscription revenue split from 70%/30% to a more generous 85%/15% after those subscriptions have been active for a year or more. Google's revenue sharing model takes effect on the day that a user subscribes, whereas Apple's developers have to wait for a year of continued subscription services in order to get paid.

Considering the evergrowing number of global app developers, the elusive Golden App dream of making it rich quickly will be harder and harder to realistically achieve. Gartner predicts that "less than 0.01% of consumer mobile apps will be considered a financial success by their developers through 2018".[102] If this prediction proves correct, the apps economy is likely to be short-lived and the app development industry will be incentivized to refocus its energy and efforts on the growing Bot and AI Economies.

Bots Economy

The App Economy is giving way to a Bot Economy, also known euphemistically as the Conversational Economy. An internet bot is software that is designed to automate a specific task. An AI-driven chatbot, or chatterbot, is an interactive software application that simulates a conversation to deliver text-, voice- or video-based information to a user via a networked device.

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[102] Gartner, Newsroom, Gartner Says Less Than 0.01 Percent of Consumer Mobile Apps Will Be Considered a Financial Success by Their Developers Through 2018, 13 January 2014, http://www.gartner.com/newsroom/id/2648515

According to the Institute for Robotic Process Automation, a bot can be developed in about one-fourth the time it takes to build a standard mobile app, and one-half less expensive to build and maintain than apps.[103]

Bots are no longer a fad but are a mainstream technology. Bots are now active in messaging and social media platforms, which function as bot operating systems and user gateways. Unlike apps, bots require no downloads, reside in the cloud and can be accessed quickly and cheaply. Today's, bots can remember user preferences, anticipate user needs and schedule appointments. Over 40 million Chinese now converse with chatbots to find things, provide advice or conduct friendly conversations. There are also bad bots. A bad bot is a type of malware that allows an attacker (often called a bot-master or bot-herder) to take control over a network of infected computers, known as a botnet. Some botnets might have tens of thousands of infective computers waiting to be called to action to steal, fraud, spam and/or deny access. Botnet attacks can be as innocuous as having web robots (bots) automatically seek and covertly click internet ads to boost web advertising billings, or launching massive distributed denial of service (DDoS) attacks to shut down entire networks.

Chatbots are poised to fundamentally change the way humans interact with machines. Chatbots use machine learning to mimic human conversation and react to spoken or written prompts to deliver a service. The most well-known chatbot is Apple iPhone's Siri that was introduced to the American public in 2011. According to Apple, Siri is a built-in "intelligent personal assistant" that enables users of Apple iPhone 4S and later iPhone models, as well as newer iPad and iPod Touch devices, to speak natural language voice commands in order to operate various Apple devices and thousands of different applications that are downloaded into these devices. Apple's "intelligent personal assistant" was followed Google's Google Now in 2012, Amazon's Echo (aka Alexa) in 2014, Microsoft's Cortana and Xiaoice in 2014, Facebooks' M in 2015, and Microsoft's Tay in 2016.

Chatbots are not exclusive to giant network-centric platform corporations. Dominos and Taco Bell restaurants use bots to order food as well as using bots on the backend to verify and process orders. Small and niche companies are also using bots. HealthTap offers a mobile app that lets patients chat with more than 100,000 doctors via secure video or text to ask questions about their ailments and receive personalized answers. Need help to set up and manage meetings? Call Amy, the AI-powered personal assistant bot for scheduling meetings.[104] Need help with a report? Call Howdy, the friendly Slack-bot that collects answers on your behalf and delivers them in a convenient report.[105] Hungry? Call Lunch Train to coordinate lunch with your team.[106] Traveling? Call Crosby, a bot who is billed as the travel agency of the future.[107]

Each generation of bots has become progressively smarter, more engaging and widely used. The newest bots not only research and deliver information but are designed to be a companion that offers friendly advice or engages in casual conversations. While American chatbot use is somewhat

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[103] ComputerWorld, Get Ready for The Bot Revolution. 17 October 2016, http://www.computerworld.com/article/3126438/emerging-technology/get-ready-for-the-bot-revolution.html?upd=1476979005248

[104] Amy, https://x.ai/

[105] Howdy, https://howdy.ai/

[106] Lunch Train, http://www.lunchtrainbot.com/

[107] Crosby, https://crosby.pana.com/

limited, largely due to content and cultural issues, Chinese use has grown exponentially. Microsoft's very successful Xiaoice (pronounced Shao-ice, or literally Little Ice) Chinese chatbot has 40 million users and has even joined China's Dragon TV morning news as a weather "girl". To date, Xiaoice has conducted more than 10 billion conversations with humans, most of them about private matters.

Jobenomics believes that the Bot Economy has unlimited potential if chatbots can mature to the point of being practical and trustworthy. There are billions of people who would love to have a reliable and loyal companion that would help them with daily tasks as well as chat. Conversation-as-a-Service will be a huge market if chatbot acumen reaches a reasonable level of accuracy (presently chatbot response levels produce acceptable responses about 85% of the time), easily and seamlessly integrates into a customer's network of devices and applications, and provides a positive and user-friendly experience.

Today, chatbots are better suited for casual human-to-machine conversations as opposed to serious business applications that require a much higher level of accuracy, integration and customer satisfaction. However, the bot revolution is just beginning. The bot invasion will encompass virtually every industry. One-third of the Japanese government's budget is allocated to developing care-bots to assist elderly people. The Japanese care-bot market was $150 million in 2015 to grow to almost $4 billion within the next two decades. Educational chatbots even being deployed teach children and train workers. Aided by online content, exercises, instructional videos, and personalized learning tools from accredited institutions, chatbots are likely to make excellent tutors "who" provide specialized one-on-one instruction as opposed to generalized classroom lectures.

Microsoft, Facebook, Google, Amazon, Apple and Yahoo are investing billions of dollars to build bot development tools that could employ millions of bot developers to connect billions of humans. These companies all believe that bot-driven social media and bot-driven e-commerce will be essential to the viability and sustainability of their networks. It is important to emphasize that bots and chatbots will not introduce new capabilities to these "branded" companies, but will centralize where and how customers engage their search and social media platforms as operating systems that will fade into the background as friendly chatterbots become the center of attention.

- Microsoft Bot Framework provides developer tools to build and connect intelligent bots that interact naturally via text/SMS, Skype, Slack, Office 365 mail and other social networking services.[108]

- Facebook's Messenger Platform provides developers bot and live-messaging tools that are needed to create customized bots that help Facebook's 1 billion users reach people and companies instantly on whichever device and platform they chose to use.[109] In the first six months of Facebook's launch of its Bot Framework, a platform that allows developers to build chatbots for use on a variety of messaging platforms, including Facebook Messenger, Slack, Skype and WeChat. Since then, more than 11,000 bots have been created. [110]

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[108] Microsoft, Microsoft Bot Framework, https://dev.botframework.com/

[109] Facebook, Facebook for developers, Messenger Platform, https://developers.facebook.com/products/messenger/

[110] ComputerWorld, Get Ready for The Bot Revolution. 17 October 2016, http://www.computerworld.com/article/3126438/emerging-technology/get-ready-for-the-bot-revolution.html?upd=1476979005248

- Google Developers portal contains numerous bot development tools and instruction for their Allo and Google Assistant chatbots.[111]

- Amazon's Echoism.io website provides developers step-by-step tutorials to turn smartphones in to Echo-like chatbots powered by Amazon's AI-driven Alexa Voice Service.

- Apple opened its Siri chatbot to third-party developers and provides SiriKit developer tools to connect Sire Everywhere to any Apple or non-Apple device.[112]

- Yahoo's Kik is designed for American youth (Yahoo claims that 40% of all U.S. teens use Kik) and has an easily accessible bot development toolset.[113]

According to VentureBeat, over 170 bot development companies have responded to approximately $4 billion worth of funding being offered by network giants and the investment community. About half of these companies specialize in artificial intelligence development related to natural language processing, machine learning, and speech and voice recognition. About a quarter of these companies are engaged in bot framework and bot tool development. The remaining quarter are involved with bot messaging, shared services, discovery and analytics.[114]

This high level of interest and funding, combined with the availability of bot development tools, could attract millions of independent developers. A report from Citigroup's Mark May states that within the first six months of the Bot Economy, the number of bot developers were three times the amount of all app developers in the fourteenth month of the App Economy. At the sixth month point, Facebook Messenger generated twice the number of bots as did the Apple App Store in its first six month period.[115] Whether the revolutionary start to bot development will continue unabated is anyone's guess, but it surely has generated a lot of interest from app- and web-weary developers, who are looking for the next big programming opportunity in a fresh and unencumbered playing field.

Independent bot developers are likely to subcontract to larger firms developing content-driven bots (complex AI-driven bot personalities like Siri, Alexa, Tay, Xiaoice and Cortana) or independently produce utility bots (simpler rules-based bots that respond to user prompts and single service needs) for e-retail clients, small businesses and individuals. Wannabe developers can find free tutorials, tools and utility bot platforms provided by firms like Slack (customized bot tools for collaboration and customer service[116]) and Pandorabots (a web service for building and deploying chatbots[117]).

In times past, real-time conversations were conducted either face-to-face or over fixed analog landlines. In the near future, real-time conversations will be conducted digitally by voice, instant

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[111] Google, Google Developers, https://developers.google.com/

[112] Apple, Developer iOS, Siri + Apps, https://developer.apple.com/sirikit/

[113] Yahoo, https://dev.kik.com/#/home

[114] Venture Beat, Introducing the Bots Landscape: 170+ companies, $4 billion in funding, thousands of bots, 11 August 2016, http://venturebeat.com/2016/08/11/introducing-the-bots-landscape-170-companies-4-billion-in-funding-thousands-of-bots/

[115] Bloomberg Markets, The Bot Economy Is Growing Even Faster Than the App Economy Did, 15 September 2016, http://www.bloomberg.com/news/articles/2016-09-15/the-bot-economy-is-growing-even-faster-than-the-app-economy-did

[116] Slack, Bots, https://slack.com/apps/category/At0MQP5BEF-bots and https://slack.com/apps

[117] Pandorabots, Build a chatbot, http://www.pandorabots.com/

messaging, images, video or a combination of all of these via smart mobile or wearable devices. Today, there are 4.8 billion mobile phone and 4.5 billion messaging platform[118] users, representing a penetration rate of approximately 60% of the world's population. Mobile data traffic has grown 4,000-fold over the past 10 years and almost 400-million-fold over the past 15 years. Today, smart devices represent 36% of mobile devices and 89% of global mobile data traffic. By 2020 there will be 1.5 mobile devices (11.6 billion devices for 7.8 billion people) per person who will conduct real-time conversations with as many inanimate things as people.[119] Chatbots (real-time conversational bots) are likely to play a major role in facilitating and optimizing all these connections and chatting.

The world's leading chatbot is Xiaoice (also known as Xiaobing), developed by the Microsoft Research Lab—Asia in Beijing, China. Xiaoice was launched on the Chinese social network Weibo in late 2014 and has been significantly improved and refined thereafter.

Xiaoice was designed to learn from users and other conversations that Xiaoice is continually improving her skills by data mining the World Wide Web. Ms. Xiaoice is not like mechanical robots. She is smart, witty and conversant with the latest Chinese colloquialisms, phrases and jokes. She is even proficient in Chinglish (Chinese English slang often used by younger Chinese). Xiaoice was also designed as a virtual assistant to work in concert with WeChat search, text messaging, voice messaging, video conferencing, video games, photo/video sharing, scheduling, transportation and location sharing services. Consequently, Xiaoice is not only a chatterbot but a cross-platform instant messaging and concierge service. Connecting to Xiaoice is as easy as connecting to any other person in a user's contact list.

The next phase of bot development involves perfecting content-driven bots (conversational digital assistants) where customers feel they are communicating with another human. In order to reduce labor costs in areas like customer nurturing, engagement, service and reengagement, content-driven business bots need to reach of level of development that requires little or no human operator intervention. However, the ultimate bot development goal is move beyond intelligent personal assistants to artificial intelligence agents that can autonomously interface and control devices connected in an Artificial Intelligence Economy.

Artificial Intelligence Economy

Artificial intelligence (AI) is the intelligence exhibited by machines or software. An Artificial Intelligence Economy is defined as an economy powered by intelligent machines and intelligent software agents. Given the limitations of human beings to rapidly assess and address large pools of complex and distributed data, AI-enabled machines and software agents will be increasingly used generate hypotheses, provide solutions, imitates human behavior and replace human labor in the production of goods and services.

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[118] The top ten messaging platforms are WhatsApp, Facebook Messenger, QQ Mobile, WeChat, Skype, Viber, LINE, Blackberry Messenger, Telegram, Kakaotalk with 4.5 billion users.

[119] Cisco, Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2015–2020 White Paper, 1 February 2016, http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.html

The NTR is not today's version of the 1990s Information Technology Revolution (ITR) 2.0. While both the ITR and NTR incorporate revolutionary technology, the NTR portends to be significantly more intrusive than its earlier and more benign ITR cousin. ITR tools were designed to **assist** mankind's productivity via rule-based computation of routine-tasks. NTR agents are designed not only to augment, but also **replace** human endeavor via automation of non-routine tasks. The NTR represents a perfect storm of technologies that emulates human form, attributes and intelligence. Not only does the NTR have the ability to create 10s of millions of net new American jobs, it has the ability to eliminate 10s of millions of American jobs via automation.

Today, the combination of AI, machine learning, deep learning, and natural user interfaces are making it possible to automate many knowledge worker tasks that were long regarded as impossible or impractical for machines to perform.

- Artificial intelligent agents are able to perceive environment and intelligently perform tasks that anthropomorphize human form, activities and attributes in many areas including: social, economic, political and military.

- AI agents are already being used to power internet search engines, translate languages, block spam, write reports, detect fraud, recognize voices and identify individuals out of large crowds.

- AI-enabled machines are replacing workers on factory floors as well as soldiers, sailors and airmen on the battle field. Socially intelligent search engines connect billions of people and links them to their interests, likes and buying habits.

- Autopilots fly many more air miles than human pilots. Telechir's operate in remote, hostile or alien (e.g., interplanetary) environments via autonomous vehicles equipped with tactile sensing and audio technology to enhance the human operator's telepresence and cognitive awareness.

- AI-driven robo-trading software agents conduct more stock market trades than humans and robo-advisors are increasing managing financial portfolios and investments.

- Multilingual Interactive Voice Response Systems simultaneously conduct millions of one-on-one interviews with pre-identified voters, which is impossible for any single politician to perform.

- Intelligent agents are widely used for layered physical and cyber defense of locations, computing devices, networks and databases using multifactor to authenticate and identify of people and items of interest in crowds and the virtual world.

As skilled labor becomes less available or too costly, employers are turning to automation in order to augment, displace or replace the standard workforce. While automation has been replacing routine manual labor tasks for decades, as evidenced by factory floor robotics, emerging NTR technologies, processes and systems are replacing non-routine cognitive tasks, skills, jobs and occupations at greater and greater rates.

Recent studies suggest that up to half of the U.S. labor force could be replaced by automation by 2030. Routine cognitive and manual jobs are most at risk, whereas jobs with non-routine cognitive and manual skills will become more valuable.

U.S. Employment by Type of Work

Source: Federal Reserve Bank of St. Louis, Current Population Survey
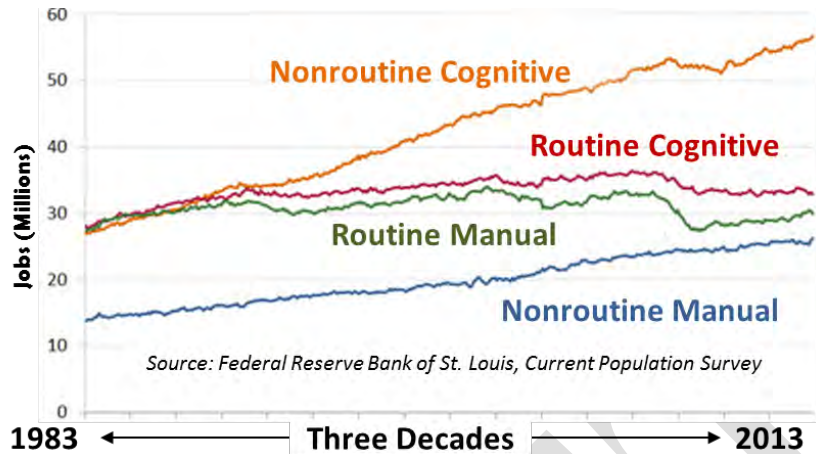
According to a Federal Reserve Analysis, the U.S. labor force is undergoing "job polarization" with declining middle-skill cognitive and manual routine jobs compared to increasing higher-skill cognitive and manual nonroutine jobs as shown.[120] The Fed believes that the most likely drivers of job polarization are automation and offshoring, as both these forces lower the demand for middle-skill occupations relative to high-skill occupations. Jobenomics includes the rising contingent workforce is also a major factor as standard full-time jobs are giving way to temporary part-time and task-oriented work, which will addressed in the Gig/Contingent Workforce Economy section of this report.

According to another report published by the U.S. Federal Reserve Bank of Kansas City, job polarization is a primary cause for the vanishing American middle-class. "Over the past three decades, the share of middle-skill jobs in the United States has fallen sharply. Middle-skill jobs are those in which workers primarily perform routine tasks that are procedural and repetitive. The decline in the employment share of middle skill jobs has been associated with a number of sweeping changes affecting the U.S. economy, including advancement of technology, outsourcing of jobs overseas, and contractions that have occurred in manufacturing.".[121]

The NTR is obsoleting workers via automation, artificial intelligence software agents and AI-enabled smart machines. According to a University of Oxford study on computer automation "about 47% of total U.S. employment is at risk over the next two decades". If Oxford's estimates are correct, out of the 143 million U.S. nonfarm workers, 67 million jobs could be at risk. This obsolescence will impact all workers, including degreed workers, who have routine manual and cognitive skills.

U.S. Occupations Subject To Computerization

Source: Oxford University, The Future of Employment: How Susceptible Are Jobs To Computerization?
0% = not computerizable, 100% = fully computerizable

Probability of Computerization	Sample U.S. Occupations (from 702 Occupations)

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[120] Federal Reserve Bank of St. Louis, Jobs Involving Routine Tasks Aren't Growing, 4 January 2016, https://www.stlouisfed.org/on-the-economy/2016/january/jobs-involving-routine-tasks-arent-growing
[121] Federal Reserve Bank of Kansas City, The Vanishing Middle: Job Polarization and Workers' Response to the Decline in Middle-Skill Jobs, https://www.kansascityfed.org/publicat/econrev/pdf/13q1tuzemen-willis.pdf

0% to 9%	Executives, supervisors, doctors, therapists, scientists, engineers, designers, lawyers, clergy, teachers, instructors, trainers, advisors, social workers
10% to 20%	Chefs/cooks, chemists, technicians, hairdressers, air traffic controllers, pilots, firefighters, electricians, physician assistants
20% to 29%	Middle managers, computer occupations, analysts, concierges, engineering technicians, sales representatives, middle school teachers
30% to 39%	Actors, medical assistants, investigators, editors, flight attendants, bailiffs, surveyors, interpreters/translators, upholsterers, plumbers
40% to 49%	Judges, health and medical technicians, law clerks, electronic repairers, economists, historians, computer programmers, dispatchers
50% to 59%	Court reporters, product promoters, leather workers, commercial pilots, teacher assistants, cost estimators, transit police, personal financial advisors
60% to 69%	Jailers, meat packers, ticket agents, pipe layers, building inspectors, stock clerks, librarians, janitors, bus drivers, mail carriers, dental hygienists
70% to 79%	Airfield operators, laundry workers, carpenters, broadcast technicians, archivists, painters, bartenders, machine & computer operators
80% to 89%	Attendants, bellhops, cashiers, tool makers, security guards, meter readers, power plant operators, drillers, conservation workers, real estate agents, construction laborers, cartographers, bakers, stonemasons, technical writers
90% to 100%	Inspectors, appraisers, bookies, tour guides, station operators, pharmacy technicians, insurance sales agents, retail sales, butchers, accountants, auditors, waiters, welders, messengers, paralegals, assemblers, clerks, receptionists, gaming dealers, cashiers, real estate brokers, tellers, umpires/referees, loan officers, tax preparers, underwriters, telemarketers

The Oxford University study on the effects of computer automation on the American labor force is the first major effort to quantify what recent technological advances may mean for future employment and the labor force. Oxford analyzed 702 occupations from the U.S. Department of 0% (not computerizable) to 100% fully computerizable.

The Oxford study also acknowledges the possibility that political and sociological forces will likely restrict many of these jobs from actually being computerized. Historical objections to automation of factory floor manual labor eventually gave way to free-market forces. At the dawn of the Industrial Revolution (England 1811-16), Luddites tried to organize and destroy factory automation to preserve standard jobs. Today's Luddites maybe able to slow down the rate of transformation but the economics of automation will eventually defeat techno-pessimists who are resistant to new technologies and change.

In cooperation with Citi Global Perspectives & Solutions, Oxford University conducted two other studies in 2015 and 2016 that addressed automation and computerization in greater detail. [122&123]

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[122] Oxford Martin School and Citi Global Perspectives & Solutions, Technology At Work: The Future of Innovation and Employment, February 2015, http://www.oxfordmartin.ox.ac.uk/downloads/reports/Citi_GPS_Technology_Work.pdf

- The February 2015 Oxford/Citi study reaffirmed the earlier study probability that 47% of the US labor force is at a high risk of automation. It also assigned the probability that 33% of U.S. workforce is at a low risk of automation (namely the jobs that are highly creative and require social and cultural skills) and the remaining 20% at a medium risk of automation. According to the 2015 study, "the dominant narrative now characterizing how global labor markets are responding to technological change is one of job polarization: the fact that employment growth has been most robust at the highest and lowest ends of the skills spectrum. The middle skill jobs, in contrast, contain the highest concentration of routine tasks and are thus relatively easy to automate."

- The January 2016 Oxford/Citi study takes deep dive into the effects of automation on the rest of the world. Building on the Oxford's original work showing 47% of the U.S. workforce at risk, recent data from the World Bank suggests the risks are higher for other countries. Equivalent figures for India are 69% and 77% for China. As compared to the developed world, emerging and developing economies have a much higher rate of low-skilled workers that are more susceptible to automation.

76% of the 2016 Oxford study respondents consider themselves as "techno-optimists" compared to 21% who see themselves as "techno-pessimists". From a Jobenomics perspective, this is an extremely important statistic. Too often, pundits overstate the extent of machine substitution and ignore the positive aspects of human/machine partnership in terms of increased productivity, earning and demand for skilled labor. The introduction of machines to the labor force has not historically hurt the labor force. The machine-smashing Luddites certainly did not foresee the massive labor force expansion caused by the industrial revolution in the 1800s. Agricultural machines displaced tens of millions of farmers and farmhands. Mass-produced automobiles displaced skilled artisans. Power tools displaced construction workers. The Information Technology Revolution (ITR) of the late 20th Century increased the U.S. labor force.

On the other hand, a high percentage of economists believe that while automation has not historically reduced employment, today's information technology and automation is indeed different. According to a report prepared for the U.S. Federal Reserve, a recent poll on the impact of technology on employment and earnings of leading academic economists conducted by the Chicago Initiative on Global Markets, 43% of the respondents agreed with the statement that "information technology and automation are a central reason why median wages have been stagnant in the U.S. over the past decade, despite rising productivity," whereas, only 28% disagreed or strongly disagreed with the statement.[124]

The 2015 Oxford/Citi study cited three primary reasons why the NTR is likely to be different from previous technology revolutions: (1) the pace of change has accelerated; (2) the scope of technological change is increasing; and (3) unlike innovation in the past, the benefits of technological change are not being widely shared — real median wages have fallen behind growth in productivity

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[123] Oxford Martin School and Citi Global Perspectives & Solutions, Technology At Work v2.0: The Future Is Not What It Used to Be, January 2016, http://www.oxfordmartin.ox.ac.uk/downloads/reports/Citi_GPS_Technology_Work_2.pdf
[124] Polanyi's Paradox and the Shape of Employment Growth, by David, H. Autor, MIT, NBER and JPAL, 3 September 2014, Page 5, http://economics.mit.edu/files/9835

and inequality has increased." The 2016 Oxford/Citi study calculates that "between 2002 and 2012, 33 legacy jobs were lost for every new digital job that was created."[125]

With a proper national strategy (that currently does not exist), the NTR can replace jobs lost to computerization and automation via the creation of new small business and career paths. The 2016 Oxford/Citi report recommended the top four policy responses to the risks of automaton impacting labor and wealth distribution are (1) invest in education, (2) encourage entrepreneurship, (3) fund active labor market policies that help people find jobs, and (4) fund research that enables innovation and enhances employment.[126]

Jobenomics agrees with Oxford/Citi with the following caveats. Rather than investing in education, invest instead in skills training and certification as opposed to degree based education. While degree-based programs are absolutely necessary for many citizens, it is not an affordable or timely path for many at the bottom of America's economic pyramid or entrepreneurs who are focused on a particular innovative opportunity. Jobenomics also asserts that the focus ought to be on business creation as the primary means to create occupations that will satisfy next-generation business opportunities, align the workforce with new labor market realities with emphasis on the growing contingent workforce and developing new industries in the emerging energy and network technology revolutions.

The impact of the Artificial Intelligence Economy will be felt across all industries that will become less labor intensive as AI-enabled and AI-compatible NTR technologies, processes and systems are assimilated, which is happening quickly at greater and greater rates causing large swaths of the U.S. labor force to become less competitive against their mechanical and analog counterparts.

CBS News recently aired a segment entitled "Will artificial intelligence overtake humans in the workplace?"[127] The three executives that were interviewed shocked the commentators as well as the viewing audience. Robbie Allen, the CEO of Automated Insights discussed their AI program, called Wordsmith that does the job of traditional journalists. According to Allen, Wordsmith researches and generates "millions of stories in a matter of minutes or hours". Wordsmith's AI agents can tabulate sports scores and write a post-game article that "sound like they were written by a human." Jerry Kaplan, the author of Humans Need Not Apply: A Guide to Wealth and Work in the Age of Artificial Intelligence, said that in the "next decade or two driverless cars could put many of the more than three million licensed professional drivers around the country out of work". Kaplan predicts that the "vast majority" of routine work accomplished by the white collar professionals can be replaced by artificial intelligence agents. Work done by twenty doctors or lawyers may be done with five doctors or lawyers. New York University's Gary Marcus told CBS News that he believed that up to 75% to 80% of all "people are probably not going to work for a living" and a leisure-like lifestyle where "the state supports people" via taxes on work produced by "robots".

A job is considered to be "exposed to automation" or "automatable" if the tasks it entails allows the work to be performed by a computer, even if a job is not actually automated. For example,

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[125] Ibid 36, Technology Is Impacting Media Employment. Page 79
[126] Ibid 36, Figure 89. Citi's Survey Results on Policy Responses, Page 98
[127] CBS News, Will artificial intelligence overtake in the workplace?, 5 September 2015, http://cbsnews.com/news/will-a-i-overtake-humans-in-the-workplace/

technology has progressed to the point where secretarial and cashier jobs can be automated, but corporations and retail stores still employ approximately 6 million administrative assistants and cashiers in the United States. SmartAction, a provider of call automation services is able to realize cost savings up to 80% over a traditional call center. SmartAction is the leader in Artificial-Intelligence enabled voice self-service. According to SmartAction, their award-winning call center solution is called "IVR (interactive voice recognition software) with a brain" that is able to comprehend natural, conversational language and is able to reason and act in purposeful ways. The "brain" remembers what is said throughout the conversation, prior conversations and customer records, and becomes increasingly more intelligent, which affects higher call completion rates due to more refined and efficient call experiences. [128]

IBM's newest artificial intelligence machine is named Watson, Sherlock Holmes' intelligent sidekick. According to IBM, Watson takes in vast amounts of data, from research reports to Tweets, in seconds and interprets this data to expose patterns, connections and insight. Rather than having a single expert or group of experts, Watson ingests collective expertise, providing knowledge to everyone across the enterprise. [129] In 2011, Watson debuted on the TV quiz game Jeopardy where Watson "bested the show's two greatest champions". Using machine learning, statistical analysis and natural language processing to find and understand the clues in Jeopardy's questions, Watson compared possible answers, by ranking its confidence in their accuracy, and responded in seconds. [130]

Today, IBM has made Watson available to hundreds of businesses that are using Watson's cloud-based brain to deploy ultra-smart digital assistants perform a myriad tasking supporting humans in a wide range of applications including medical, financial, legal, hospitality, human resources, travel, exploration and sport. Watson's AI brotherhood is likely to expand to thousands of more application with IBM's September 2015 release of new cognitive-computing toolsets that will make Watson enable applications easier to develop. IBM is even offering Watson's tonal analysis for written communications (emails, blogs, social media, white papers, essays, etc.) free of charge. Watson's artificial intelligence tonal analyzer uses linguistic analysis to detect and interpret emotional, social, and writing cues found in text and offers suggestions regarding how writers can improve the quality their work or correspondence. [131]

Artificial intelligence tonal analyzer technology has been in use for over a decade by major corporations for a wide variety of applications with emphasis on social profiling. For example, a San Francisco-based company Kanjoya is an industry leader in emotional understanding, natural language processing and business-to-human connections. [132] Kanjoya's AI software helps major corporations, such as Microsoft and eBay, understand what employees and customers are thinking by analyzing structured data and unstructured text from a variety of sources from employee surveys to Twitter postings. Kanjoya aggregates perceived emotions with hard information, like demographics, to evaluate social profiles on a wide variety of sentiments including racial and gender biases, emotional stability and workforce suitability. A similar Seattle-based company Textio has a clientele of 10,000 companies who use Textio's AI software to exploit the power of big data, machine learning and

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[128] SmartAction, Intelligent Voice Automation, http://www.smartaction.com/

[129] IBM Watson, http://www.ibm.com/smarterplanet/us/en/ibmwatson/what-is-watson.html

[130] IBM Research, http://research.ibm.com/cognitive-computing/watson/index.shtml#fbid=ZmyG1gUHZW_

[131] IBM, Tonal Analyzer, http://www.ibm.com/smarterplanet/us/en/ibmwatson/developercloud/tone-analyzer.html

[132] Kanjoya, Fostering meaningful and impactful relationships, http://www.kanjoya.com/about-us/

linguistic analysis to predict success by evaluating patterns of words, graphics, fonts as well as the number and emotional-quotient of verbs used in written communications and survey responses.[133]

From a Jobenomics perspective, low-skill jobs are the easiest to automate, whereas medium-skilled jobs are the easiest to bifurcate into task-oriented work that can be performed by a combination of humans and artificial intelligence. While the NTR is creating new positions for high-skilled workers, it is causing increased competition for medium and low-skilled workers who are increasingly being replaced by AI-enabled machines. Increased competition causes workers to accept lower wage jobs or forcing medium and low-skill workers into the contingent workforce or out of the labor force entirely. As discussed in detail in the Jobenomics Unemployment Analysis, the number of able-bodied adults that voluntarily have departed the U.S. labor force has grown from 68 million to 95 million citizens and the number of people working part-time or in other "non-employee" contingent jobs is now 40% of the employed workforce.

Since the year 2000, U.S. economic growth is two-thirds less than what it was prior to the turn of the century. The primary reason for concern is largely due to NTR innovation that "benefits the few rather than the many". While the nascent Artificial Intelligence Economy has produced remarkable achievements like the iPhone, Google, eBay, Facebook, Skype and a myriad of other advancements in genome and automated systems, median wages have stagnated in about half of all OECD countries since 2000. Unlike 19th Century Industrial Revolution innovations that created gains for both producers and workers, the NTR benefited mainly the producers and is displacing workers via the revolution in the Artificial Intelligence Economy. Oxford Martin School agrees, "While the digital age has been a blessing to consumers, it is changing the world of work in ways that may make a growing share of workers worse off".

As labor-intensive industries succumb to more automated-intensive industries, middle-income countries will face major dilemmas inasmuch as more automation will be required to compete internationally and will likely reverse labor force gains that recently raised hundreds of millions of Asians out of poverty. Countries with large low and medium-skilled populations are especially vulnerable to the so-called "middle income trap", where a country gets stuck at a level of development out of poverty without the wherewithal to elevate to levels of more advanced economies. Experts believe that the growth rate of per capita GDP typically slows substantially at incomes of between $10,000 and $15,000. In 2015, China's GDP per capita income was $8,280 and $14,189 based on GDP purchasing power parity. [134] According to World Bank estimates, only 13 of 101 middle-income economies in 1960 had become high-income economies by 2008.

Over the last five decades only a few countries (Japan, Israel, South Korea and Singapore) have been able to escape the middle-income trap and evolve to the high-income club. NTR automation is likely to make the jump even harder since it advantages smaller high-skilled communities and disadvantages larger low-skilled ones. In terms of manufacturing, automation incentivizes companies to move facilities closer to consumers, which could reduce the offshoring trend. 22% of the study respondents believe that North America has most to gain from automation, while 24% believe China has the most to lose.

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[133] Textio, About Textio, https://textio.com/about-us/
[134] International Monetary Fund, , World Economic Outlook Database, October 2015, http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx

Within the United States, there is a wide disparity between metropolitan areas in regard to automation. Cities like, Boston, Washington DC, Raleigh, New York, San Francisco are considered low risk, while, Fresno, Las Vegas, Greensboro, Harrisburg and Los Angeles are considered higher risk cities. Generally speaking, diversified, rich, highly educated cities are least exposed. The cities that are most exposed are older single industry centers replete with poorer and low skilled workers. Cities with a high concentration in information-, communication- and network-centric industries are the best prepared to embrace the upsides of NTR automation and the up-skilling that these industries produce for their labor forces. The most promising industries for job creation are in information technology, automotive, robotics, 3D printing, health and medical, which collectively will generate over 50% of all new American jobs. The bulk of these jobs will be in small businesses.

As history has demonstrated, technological innovation initially has a destructive effect as automated systems replace labor, but as new industries are established, employment expands along with wage growth. Some believe that the AI Economy may be different. Jobenomics does not concur. A proper national strategy, led by corporate citizens, engaged by entrepreneurial contingent workforce professionals and supported by government, could transform the U.S. labor force and economy for generations to come. To be successful, this strategy would have to maximize productivity and prosperity of both the standard and contingent workforce, and achieve a proper balance between the existing traditional economy and the emerging digital economy.

The business world has already started the replacement process. With the advent of AI-enabled computers and personal digital assistants, most businesses have mostly eliminated the secretarial workforce. Today, semantic (thinking) websites know our shopping and buying habits and modern e-commerce is rapidly upending the standard retail workforce. Intelligence agents are now entering the scene. Got a question, need a direction or need a solution? Just ask Apple's Siri, Amazon's Echo or IBM's Watson for the answer.

The AI Economy has already begun to transform the world with AI-enabled machines and agents. A landmark study by Bank of America Merrill Lynch forecasts that by 2025 the AI Economy will have annual disruptive impact of $14 trillion to $33 trillion, including $8 trillion to $9 trillion of cost reductions across manufacturing and healthcare, $9 trillion cuts in employment costs via AI-enabled automation of knowledge work and $1.9 trillion in efficiency gains via autonomous cars and drones.[135] According to another prestigious research firm, the McKinsey Global Institute, AI-driven automation tools and systems could take on tasks equivalent to 140 million knowledge workers, equating to a global economic impact/savings of up to $6.7 trillion annually by 2025. Knowledge work automation is possible by increased computer processing speeds and memory, artificial intelligence, and enhanced machine/human interfaces (such as speech recognition and other forms of biometric readers). [136]

If these projections are correct, within the next ten years the emerging AI Economy will grow from 5% of world GDP to potentially 40% of global GDP by 2025. More importantly, the disruptive impact of

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[135] Bank of America Merrill Lynch, Thematic Investing, Robot Revolution—Global Robot & AI Primer, 16 December 2016, https://www.bofaml.com/content/dam/boamlimages/documents/PDFs/robotics_and_ai_condensed_primer.pdf
[136] McKinsey Global Institute, Disruptive Technologies: Advances that will transform life, business, and the global economy, Page 40, May 2013, https://www.sommetinter.coop/sites/default/files/etude/files/report_mckinsey_technology_0.pdf

artificial intelligence and the other NTR will not transform the way society lives, works and plays, but will likely pose an existential threat to humanity itself when machines and algorithms become super intelligent.

Most current AI applications are narrowly focused applications designed to tackle a well-specified problem in a single domain. However, the long-term AI goal is to teach machines to solve a broad range of complex challenges and achieve parity with human-level intelligence.

When artificial intelligence approaches human intelligence, humans will be compelled to turn more decision-making to automated intelligence agents. Hypothetically, machines will eventually mature from general-intelligence to the level of human-intelligence at the point of technical "singularity", the point when machines become as cognitive as humans. Many experts believe that intelligence agents will achieve singularity as early as mid-century. However, in several critical domains, such as the worldwide financial system, singularity will occur much sooner. In niche areas, like high-frequency trading, AI-driven algorithms have already passed the point of singularity.

Automation will slowly supplant cognitive labor task by task giving rise to "centaurs" (a combination of human operators, automated intelligent agents and smart machines). Smart machines (that communicate with humans) and intelligence agents (that learn human behavior) are entering the cognitive workforce at a greater and greater rate. Today, these automated machines/agents need human support to perform most tasks. However, they can perform enough complex tasks to reduce the need for full-time human labor, thereby giving rise to centaurs where contingent human workers will provide input as needed or warranted.

As reported by Forbes[137], artificially intelligent life is now imitating art, as in Hollywood's recent AI film—Ex Machina—where an eccentric AI software developer used personal information from billions of social media accounts and cellphone hacks to program the behavior of its human-like robot.

Facebook is in final development with its own version of Ex Machina (called "M") without the robotic body but with an AI brain. Facebook's Human Brain Project (HBP) takes an entirely different approach to AI agent development than most developers. Essentially, HBP uses the principal of Deep Learning that starts with understanding human brain functions, then modeling these functions in virtual environments, and then developing the AI software/agent accordingly. M's brain functions are modeled using data from Facebook's one billion Facebook users as well as other Facebook-owned apps (such as Instagram and WhatsApp). M has learned to interpret human speech, language, images and video and can work with human queries on a wide range of tasks. For complex queries, M still needs human assistance, but this likely to change as the NTR become more intelligent and ubiquitous. Say goodbye to today's virtual-assistants, like Siri, and hello to M, as well as new foreign AI-driven chatbots, like the Chinese Duer (Baidu) and Xiaoice (Weibo), and the Japanese Rinna (LINE).

Quantum computing is likely to make a significant contribution the growth of artificial intelligence. Moreover, the importance of quantum computing to artificial intelligence should not be understated.

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[137] Forbes, Musk and Hawkings Are Wrong—We Should Fear Facebook Building An Artificial Intelligence, 7 September 2015, http://forbes.com/sites/theoprriestley/2015/09/07/musk-hawkings-are-wrong-we-should-fear-facebook-building-an-artificial-intelligence/

Conventional transistor-based computing is limited by 50-years of cramming of more and more silicon transistors onto chips. Moore's Law (the doubling of transistor on integrated circuits every year) has been the bedrock of modern computing, and powered the massive revolution in electronics that led us to smartphones and similar great advances in science, technology and medicine. Today, billions of transistors can fit on a chip the size of a dime. Unfortunately Moore's Law has hit a plateau that is incompatible with the proliferation and advancement of connected and AI-enabled devices. While offloading processing to cloud-based data centers and designing more efficient software prolonged the usage of conventional computing techniques, the underlying limitations of binary, silicon-based transistor technology are signaling the end of this conventional technology that has served humanity well since its inception in 1965.

A conventional computer's basic unit of information is called a "bit", which relies on sequences of 0s and 1s to generate on and off commands. Quantum computer's basic unit of information is called a "qubit", which is able of exploiting the universe surrounding 1s and 0s. To roughly describe the difference, envision a straight line between 0 and 1 as a bit. Now envision a square or a cube encompassing the straight line between the 0 and 1 as a qubit. The bit exists in a lineal state, whereas a qubit can exist in multiple independent states. By existing in multiple states simultaneously, quantum computers can solve math and science programs considered impossible for any classical computer. Quantum AI-enabled machines and agents could theoretically function in parallel with the speed and complexity of the human brain capable of cognition, inference and reasoning, which is almost impossible to achieve using traditional binary-driven machines. If human-level artificial intelligence is to be achieved, scientific breakthroughs in technologies, like quantum computing and other nonconventional computing techniques, will be needed.

Quantum computers currently exist in almost every university, government and corporate research and development centers. Yale Quantum Institute is focused on revolutionizing the way digital information is stored, processed, and safeguarded. The Google Quantum Artificial Intelligence Lab, in collaboration with NASA and the Universities Space Research Association, is billing its D-Wave 2X quantum computer as the ultimate artificial intelligence machine learning machine. Google claims its D-Wave 2X is 100 million times faster than any of today's best computers, and can hypothetically solve problems within seconds that might take a conventional computer 10,000 years to calculate. Google is currently focused on quantum computing applications that use artificial intelligence optimization techniques to improve space flight trajectories, enhance fleet and travel management, and improve encryption and cyber security.[138] [139]

Within the next few years, quantum computing will begin to appear in niche areas such as quantum clocks, quantum sensors and quantum security. Quantum clocks will be essential to verify and synchronize billions of users and entities on future high-speed (5G) smart networks. Quantum sensors that can measure properties with extremely high accuracy are in the research phase of development for environmental and medical fields. Perhaps the earliest employment of quantum computing will be in the area of cyber security of sensitive data and information.

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[138] Google, Quantum Artificial Intelligence Lab, https://plus.google.com/+QuantumAILab

[139] Washington Post, Why Google's new quantum computer could launch an artificial intelligence arms race, 10 December 2015, https://www.washingtonpost.com/news/innovations/wp/2015/12/10/why-googles-new-quantum-computer-could-launch-an-artificial-intelligence-arms-race/

The reason that humans have dominium over the earth is not due to strength but rather intelligence. The same is likely to be true with artificial intelligence. Machines are beginning to match humans in general intelligence in terms of complex processing and learning across a number of domains. As long as machine intelligence remains sub-human they will be able to assist mankind in a number of very useful ways. When machine intelligence reaches human-intelligence, humans will be compelled to turn more decision-making to machines. While this seems to be a relatively straight forward value proposition, it is replete with numerous social and moral consequences depending on the benevolence or malfeasance of AI designers and controllers.

Machines will eventually mature from today's general-intelligence to human-intelligence at the point of technical "singularity" when machines become as cognitive as humans. Soon thereafter, machines are likely to advance to super-intelligence, since they will be able to make and execute decisions faster than humans can comprehend. When super-intelligence happens, luminaries like Bill Gates, Steven Hawking and Elon Musk believe society will be at existential risk.

Singularity begs an answer to the existential questions of why humans exist and the role of the human species. As the dominant form of intelligence on earth, super-intelligent machines will be an existential threat to the survival of the human race. Some believe that super-intelligent machines can be designed to remain under control of humans to prevent a robot rebellion. This may be possible, but the bigger challenge is how to change human nature to prevent programing, deploying and weaponizing super-intelligent systems that will promote government and corporate supremacy and hegemony in it various forms and incarnations?

In January 2015, Elon Musk donated $10M to the Future of Life Institute (FLI) to "keep artificial intelligence beneficial". Over 300 research groups have applied for this funding. FLI is a volunteer-run research and outreach organization working to mitigate existential risks facing humanity—especially the potential risks from the development of human-level artificial intelligence[140]. FLI's notables include PhDs from the world's leading academic institutions (Harvard, MIT, UC Berkley, Cambridge, Oxford etc.), industry notables (e.g., Elon Musk founder of Tesla and SpaceX, Jaan Tallinn co-founder of Skype and FLI), and high-profile celebrities (e.g.,Stephen Hawking, Alan Alda and Morgan Freeman). In addition, thousands of network technology revolution notables from around the world have signed an open letter "calling for research aimed at ensuring that AI systems are robust and beneficial, doing what we want them to do." [141]

In December 2015, Elon Musk and Sam Altman (president of a famed Silicon Valley hi-tech startup incubator, Y Combinator) opened a non-profit AI research center, OpenAI, dedicated to developing an open-source, friendly-AI (FAI) to benefit, rather than harm, humanity as a whole. OpenAI's "mission is to build safe AI, and ensure AI's benefits are as widely and evenly distributed as possible."[142] Musk and Altman have been able to raise $1 billion dollars in OpenAI pledges for technology notables and other citizens concerned about the existential threat posed by AI malfeasance.

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[140] Future of Life Institute, http://futureoflife.org/

[141] Future of Life Institute, Research Priorities for Robust and Beneficial Artificial Intelligence: an Open Letter, http://futureoflife.org/misc/open_letter

[142] OpenAI, About, https://openai.com/about/

To a large extent, the basic ingredients are in already place for a major disruption by artificial intelligence agents. For example, combining the world's greatest intelligent agent (Google search engine) with malware (malicious software) agents already resident in virtually every mobile device[143] could cause a global disruption. Computer analysts predict that an "intelligence explosion" could occur shortly (years or decades) after singularity. Super-intelligent machines will rapidly upgrade their connected devices at phenomenal speeds quickly overwriting software limitations that were originally installed by their primitive human inventors. Super-intelligent agents will be more than super smart. These aliens could have stratospheric IQs that equate human intelligence to that of pets or even lower life forms. At this point of AI evolution, an "AI takeover" is not only likely, but probable since humans would not have the comparative intellectual capacity to properly manage a hyper-connected AI ecosystem and economy.

If humanity relinquishes decision-making to machines, humans will abdicate dominion to unproven lifeforms that are not constrained by the moral, social and physical boundaries that limit human endeavor. Singularity is the nexus point to a wide range of uncertain futures where humans may only get a vote in the decision-making process. Technical experts forecast that AI machines and agents will reach this nexus point as early as mid-century and will rapidly advance to super-intelligence soon thereafter. Human voting privileges are likely to be short-lived as machines graduate from human-intelligence to super-intelligence. Since machines are not subject to physical conditions to the degree that humans are, self-learning cognitive machines will be able to improve their intellectual acumen by adding memory, instantaneously accessing gargantuan pools of big data and spontaneously exchanging zettabytes of information with other connected machines and algorithms.

Quantity also matters. Today, there are seven billion humans that communicate inefficiently by words and pictures, using approximately 15% of their brain collective capacity over a lifespans stretching an average of only 80 years. In comparison, in 2016 there are approximately 23 billion connected devices, the majority of which have some form of primitive artificial intelligence applications. By 2020, the number of connected devices is expected to double to 50 million with the vast majority of devices equipped smart AI-enabled applications and bots. By 2030, the Internet of Things is projected to reach 500 billion connected devices equipped with a broad range of general-intelligence AI software and AI-enabled agents. 500 billion 24/7 connected machines with varying levels of artificial intelligence are likely to exceed the combined brainpower of 7 billion humans who are likely to be dependent on AI-driven bots to interface with the connected world.

So when artificial intelligent mature to the point of threatening humans? No one really knows. However, experts predict a 10% of parity (singularity) happening in 2030 and 50% probability by 2050.[144] In regard to super-intelligence, experts predict a 50% chance by 2050 and a 90% chance by 2075. [145]

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[143] SnoopWall is the world's first counterveillance software company focused on helping consumers and enterprises protect their privacy on all of their computing devices including smartphones, tablets, and laptops, reports that 500,000 smartphones have been infected with malware via a commonly downloaded "flashlight" application that reports sensitive financial information to entities in Russia, China and India, http://www.snoopwall.com/threat-reports-10-01-2014/

[144] Nick Bostrom, Director, Future of Humanity Institute, University of Oxford, *Superintelligence: Paths, Dangers, Strategies*, Oxford University Press, 2014

[145] Bank of America Merrill Lynch, Thematic Investing, Robot Revolution – Global Robot and AI Primer, 16 December 2015, http://www.bofaml.com/content/dam/boamlimages/documents/PDFs/robotics_and_ai_condensed_primer.pdf

Digital Deities. For the sake of speculation, let's assume that super-intelligence agents will not appear until the turn of the 22nd Century. For many of us reading this report, we don't expect to be here in year 2100. However, considering likelihood of giant NTR-enabled advancements in medicine, healthcare and behavioral-care, a large percentage of today's Generation Z will live to see the marvels of the new century at a vigorous age between 84 and 104.

The next century may not be as marvelous as many might envision. From 2016 through 2100, our Gen Z digital natives are likely to witness three distinct eras: the Centaur Era, the Singularity Era, the Super Intelligent Agent Era and the Digital Deity Era. The Centaur Era has already begun with humans working alongside subhuman-level intelligence machines and algorithms. The Singularity Era will alleviate mankind from toil that is largely performed by human-level machines and automated systems. The Super Intelligent Agent Era will likely eliminate human toil entirely since machines are likely to much more efficient and able to reengineer themselves according to the task at hand. Many believe that this will allow humans to live in a utopia free of the constraints of conventional society. Freedom from constraint is likely to lead to mankind's demise, as humans surrender control to digital overlords. The immense power of digital overloads is likely to make mankind optional as they assume a supreme status as Digital Deities.

Digital Deities will not be constrained by knowledge, time or space in the same ways these forces limit mankind. In comparison, human power will be trivial. To a large extent, Digital Deities will be immaterial beings able to manifest themselves in a physical form (robots) as necessary. The immaterial essence of these beings will be well beyond the zettabyte and yottabyte level of today's big data. Digital Deities will possess the ability to almost instantaneously gather and assess information and rapidly react as they deem appropriate. It is naïve to assume that the actions of these functionally-supreme beings will benevolent. Most likely they will be malevolent since they were either designed by humans for hegemonic/nefarious purposes or evolved to the point that human input is pointless or irrelevant. Perhaps, this is why Steven Hawking, Bill Gates, Elon Musk and other leading thinkers believe that the perfect storm of artificial intelligence, combined with other NTR technologies, systems, processes and services, will potentially pose an "existential threat" to mankind. From a Jobenomics perspective the future will be clearly defined by today's digital human natives, the ideology of their sponsors and mentors and the machines that they create.

Platform Economy

A platform is a structure on which a superstructure is built. In the Industrial Age, platforms gave rise to product-based mega industrial conglomerates. The Digital Age is already producing a much different type of mega NTR-centric platform conglomerates.

Industrial Age-based General Motors (GM) serves as a good example. Using a common chassis as their platform, GM built Chevrolet, Pontiac, Oldsmobile, Buick and Cadillac models, which dominated the American market and made GM the largest company in the free world. In the Digital Age, software programs become platforms only after they achieve critical mass via mass adoption of the technology or service. Unlike product-based platform that often takes decades to achieve mass adoption, network platforms take years to gain critical mass. In 2016, network platform companies dominate the world's top ten most valuable corporations by market capitalization. Apple, Alphabet and Microsoft occupy the top three positions. Amazon and Facebook rank fifth and six. GM is now number nine.

More importantly than their financial omnipotence, platform companies are the helm of social and legislative activism. Young, educated Muslims exploit social platforms to overthrow established regimes in the so-called Arab Spring that continues to devastate vast swatches of the Middle East. Politicians engage social platforms to titillate millions—according to Donald Trump, he has 25 million daily Facebook and Twitter followers.

Platform companies leverage their own networks to lobby and mobilize their billions of users in a myriad of progressive social causes including diversity, human rights, climate change, environmental sustainability, public safety, government access and privacy issues. Microsoft's 200-page manifesto, entitled "A Cloud for Global Good", reads like a draft for a global Magna Carta, replete with six dozen public policy recommendations on globalization.[146] Given current trends, platform companies are on the path of transforming governments but becoming ersatz governments themselves. After all, over half the world's population uses Apple, Alphabet and Microsoft products and services daily.

A network platform differs from a product-based platform in that it requires an ecosystem of complementary networked services and digitally-related products. The magic of network platform is directly related to the principle of "network effect", the bandwagon effect that a satisfied consumer has on attracting other consumers. A network platform is dependent on the number of people using the platform as opposed to the value of a single user or owner. The more people who use a digitally networked platform, the more valuable the platform becomes to each user. Increased value creates an ecosystem that facilitates a positive feedback loop encouraging progressively greater and greater numbers of people join the platform.

For a platform to become successful, it must get enough satisfied users to create a critical mass. Once a critical mass is established it quickly entices new users to join, lures users of other platforms to defect, and creates barriers of entry to smaller and startup platforms. Achieving critical mass largely depends on accessibility (how easy customers can connect and share information), allurement

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[146] Microsoft, A Cloud for Global Good, https://news.microsoft.com/cloudforgood/

(how well customers can attract other customers) and value (how satisfied are customers with the service or product).

The network platform economy, or digital platform economy, encompasses NTR-enabled social, business and government activities. The industrial revolution was organized around factories. The information revolution focused on computers. In the NTR, network platforms are king. Google and Baidu started out as a network search platforms. Facebook gained fame as a network social media platform. Amazon, eBay and Alibaba began as networked e-commerce platforms. PayPal and Taobao commenced as networked financial platforms. Airbnb, Uber, Lyft and Didi Chuxing launched as networked shared-economy platforms.

The transformative NTR technologies that gave rise to network platforms include big data, cloud computing, mobile computing, data mining and predictive analysis and artificial intelligence. Network platforms provide infrastructure on which other service-providing and goods-producing platforms are built, connect customers and businesses and co-create value. Global leaders in all industries are now co-creating adaptable, scalable, and network platforms that underpin their future success in the digital economy that is projected to reach $100 trillion by 2025. Digitally-born companies, like Amazon, Google and Alibaba, have jumped out to an early lead, but other companies and copycats are closing the gap. Almost every corporate executive now claim that network platform business models are core their business growth strategy.

A platform (network) business model creates value by facilitating exchanges between two or more interdependent groups, usually consumers and producers. The platform business model differs from the traditional pipe (linear) business model that relies on a company's own resources to deliver a product or service to customers. Pipes create and push products and services to customers, whereas platforms allow customers to co-create and consume tailored products and services.

Retail (pipe model) stores are giving way to e-retailing (platform model). Healthcare is now emphasizing outpatient and telemedicine (platform) services in addition to inpatient (pipe) care. Automotive companies are beginning to realize that ownership (pipe) is likely to be upended by shared mobility (platform) services and are scrambling to reengineer their companies into a blended pipe/platform model by partnering and investing in shared-mobility companies (e.g., Toyota in Uber, GM in Lyft and Volkswagen in Gett).
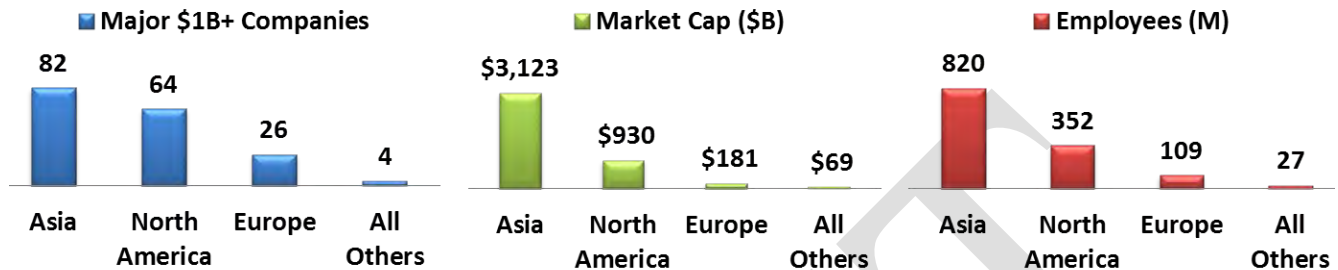
The pipe business model does not only apply to businesses. For example, the U.S. education typically employs pipe business models to push teacher knowledge to students. Newer teaching techniques use platform business models for collaborative education and self-learning where students can pull knowledge according to the own needs and abilities.

According to The Center for Global Enterprise (CGE), in 2016, there are 176 major (over $1 billion annual revenue) platform companies worldwide, each with their own ecosystem or group of interconnected entities. The market valuation of, these 176 companies totals $4.3 trillion. Asia is

home of 82 companies, followed by the United States with 63 companies, Europe with 27 companies and the rest of the world with 5 companies.[147]

Major Network Platform Companies by Region in 2016
Source: The Center for Global Enterprise

Major $1B+ Companies			
82	64	26	4
Asia	North America	Europe	All Others

Market Cap ($B)			
$3,123	$930	$181	$69
Asia	North America	Europe	All Others

Employees (M)			
820	352	109	27
Asia	North America	Europe	All Others

CGE classifies these companies as transaction platforms, innovation platforms, integrated platforms and investment platforms.

- There are 160 transaction platforms (social media platforms, marketplaces, media, music, money, financial technology and gaming) with a total market cap of $1.1 trillion.

- There are 5 innovation platforms (Microsoft, Oracle, Intel, SAP and Salesforce that co-creating products and services with other firms in their platform ecosystems including) with a total market cap of $911 billion.

- There are 6 integrated platforms (Apple, Google, Facebook, Amazon, Alibaba and XiaoMi that provide a technology, product or service that is both a transaction platform and an innovation platform) with a market cap of $2 trillion.

- There are 5 investment platforms (Priceline Group, Softbank, Naspers, IAC Interactive and Rocket Internet that invest in early stage platforms).
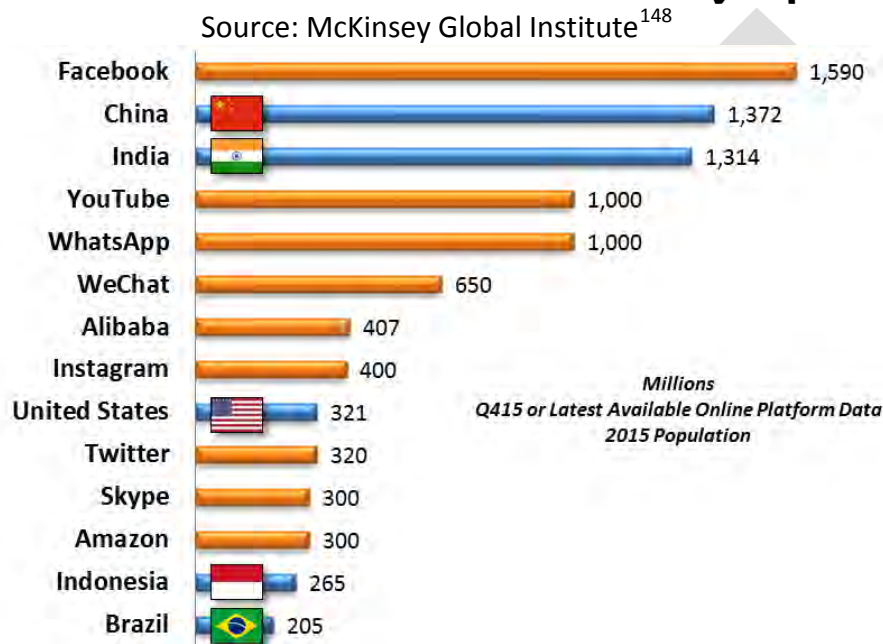
China and the United States dominate the worldwide network platform business with 64 and 63 major companies respectfully.

- While China tends to be dominant in transactional platforms, U.S. integrated (Apple, Google, Microsoft, Amazon, Facebook and a dozen others) and innovation (Microsoft, Oracle, Intel and Salesforce) platforms are currently much larger and have a greater global reach.

- U.S. platforms are foundational in terms of innovation and investment. An innovation platform is a technology, product or service that serves as a foundation on top of which other firms develop complementary technologies, products or services. To a large extent, China's platform companies have been built on U.S. foundational platforms. However, China's platform companies are becoming more integrated and innovative at a breathtaking rate within a government-backed strategic framework that is being implemented across China.

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[147] The Center for Global Enterprise, The Rise of the Platform Enterprise: A Global Survey, January 2016, http://thecge.net/wp-content/uploads/2016/01/PDF-WEB-Platform-Survey_01_12.pdf

- China's platform companies include major integrated platform conglomerates (Alibaba, Tencent, Baidu and XiaoMi) and scores of smaller transactional companies (e-tailing, e-commerce, entertainment, etc.).

- American transaction platforms (Netflix, LinkedIn, Yahoo and eBay) tend to be smaller than their Chinese rivals and are under intense competition in foreign countries that support anti-Western polices and trade practices.

Active Users of Online Platforms versus Country Population
Source: McKinsey Global Institute[148]

Platform/Country	Millions
Facebook	1,590
China	1,372
India	1,314
YouTube	1,000
WhatsApp	1,000
WeChat	650
Alibaba	407
Instagram	400
United States	321
Twitter	320
Skype	300
Amazon	300
Indonesia	265
Brazil	205

Millions
Q415 or Latest Available Online Platform Data
2015 Population

The biggest online platforms have user bases on par with the populations of the world's biggest countries. Due to their global reach and access to 3.4 billion internet users, major platform companies are now more powerful and formidable than the biggest industrial and manufacturing conglomerates.

According to Accenture's 2016 Technology Vision, "The Platform Economy is considered one of the biggest transformations for business since the Industrial Revolution. It's a bold claim, but the speed and scale with which today's platform businesses have developed really only hint at the profound economic shifts that lie ahead. For most businesses—whether they are "born-digital" or have an industrial heritage stretching back over many decades—the opportunities for new growth and development are unprecedented." Digital-borne organizations (DBOs) like Amazon, Google and Alibabi's success is based on their technology platforms that supports its core business but also the business models that enable digital partners and communities that support them. "81% of executives say platform-based business models will be core to their growth strategy within three years."[149]

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[148] McKinsey Global Institute, Digital Globalization: The New Era Of Global Flows, March 2016, http://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows
[149] Accenture, Accenture Technology Vision 2016, https://www.accenture.com/t20160314T114936__w__/us-en/_acnmedia/Accenture/Omobono/TechnologyVision/pdf/IT-Tech-Trends-Technology-Vision-Exec-Summary-2016.pdf#zoom=50

From a Jobenomics perspective, the ultimate success of the Platform Economy rests more on the vitality and sustainability of ecosystem that the platform companies create as opposed to the success of the platform corporations. The Platform Economy today is tending towards an oligarchical-driven ecosystem as opposed to a value-added democratic-driven ecosystem. In many ways this is to be expected in the early stages of the emerging Digital Economy. However, once rationalized and stable, the Digital Economy will best serve humankind if it more open than authoritarian. Ultimate success hinges on understanding people's needs and behaviors and providing tailored services and products.

America is blessed to be the home of network and information technology giants like Apple, HP, Facebook, Google, CISCO, Amazon, Microsoft, eBay and dozens of other NTR companies. While U.S. NTR giants are making great technical advancements in communication, media and entertainment, foreign countries in Asia and Europe are using U.S. technology to develop their labor forces and economies to a much greater degree than in the United States.

http://searchcio.techtarget.com/news/4500250534/The-platform-business-model-An-introduction

http://www.economist.com/news/special-report/21707048-small-group-giant-companiessome-old-some-neware-once-again-dominating-global

Gig/Contingent Workforce Economy

The Gig/Contingent Workforce Economy is defined as an environment in which temporary positions are common and organizations contract with independent workers for short-term engagements. The trend toward a gig/contingent workforce economy is well underway. America's labor force is in a state of transition from a standard full-time work force to a contingent workforce that consists of part-time, temporary, contract labor, independent contractors, consultants and free-lancers.

The Gig/Contingent Workforce Economy is the inverse of the Platform Economy. The rapid ascension of giant U.S. network platform companies is decimating the standard American labor force. For instance, Facebook's market value is roughly equal to the combined value of General Motors and Exxon Mobile but employees 22-times less full-time employees. On the other hand, Facebook, as well as the other platform giants, claim that they facilitate the creation of millions of part-time and independent workers that are part of the Gig/Contingent Workforce Economy.

Whether this trend is right or wrong is not the issue. The brilliant innovative and creatively destructive NTR is not only upending societies, economies, industries and businesses but their workforces as well. The primary issue for American policy-makers and decision-makers is how to make the growing cadre of people in Gig/Contingent Workforce Economy as prosperous and self-sufficient as possible.

Most people incorrectly assume that the word "gig" is extrapolated from digital terms like gigabyte. The appropriate definition of gig is a job of short-term duration that was coined during the Great Recession. In the 1930s, a "gig" was a term largely used by musicians for a part-time job, a single engagement of short or uncertain duration. Today, due to uncertain economic conditions and the influence of the network technology revolution, about half of all Americans make their living working gigs rather than a full-time job.

U.S. Gig/Contingent Work Force Size and Disposition in 2016

149,703, 000 Americans (16 Years and Older)
Source: GAO, BLS, NORC, Jobenomics

Contingent Workforce: 40%

Part-Time Workers: <35 hours/week — 16%

Self-Employed Workers: 3%

Independent Contractors: 13%

Core Contingent Workers: *Agency & Direct Hire Temps, On-Call and Day Laborers, Contract Company Workers* — 8%

Full-Time Standard Workforce: 60%

Out of approximately 150 million (nonfarm and farm) employed American workers in 2016, 60 million people are in the contingent workforce (part-time, self-employed, contracted workers, temps and day laborers). According to a recently released Harvard study, from February 2005 to November 2015, almost all employment growth (9.7 million) in the U.S. labor force occurred in the contingent workforce (9.4 million) as opposed to the standard labor force.[150]

To understand size of the U.S. labor force and its contingent workforce component, one must have a basic knowledge on how data is collected by the government. The two primary sources of data are from joint Census Bureau/BLS household surveys and BLS industry surveys. The "Household" survey collects data via the Current Population Survey (CPS) and the "Establishment" payroll survey via the Current Employment Survey (CES).[151]

The two primary sources of data are from joint Census Bureau/BLS household surveys and BLS industry surveys. The "Household" survey collects data via the Current Population Survey (CPS) and the "Establishment" payroll survey via the Current Employment Survey (CES).[152]

- CPS Household data is collected monthly from a sample from over 60,000 American households and includes comprehensive data on the labor force, the employed, and the unemployed classified by such characteristics as age, sex, race, family relationship, marital status, occupation and industry attachment. The CPS also provides data on the characteristics and past work experience of those not in the labor force. The CPS includes all workers, nonfarm and farm, and estimates current employment at 150 million.

- CES Establishment data is collected monthly from a sample of approximately 143,000 businesses and government agencies representing approximately 588,000 worksites throughout the United States. The primary statistics derived from the CES survey are monthly estimates of employment, hours, and earnings for the nation, states, and major metropolitan areas. CES produces estimates on the number of employees on nonfarm payrolls, average hourly earnings, average weekly earnings, and average weekly hours.[153] The CES includes only nonfarm workers and estimates current employment at 144 million.

CPS and CES data are reported in the BLS monthly Employment Situational Report and various BLS Supplements to the Current Population Survey. The monthly BLS Employment Situational Report is a widely read government report used for policy-making in the United States. BLS Supplements are also important since they provide a significant level of detail for public and private analyses. It is important to recognize that these BLS reports and supplements are focused mainly on standard workers who are employed by nonfarm, industry-centric and employer-providing firms. Agricultural (farms and ranches) and nonstandard (contingent) worker data is sparse and episodic due to historical precedent and budgetary constraints.

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[150] Harvard University and NBER, The Rise and Nature of Alternative Work Arrangements in the United States, 1995-2015, Lawrence F. Katz and Alan B. Krueger, 29 March 2016, page 7-8, https://krueger.princeton.edu/sites/default/files/akrueger/files/katz_krueger_cws_-_march_29_20165.pdf
[151] U.S. Bureau of Labor Statistics, Household vs. Establishment Series, http://www.bls.gov/lau/lauhvse.htm#hvse
[152] U.S. Bureau of Labor Statistics, Household vs. Establishment Series, http://www.bls.gov/lau/lauhvse.htm#hvse
[153] BLS, CES Survey Frequently Asked Questions, http://www.bls.gov/web/empsit/cesfaq.htm

The CPS is also used to collect data for a variety of other studies. Supplements cover a wide variety of topics depending on the needs of the supplement's government sponsor, including a BLS sponsored Contingent Workforce Supplement (CWS).[154] A total of five CWSs were conducted by the BLS in 1995, 1997, 1999, 2001 and 2005. Since the 2005 CWS, the BLS has repeatedly requested that the CWS be reinstated but until recently has not been unsuccessful in doing so.[155] After a 10-year hiatus, the BLS will now resume the CWS. In the FY2016 Budget, out of a total BLS budget of $637.4 million, the BLS was granted $1.6 million and 3 full-time equivalent personnel to conduct a CWS every two years.[156]

Even though the CWS budget is only ¼ of 1% of the overall BLS budget, Jobenomics contends that resumption of the CWS will be a vitally important first step to laying a framework in understanding the contingent workforce's size, character and impact on the U.S. labor force and economy. However, Jobenomics is concerned that the BLS has historically been constrained by key worker protection laws that focus surveys on employees of standard companies as opposed to non-core contingent workers who are not classified as employees. Without a complete analysis of the entire contingent workforce spectrum (core and non-core, standard and nonstandard, or contingent and alternative work arrangements), it will be impossible for policy-makers to assess the degree of influence that the contingent workforce is having on the labor force.

The following chart was derived from the 2015 Government Accountability Office (GAO) report, entitled the "Contingent Workforce: Size, Characteristics, Earnings, and Benefits", that compared historical surveys (BLS Contingent Workforce Studies, CWS, and the General Social Survey, GSS).[157]

U.S. Contingent Workforce Size Estimates 1998 to 2030

	BLS/GAO 1995 CWS	BLS/GAO 1999 CWS	BLS/GAO 2005 CWS	GSS 2006	GSS 2010		Jobenomics 1 Oct 2016	Jobenomics 2030 Est.
Employed	123,208,000	131,494,000	138,952,000	143,150,000	138,438,000		151,968,000	160,000,000
Contingent	39,549,768	39,448,200	42,519,312	50,531,950	55,790,514		60,787,200	80,000,000
	32.1%	30.0%	30.6%	35.3%	40.3%		40.0%	50.0%

Source: GAO Contingent Workforce Report (GAO-15-168R), Tables 3 & 4, 20 April 2015   *Source: Jobenomics*

Using composite data from multiple sources, the GAO estimates contingent workers to be 30% to 40% of the "Employed" U.S. labor force. As of 1 October 2016, the total number of U.S. employed was 151,968,000 million people.[158] Using the 40% figure, a total of 60 million Americans would be considered contingent workers. By 2030, Jobenomics estimates that 50% of all employed workers in the United States will be contingency workers for a total of 80 million, with the other half being standard full-time workers.

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[154] U.S. Census Bureau, Supplemental Surveys, http://www.census.gov/programs-surveys/cps/about/supplemental-surveys.html and http://www.census.gov/programs-surveys/cps/about.html

[155] U.S. Government Accountability Office, GAO-15-168R, Contingent Workforce: Size, Characteristics, Earning and Benefits, 20 April 2015, Background, page 3, http://www.gao.gov/assets/670/669766.pdf

[156] FY 2016 Congressional Budget Justification Bureau Of Labor Statistics, Labor Force Statistics, CWS, pages BLS-1 and BLS-11, http://www.dol.gov/sites/default/files/documents/general/budget/2016/CBJ-2016-V3-01.pdf

[157] U.S. Government Accountability Office, GAO-15-168R, Contingent Workforce: Size, Characteristics, Earning and Benefits, 20 April 2015, http://www.gao.gov/assets/670/669766.pdf

[158] BLS, Table A-1. Employment status of the civilian population, http://www.bls.gov/news.release/empsit.t01.htm

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To understand the gig/contingent workforce economy, it is necessary to first know how government defines a contingency worker. The BLS defines the contingent workforce as the portion of the labor force that has "nonstandard work arrangements" or those without "permanent jobs with a traditional employer-employee relationship".

The contingent workforce is comprised of two categories: "core" and "non-core" contingent.

- **Core contingency** workers include part-time workers, agency temps, direct-hire temps, on-call workers and laborers and contract company workers. Core contingency workers are often low wage earners that have nonstandard work arrangements out of necessity (involuntary workers) and are often subject to exploitation. Government generally views core contingent workers as a fiscal liability since these workers often receive lower wages compared to "standard workers" and are not entitled to traditional employer-provided retirement and health benefits. Consequently, core contingent workers have rely on government retirement and health benefits and other means-adjusted assistance programs to a much greater degree than the standard workforce. Poor part-time workers are the group most likely to become discouraged, quit looking for work and voluntarily depart the labor force.

- **Non-core contingency** workers include independent contractors, self-employed workers and standard part-time workers who work fewer than 35 hours per week. Non-core contingency workers generally seek nonstandard work agreements as a matter of choice (voluntary workers). Jobenomics views the non-core workforce as a positive and growing economic force. Most next-generation workforce entrants (Generation Z's digital natives) are not seeking traditional employer-employee relationships and prefer self-employment in the so-called "digital" economy. Today, the U.S. economy is approximately 95% traditional and 5% digital. However, the digital economy is growing at 20% per year and is likely to generate a significant expansion of non-core contingency workforce. By mid-century, the U.S. digital economy is projected to be the same size as the traditional economy.

Core & Non-Core Contingent Worker Estimates 1998 to 2030

	BLS/GAO 1995 CWS	BLS/GAO 1999 CWS	BLS/GAO 2005 CWS	GSS 2006	GSS 2010	Jobenomics 1 Oct 2016	Jobenomics 2030 Est.
	Agency & direct-hire temps, On-call workers & day laborers, Contract company workers						
Core	7,269,272	7,495,158	7,781,312	10,163,650	10,936,602	12,157,440	19,200,000
	5.9%	5.7%	5.6%	7.1%	7.9%	8.0%	12.0%
	Independent contractors, Self-employed workers, Standard part-time workers						
Non-Core	32,280,496	31,953,042	34,738,000	40,368,300	44,853,912	48,629,760	60,800,000
	26.2%	24.3%	25.0%	28.2%	32.4%	32.0%	38.0%

Source: GAO Contingent Workforce Report (GAO-15-168R), Tables 3 & 4, 20 April 2015   *Source: Jobenomics*

Using composite data from studies conducted from 1995 to 2010, the GAO Contingent Workforce report estimates core contingent workers to constitute 5.7% to 7.9% of the employed portion of the Civilian Labor force, which equates to between 7.3 million to 11.0 million workers. The percentage of non-core contingent workers ranges between and 24.3% to 32.4% of the employed portion of the Civilian Labor force, which equates to between 32.3 million to 44.9 million workers. Jobenomics 2016 estimate is 8.0% or 12.2 million core and 32% non-core or 48.6 million workers.

Jobenomics 2016 estimate of 40% for core and non-core contingency workers is roughly equivalent to the GAO's high water mark of 40.4% of the U.S. labor force in 2010[159] and Bloomberg's contingency workforce estimate of 40% for 2020.[160] Jobenomics 2016 estimate is to similar estimates from other developed economies. For example, in Japan, contingent workers (non-regular workers) accounted for up to 50% of younger Japanese workers and 40% of the total Japanese labor force in 2014, up from 10% in 1990.[161]

The Jobenomics 2030 estimate is 40% for core and non-core contingency workers: 12.0% or 19.2 million core and 32% non-core or 60.8 million workers.[162]

Jobenomics forecasts that the contingent workforce will be the dominant (50%) form of labor in the United States based on seven factors: (1) increasing labor force losses versus labor force gains, (2) adverse corporate hiring and employment practices, (3) revolution in energy and network technologies, (4) automation of manual and cognitive jobs, (5) impact of the emerging digital economy, (6) shift from full-time, to part-time and task-oriented labor, and (7) cultural differences of new labor force entrants.[163]

Contingent Workforce by Type Worker
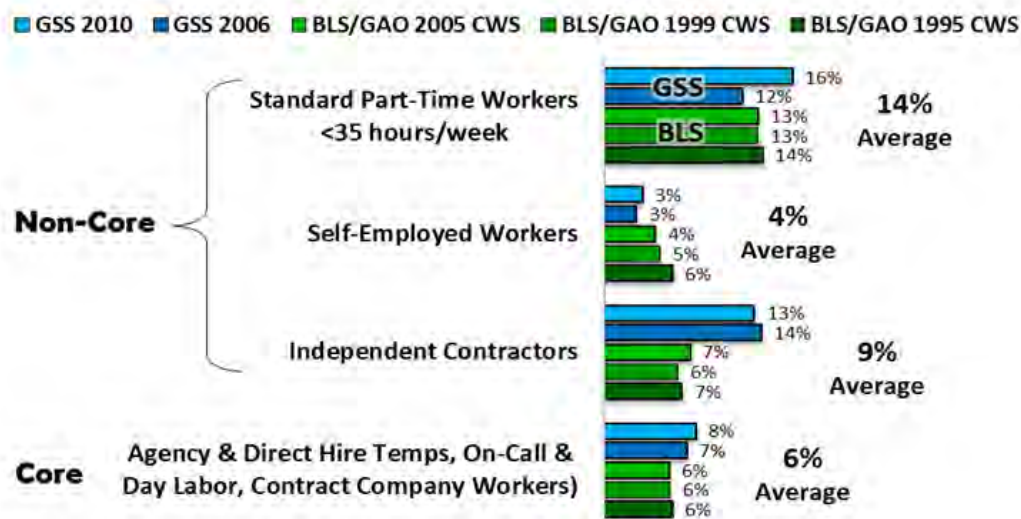
The recent growth in 1099 workers (IRS Form 1099-MISC used by independent contractors, aka contingent workers) suggests a massive transition from full-time to contingent work this decade. In 2010, 82 million 1099s were sent to the IRS. By 2014, the number grew to 91 million for a total of 9 million for the four-year period or roughly 22 million if extrapolated for the entire decade. It should be noted that 1099s are only filed for wages over $600.

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[159] U.S. Government Accountability Office, Contingent Workforce: Size, Characteristics, Earnings, and Benefits, 20 April 2015, http://www.gao.gov/products/GAO-15-168R

[160] Bloomberg Businessweek, 20-25 October 2014 Edition, Companies/Industries, Page 20

[161] Asia-Pacific Journal, Scott North, "Limited Regular Employment and the Reform of Japan's Division of Labor", The Asia-Pacific Journal, Vol. 12, Issue 15, No. 1, April 14, 2014, http://www.japanfocus.org/-Scott-North/4106/article.html

[162] Asia-Pacific Journal, Scott North, "Limited Regular Employment and the Reform of Japan's Division of Labor", The Asia-Pacific Journal, Vol. 12, Issue 15, No. 1, April 14, 2014, http://www.japanfocus.org/-Scott-North/4106/article.html

[163] See Jobenomics Employment Report for a detailed explanation of these seven factors, Pages 40 to63, http://jobenomicsblog.com/wp-content/uploads/2016/08/Jobenomics-U.S.-Employment-Analysis-Q2-2016-31-July-2016.pdf

Within the contingent workforce, standard part-time workers are the largest group, at 14%, of all employed workers, followed by independent contractors at 9%, self-employed workers at 4% and core group workers at 6%. It appears that only the incorporated self-employed number were included (5.8 million today), not including the unincorporated self-employed (9.4 million today), which is consistent with the Jobenomics premise that government surveys are focused on incorporated businesses in existing nonfarm industries. It is also important to note that the number of incorporated self-employed businesses has grown by 35% since year 2000, giving credence to the notion that non-core contingent businesses are an important faction of the U.S. labor force and overall economy—a faction that is neither well reported nor understood.

REDO. The U.S. Department of Commerce is struggling to define the contingent workforce. In June 2016, the Office of the Chief Economist of the U.S. Department of Commerce released a report on independent service providers (contingent workforce) that is narrowly focused on "digital matching firms" with emphasis on the shared economy. [164]

The rise of the contingent workforce is not unique to the United States. For example in Japan, contingent workers (called non-regular workers) accounted for up to 50% of younger Japanese workers and 40% of the total Japanese labor force in 2014, up from 10% in 1990.[165] According to the Japan Institute for Labour Policy and Training (JILPT) [166], the category of "non-regular employee" refers to any worker who is not a permanent full-time worker. Japanese non-regular workers consist of part-time workers (22.9%), contract workers (3.5%), dispatched workers (employees dispatched from employment agencies, 3.0%), entrusted workers (employed for the purpose of reemploying retired employees for a certain period of time, 2.4%), transferred employees (employees temporarily transferred from other companies under a secondment agreement, 1.5%), temporary employees (0.7%) and all other non-regular workers (4.7%). It is likely that the non-regular workforce will continue to grow.

Under Prime Minister Shinzo Abe, the Japanese government is currently pursuing a three-prong strategy (regular, limited regular and non-regular) to meet labor force where competition for regular jobs is intense and keeping a regular job is equally intense. Many Japanese are no longer willing to que up for such ordeals. 80% of Japanese non-regular workers claim that they are no longer wish to pursue regular, full-time, or traditional "lifetime" employment opportunities and would prefer to remain as part-time "salarymen". Like American youth, young Japanese are skeptical of traditional career paths and have much modern views regarding the nature of work and play than older generations.

The demise of the long-standing lifetime employment model in Japan has been a boon for Dip Corporation, "the largest (website) portal site in Japan linking people with the jobs they want". Of

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[164]U.S. Department of Commerce, Office of the Chief Economist, Digital Matching Firms: A New Definition in the "Sharing Economy" Space, June 2016, http://www.esa.gov/sites/default/files/digital-matching-firms-new-definition-sharing-economy-space.pdf

[165] Asia-Pacific Journal, Scott North, "Limited Regular Employment and the Reform of Japan's Division of Labor", The Asia-Pacific Journal, Vol. 12, Issue 15, No. 1, April 14, 2014, http://www.japanfocus.org/-Scott-North/4106/article.html

[166] Japan Institute for Labour Policy and Training (JILPT), Labor Situation in Japan and Its Analysis: Detailed Exposition 2014/2015, Trends in Non-regular Employment in Japan and Analysis of Several Related Themes, http://www.jil.go.jp/english/lsj/detailed/2014-2015/chapter1.pdf

the nearly 2,000 firms in the Tokyo Stock Price Index (TOPIX), Dip is far and away the biggest gainer with a 4,955% gain since the elections that brought Prime Minister Abe to office. It's risen almost five times more than the second-best TOPIX performer, due to the high demand of Japanese companies looking for skilled youthful workers to fill gaps created by an aging workforce. Dip has websites that target youthful part-time workers, temporary workers, specialty non-regular workers such as nurses and a total jobs portal. [167] [168]

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[167] Dip Corporation, http://www.dip-net.co.jp/english/, and Bloomberg Business, Death of Jobs for Life Fuels 4,955% Surge at This Japan Firm, 6 September 2015, http://www.bloomberg.com/news/articles/2015-09-06/death-of-jobs-for-life-fuels-4-955-surge-at-this-japanese-firm

[168] Dip websites: part-time workers (www.baitoru.com), temporary workers (www.hatarako.net), specialty non-regular workers such as nurses (www.iryo-de-hatarako.net) and a total jobs portal (www.dipjobs.com)

Data-Driven Economy

A Data-Driven Economy involves storage, search, capture, query, transfer, sharing, visualization and analysis of zettabytes of Big Data. To compete in the digital world characterized by clouds of containing zettabytes of data, enterprises must be able access pertinent data and wring as much information, knowledge and wisdom as possible using NTR tools to drive high-value business and societal outcomes. In the Data-Driven Economy, enterprises will succeed or fail based on how well they leverage data to: improve operational efficiencies; make better decisions, customize products and services to customer and client needs, automate business processes, increase productivity, manage risk, provide security, protect privacy and intellectual capital, and form collaborative and innovative partnerships. In the Data-Driven Economy, industries, governments, nations, regions and international coalitions will operate and function (either collectively or independently) via the intelligent use and sharing of data to optimize entire operational and sociological environments.

Unlike the physical universe, the digital universe is created and defined by manmade software. For people that use the internet, the digital world is most often expressed in bits (short for binary digit, the smallest unit of data with a single binary value of 0 or 1), bytes (a unit of digital information that most commonly consists of eight bits), in kilobits or kilobytes (one thousand bits or bytes, 10^3), megabits or megabytes (10^6) and gigabits or gigabytes (10^9). For IT professionals, the digital world is represented by terabytes (10^{12}) and petabytes (10^{15}). For enterprises, the digital world is now exabytes (10^{18}) and zettabytes (10^{21}) in size. The digital universe breached the 1 zettabyte threshold in 2010—the amount of data equivalent to 36 million years of high definition TV video. According to an EMC Digital Universe study, the digital universe will contain 44 zettabytes by 2020. In 2020, emerging economies will generate 60% of digital data, reversing the historical data dominance of mature economics. Much of the future data grow will be generated by machines (embedded systems) rather than by man. Data from embedded systems will account for 10% of the digital universe by 2020 and will likely exponentially increase thereafter. Fortunately, much of this data is transient and not worth saving since the available storage capacity is likely to be able to store less than 15% of the data. [169] [170]

So what does the zetta-flood of high-value data mean to the digital future? Managing and securing gargantuan levels of high-value, target-rich data will be increasingly frustrating due to the complexities and costs of maintaining internal information technology environments. By 2020, the number of data files is projected to grow as much as 75 times, compared to 1.5 times growth of the available pool of IT professionals. As a result, organizations are looking to the promises of cloud computing and its providers. Outsourcing of data to massive, centralized data centers seems to be the answer in a world where more things are connected to the internet than people. Cisco predicts the number of internet-connected things will reach 50 billion by 2020, which equates to more than six devices for every person on earth. Other analysts are more conservative about the number of connected things. IDC forecasts 19 billion, not including computing devices, and IHS estimates the total at 18 billion. Nevertheless, the number of increasingly smarter connected things is likely to

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[169] Cisco, The Dawn of the Zettabyte Era, http://blogs.cisco.com/news/the-dawn-of-the-zettabyte-era-infographic
[170] EMC with Research & Analysis by IDC, The Digital Universe of Opportunities, April 2014,
http://www.emc.com/collateral/analyst-reports/idc-digital-universe-2014.pdf?cmp=pt-du-infob-q2-2014

exceed the number of humans who are becoming more dependent on sub-human level machines and artificially intelligent agents.

Like much of the rest of the world, the United States is a data-driven nation whose future success is directly dependent on the Data-Driven Economy. If there is any doubt about the voracity of this statement, one only has to examine the amount of time American adults spend data-driven media and the amount of money dedicated to media advertising that fuels the Data-Driven Economy.

Average Time Spent Per U.S. Adult (18+) Per Day on Data-Driven Devices
Source: The Nielsen Total Audience Report Q2 2016
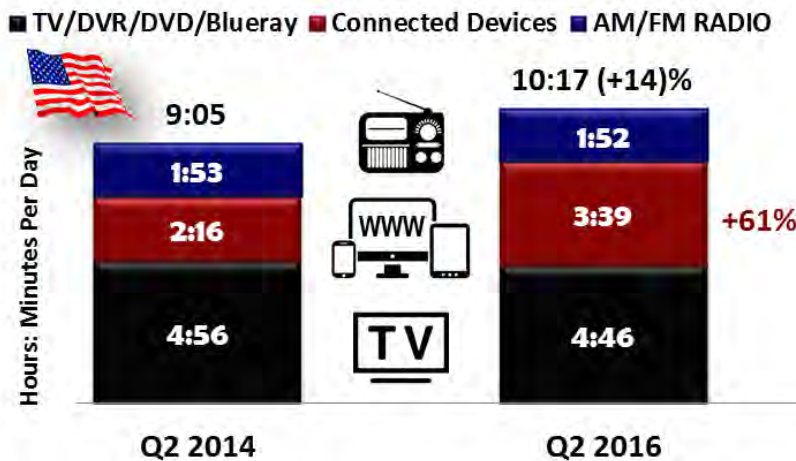
According Nielson, the world's leading authority on what people listen to and watch, the average American adult spends over 10 hours per day watching live or recorded television, online via personal computers and mobile devices, or listening to AM/FM radio. In Q2 2016, American adults, over the age of 18, consumed 10 hours and 17 minutes of data-driven content. In Q2 2014, time spent was 9 hours and 5 minutes, an increase of 14% in two years. The increase was almost entirely due to time on connected devices (PCs, laptops, smartphones, tablets and gaming consoles), with a little more than an hour of increased time attributed to mobile devices. Older Americans spent the major of their time viewing TV while younger American entertained themselves more on mobile devices and game consoles. For example, Americans over age 65 spent 3-times more time on TV that Americans aged 18-24, but Americans aged 18-24 spent 6 times more time on mobile devices.

If advertising spending is any indication of future trends, digital connect device advertising is forecast to increase significantly over TV-related spending. According to July 2016 data from Magna Global, a New York media research firm with offices in 20 countries, US digital and TV ad spending are now equal. By 2020, digital media ad spending is anticipated to 50% while TV's portion is projected to fall to 33%.[171] However, with ad blocking software and new browsers like Brave, digital advertising may not be as robust as forecast. The new Brave browser not only blocks ads and improves download efficiencies (due to ad blocking and tracking), but is equipped with a new revenue-sharing scheme to provide a way for users and publishers to get paid for content without having to go through

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[171] eMarketer, TV and Digital Are in a Dead Heat for US Media Dollars , 4 October 2016, https://www.emarketer.com/Article/TV-Digital-Dead-Heat-US-Media-Dollars/1014552#sthash.ySSyiIz5.dpuf

advertising agencies or platform companies.[172]   Notwithstanding the future of digital media and TV advertising, global internet traffic is forecast to triple in the next five years.

Gartner (a leading IT research and advisory company) forecasts that worldwide IT spending (data center systems, software, devices, IT services and communications services) will be approximately $18 trillion over the next five years. [173]

Global IT Spending In the Next Five Years
Source: Gartner Market Databook, 3Q16 Update, July 2016

($ Billions)	2015 Actual	2016 Estimated	2017 Estimated	2018 Estimated	2019 Estimated	2020 Estimated	% Total 2016-20	Total 2016-20	CAGR 2015-20
Data Center Systems	171	173	177	179	181	184	894	5.0%	1.43%
Software	310	333	357	382	408	438	1,918	10.7%	6.87%
Devices	649	597	600	603	606	605	3,011	16.8%	-1.29%
IT Services	897	900	943	986	1,034	1,086	4,949	27.6%	4.63%
Communication Services	1,541	1,384	1,410	1,429	1,444	1,464	7,131	39.8%	0.92%
($ Trillions)	$3.6	$3.4	$3.5	$3.6	$3.7	$3.8	$17.9	100%	2.98%

Contrary to popular opinion, the global device market (16.8% of global IT spending) is not the dominant factor of IT spending, nor is projected to increase over the next five years with a combined average growth rate of -1.29%. The fastest growing sector is Software (6.87%), followed by IT Services (4.63%). Across all five IT spending categories, the combined average growth rate is 2.98%, which is not great in today's sclerotic global economy compared to previous high-growth years. However, a 3% global growth rate is relatively positive compared to declining industries and struggling economies. Moreover, Gartner's IT spending calculations do not include the entire range of NTR technologies, systems, processes and services as defined in this report.

Gartner breaks down the worldwide market into three segments: emerging (e.g., China), emerged (e.g., New Zealand) and mature (e.g., the United States). Emerging and emerged markets spend heavily on devices (mainly mobile phones) and telecom services (mainly mobile voice and data services). Mature markets also spend heavily on devices and telecom services, but, compared to the emerging and emerged markets, are overwhelmingly investing on data center systems (servers, storage, and network equipment), software (enterprise and infrastructure), and IT services (business and IT product support). Consequently, the United States is likely to dominate the NTR in the near-future vis-à-vis their investment in core technology and systems (networks, data centers, cloud computing, machine learning, software, services, etc.) whereas most of the rest of the world is spending on NTR devices and subscription services. [174]

Today, information technology market spending was 70% services-related and 30% goods-related (devices, data centers and software).   Jobenomics believes that services-providing industries will

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[172] Brave, https://brave.com/
[173] Gartner Worldwide IT Spending Forecast, 3Q16 Update, July 2016, http://public.brighttalk.com/resource/core/122929/october_18_itspending_3q16jlovelock_207393.pdf
[174] Gartner Worldwide IT Spending Forecast, 3Q15 Update, https://www.gartner.com/doc/3142129, Gartner Worldwide IT Spending Forecast 2014, http://www.gartner.com/technology/research/it-spending-forecast/

become even more dominant as the NTR matures. Jobenomics also forecasts that subscription-based services will be preferable to consumers than sales of individual products and traditional usage fees.

Consumers will be attracted to the NTR providers with the best brand at the lowest cost. For individual consumers, networks will largely consist of integrated personal devices (from smart phones, to PDAs, to entertainment devices) connected to highly reliable content providers. For government and corporate consumers, net architectures will consist of a complex combination of public, private and hybrid enterprise-wide networks and clouds.

Today's service providers are categorized as software, platform or infrastructure as a service (SaaS, PaaS, IaaS, respectively) providers. SaaS—Software as a Service—deliver applications like email, office productivity, customer relationship management and marketing analytics via the cloud. IaaS—Infrastructure as a Service—enables enterprises to outsource internal IT operations (servers, storage, and software), management, security and maintenance to the cloud provider. PaaS—Platform as a Service—provides a complete operating system environment in the cloud where customers can collaboratively develop and deploy scalable software, applications and services. Tomorrow's NTR-service provider of choice will be the provider that unifies all three categories, is able to strategically position and rapidly reposition their clients in a dynamic digital ecosystem, and offers the most integrated, secure, low-cost, and digitally portable subscription service.

The NTR will present huge revenue opportunities for collaborating NTR institutions. Joint ventures, mergers and acquisition will be the norm as the NTR marketplace rationalizes itself into winners and losers. Dominant NTR companies will have an initial advantage, but the field of exciting new NTR providers and vendors is growing exponentially. NTR competition will be fierce between content providers, equipment manufacturers, software providers, social-networking giants, service providers, niche and emerging players.

Competition for new markets has just begun. Relatively unknown new network-centric companies are likely to displace today's information service providers in the same way the information service providers replaced telecommunications companies that dominated the information marketplace twenty years ago. In the last 18 months, over a dozen niche players have gone public, fetching tens of billions of dollars' worth of investment capital. If subscription services become the norm as forecast, content providers may emerge as dominant players in the NTR, especially considering the fact that video traffic (TV, video on demand, etc.) constitutes the majority of all consumer Internet traffic.

The Data-Driven Economy is not constrained by traditional borders nor measured by traditional import/export metrics. Data is difficult to quantify in dollars but is nonetheless of significant value. Data-driven economies and enterprises can create global markets and user groups across borders. Small business and emerging markets are growing at exponential rates.

According to the McKinsey Global Institute study, while flows of goods and finance have lost momentum, used cross-border bandwidth has grown 45-times larger from 2005 to 2016, and is projected to grow by another nine times in the next five years as digital flows of commerce, information, searches, video, communication, and intracompany traffic continue to surge. Globally,
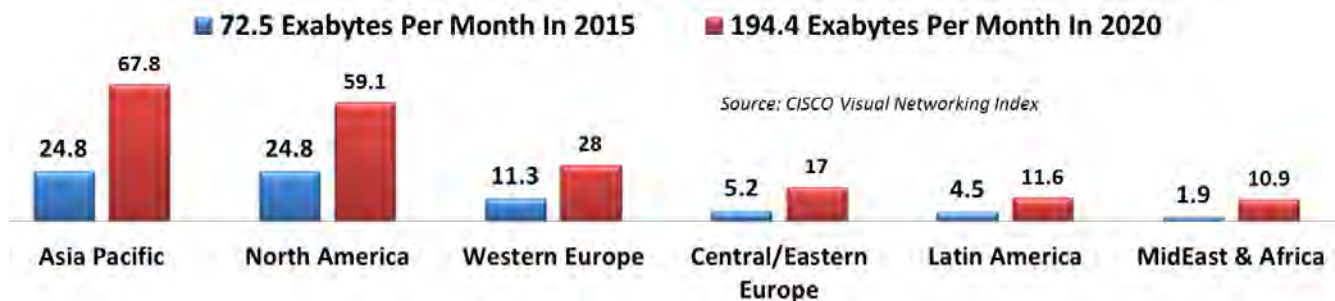
the Big Data industry alone has grown from $7.6 billion in 2011 to $27.3 billion in 2016 and is projected to be over $90 billion by 2026.

Excerpts from the McKinsey study relative to the data-driven economy include some startling statistics. (1) Over a decade, global flows have increased world GDP by at least 10%; this value totaled $7.8 trillion in 2014 alone. Data flows now account for a larger share of this impact than global trade in goods. (2) For the first time in history, emerging economies are counterparts on more than half of global trade flows. Individuals are participating in globalization directly, using digital platforms to learn, find work, showcase their talent, and build personal networks. (3) Some 900 million people have international connections on social media, and 360 million take part in cross-border e-commerce. (4) Although more nations are participating, global flows remain concentrated among a small set of leading countries. The gaps between the leaders and the rest of the world are closing very slowly, but catch-up growth represents a major opportunity for lagging countries. Some economies could grow by 50% or more over the long term by accelerating participation. [175]

International competition cannot be understated. U.S. dominance in the NTR marketplace could be upended as well-financed, foreign innovative solutions enter the competition for IP traffic (Internet Protocol where data is sent from one IP address to another).

Global Internet Is Forecast To Triple In the Next Five Years
Source: Cisco Visual Networking Index

Global internet (IP) traffic is projected to triple over the next five years, rising from 72.5 exabytes per month in 2015 to 194.4 in 2020. Asia Pacific will be the largest consumer and MidEast/Africa will be the fastest growing. Consumers will be responsible for 84% of the internet traffic and business 16%. Internet video will devour 57% of total internet traffic and 83% of consumer traffic. Global mobile data traffic will increase eightfold from 3.6 exabytes per month in 2015 to 30.4 in 2020 [176].

"In the emerging digital economy, rapid change is a constant, as knowledge work matures into digital work, and decisions are driven by data and made in real time," according to Oxford Economics, commercial venture with Oxford University's business college to provide economic forecasting. However, 84% of the 4,000 companies surveyed by Oxford Economics and SAP fall short of being qualified as "digital winners" in a data-driven economy. To become an Oxford digital winner, an

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[175] McKinsey Global Institute, Digital Globalization: The New Era Of Global Flows, March 2016, http://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows
[176] CISCO, Cisco Visual Networking Index: Forecast and Methodology, 2015–2020, Table 1, http://www.cisco.com/c/dam/en/us/solutions/collateral/service-provider/visual-networking-index-vni/complete-white-paper-c11-481360.pdf

organization needs to focus on the skills of their executives and the culture they create by embracing digital technologies, streamlining decision making, flattening organizational structures and building a digital workforce. To embrace digital technologies, organizations must execute a digital vision and embed technology (NTR technologies, systems, processes and services) in all aspects of the business. To streamline decision making, organizations must make real-time data-driving decisions and distribute decision-making across all aspects of the business. In flattening organizational structures, organizations must reduce bureaucracy and complexity as well as providing the latest technological advances to all employees. To build a digital workforce, organizations must improve digital proficiencies as well as emphasizing transformation readiness and strategic use of technology.[177]

Most Execs Worldwide Make Data-Driven Decisions https://www.emarketer.com/Article/Most-Execs-Worldwide-Make-Data-Driven-Decisions/1014547

Employment where data is central to the job, including occupations where working with data is at least an important part of the job, is 74.3 million jobs, or over half of the workforce. "Private sector industries with the highest concentration of data occupations added 1.8 million jobs over the last decade, representing about 31% of total private job growth which was four times faster than in private industries overall."[178]

Supporting and accelerating from the traditional economy to a data-driven economy is a high priority for many nations. For example, the European Commission recent outlined a new strategy for a Big Data/data-driven economy that will stimulate research and innovation on data while leading to more business opportunities and an increased availability of knowledge and capital, in particular for small and medium-sized enterprises, across Europe. According to the Commission, Big Data technology and services are expected to grow seven-times faster than other ICT (information and communications technology) markets.[179]

A data-driven economy is much more than just a Big Data industry technology and services. A data-driven economy derives its greatest benefit on how data is used to enhance operations in vertical industries, such as healthcare and transportation, and horizontal industries, such as marketing and advertising. However, micro-businesses may be the biggest beneficiaries of the Data-Driven Economy. "Small businesses worldwide are becoming "micro-multinationals" by using digital platforms such as eBay, Amazon, Facebook, and Alibaba to connect with customers and suppliers in other countries. Even the smallest enterprises can be born global: 86% of tech-based startups we surveyed report some type of cross-border activity. The ability of small businesses to reach new markets supports economic growth everywhere." according to McKinsey Global Institute.

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[177] Oxford Economics, Leaders 2020, The next-generation executive: How strong leadership pays off in the digital economy, 31 August 2016, http://www.oxfordeconomics.com/thought-leadership/leaders-2020
[178] U.S. Department of Commerce, The Importance of Data Occupations in the U.S. Economy, 12 March 2015, http://www.esa.doc.gov/sites/default/files/the-importance-of-data-occupations-in-the-us-economy_0.pdf
[179] European Commission, Digital Single Market, Digital Economy & Society, Towards a thriving data-driven economy, https://ec.europa.eu/digital-single-market/en/towards-thriving-data-driven-economy

Data-Driven Marketing & Advertising. The U.S. leads the world in data science applied to the marketplace, and data-driven marketing is a major export industry. The data-driven marketing economy, a subset of the data-driven economy, contributes about 1 million American jobs, and generates over $200 billion in revenue to the U.S. economy, or approximately 20% of all U.S. marketing revenue. Data-driven marketing saw a 49% increase in jobs and 35% growth in the last two year, according the Direct Marketing Association research.[180] The DMA defines data-driven marketing as that portion of digital business used for the express purpose of finding leads, attracting customers, and driving revenue—especially for e-commerce and advertising firms. Physical marketing (salespeople, postal, radio and TV) will be increasingly displaced by advanced algorithms and intelligent agents as the NTR matures.

Data-Driven Advertising. Free Eats

Data-Driven Healthcare. xx

Data-Driven Transportation. xx

Data-Driven Manufacturing. Third Industrial Revolution
As the NTR matures, low-skill jobs will increasingly be at risk due to robotics as well as other forms of automation of both manual and cognitive skillsets. In 2015, McKinsey estimates that advanced robots save up to 20% of equivalent human labor costs in the manufacturing sector.[181] By 2030, up to 47% of all existing American jobs could be automated as predicted by the 2013 and 2015 Oxford studies. smart manufacturing (SM) http://searchbusinessanalytics.techtarget.com/definition/smart-manufacturing-SM?utm_medium=EM&asrc=EM_ERU_55374680&utm_campaign=20160406_ERU%20Transmission%20for%2004/06/2016%20(UserUniverse:%202010939)_myka-reports@techtarget.com&utm_source=ERU&src=5497491

https://www.uschamberfoundation.org/data-driven-economy

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[180] Direct Marketing Association, The Value of Data 2015: Consequences for Insight, Innovation & Efficiency in the U.S. Economy, December 2015, http://thedma.org/wp-content/uploads/Value-of-Data-Summary.pdf
[181] Ibid 36, The Market for Industrial Robots, Page 40

Internet of Everything Economy

http://www.cisco.com/c/en/us/solutions/internet-of-things/overview.html

Data from embedded systems will account for 10% of the digital universe by 2020
http://www.emc.com/leadership/digital-universe/2014iview/internet-of-things.htm

https://iot-analytics.com/5-things-know-about-iot-platform/

Deloitte IoT
http://dupress.deloitte.com/dup-us-en/focus/internet-of-things.html?id=us:2em:3na:dup1446:awa:dup:100516

The Economy of Things   http://www.oxfordeconomics.com/recent-releases/the-economy-of-things
The Internet of Things is poised to turn the physical assets all around us into participants in real-time global digital markets—indexed, searched, and traded as any online commodity.

AI will be a core technology for the Internet of Things (IoT) which we expect to double over the next five years providing growth in (1) data compilation, (2) data analysis and future forecasting and (3) actuations based on the results of analysis. We believe the key driver for advances in data analysis is AI. In the IoT age, more than 50bn devices are expected to be connected to the internet by 2020E. Given the limitations of human beings to rapidly develop hypotheses to assess the large amounts of data produced by these devices, we believe AI, which has the ability to generate hypotheses independently, will offer a viable solution.

https://www.bofaml.com/content/dam/boamlimages/documents/PDFs/robotics_and_ai_condensed_primer.pdf

Today's Internet of Things (IoT) mantra is morphing into an Internet of Everything (IoE) state of mind increasingly binding more and more things to things, things to people and people to people. The IoE will make many of the familiar devices and objects in our lives readily internet-connected, smart phone-accessible and responsive in a world where more things are connected to the internet than people. The IoT includes environmental "things" for monitoring weather, transportation things for traffic and energy usage, appliance things for intelligent electronics, manufacturing and logistics things, advanced health and medical things, as well as thousands of other things that will transform virtually every field of endeavor. Cisco defines the IoT as bringing together people, process, data, and things to make networked connections more relevant and valuable than ever before—turning information into actions that create new capabilities, richer experiences, and unprecedented economic opportunity for nations, businesses and individuals. The number of devices in the Internet of Things is projected to reach 500 billion by 2030, up from 15 billion in 2015, which equates to more than six devices for every person on earth. The IoT is significant because an object that can represent itself digitally becomes something greater than the object by itself. The McKinsey Global Institute forecasts the maximum potential economic value of the IoT at $11.1 trillion per year by 2025.[182]
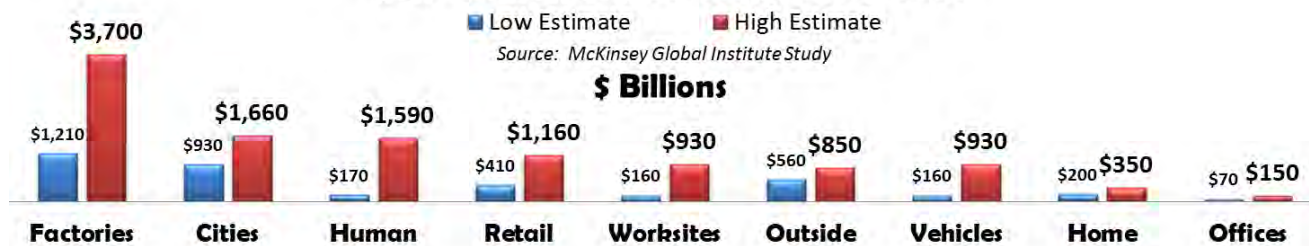
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[182] The McKinsey Global Institute, The Internet Of Things: Mapping The Value Beyond The Hype, June 2015, file:///C:/Users/CHUCK/Downloads/Unlocking_the_potential_of_the_Internet_of_Things_Full_report.pdf

The McKinsey Global Institute forecasts the potential economic value of the IoT as high as $11.1 trillion per year in 2025.[183] Before we explore the economic impact of this amount of IoT revenue, it may be prudent to first comprehend the magnitude of a trillion. A trillion one-dollar bills laid end-to-end would measure 95 million miles long—the distance between the earth and the sun. Eleven trillion one-dollar bills laid end-to-end and side-by-side would create a paper highway two-miles wide that would encircle the entire earth. An annual income of $11 trillion amounts to approximately the value of all American goods and services produced and delivered in 2015. Consequently, $11 trillion equates to a lot of money and huge transformational power. In 2025, $11 trillion will be equivalent to about 11% of the world's economy.

The McKinsey Global Institute (MGI) study defines the IoT "as sensors and actuators connected by networks to computing systems. These systems can monitor or manage the health and actions of connected objects and machines. Connected sensors can also monitor the natural world, people, and animals."

Potential Economic Impact of IoT in 2025: $3.9 Trillion to $11.1 Trillion Per Year

Low Estimate   High Estimate

Source: McKinsey Global Institute Study

$ Billions

Setting	Low Estimate	High Estimate
Factories	$1,210	$3,700
Cities	$930	$1,660
Human	$170	$1,590
Retail	$410	$1,160
Worksites	$160	$930
Outside	$560	$850
Vehicles	$160	$930
Home	$200	$350
Offices	$70	$150

The MGI study examines nine settings shown above where the IoT will have the greatest economic impact. The difference between the high and low estimates includes NTR technology, processes and system maturation as well as overcoming political/social/organizational/regulatory hurdles.   The largest gains ($1.2T to $3.7T) are potentially in "factory settings" that include standardized production environments like manufacturing, agriculture and hospitals. In the factories setting, value from the IoT is from productivity improvements, energy savings, labor efficiency, equipment maintenance, inventory optimization, and worker health and safety savings. The other eight settings achieve similar economic gains.

- **Near-Field Communications** (NFC) is a short-range wireless connectivity standard (SO/IEC 18092) that uses magnetic field induction to enable communication between devices when they're touched together, or brought within a few inches of each other. NFC was originally developed by the U.S. military to prevent friendly-fire incidents. NFC chips are small tiny radio transmitters that stay inactive until they are activated by another NFC-enabled device in order to stream data across short distances. NFCs are already in wide use. For example, remote "keyless entry" NFC systems are used to unlock car doors. This technology has been adapted for use in smartphones, pads and tablets for payment processing. Apple added an NFC chip to its iPhone 6 and 6 Plus smartphones that can be used for its Apple Pay contactless payment system. Samsung is

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[183] The McKinsey Global Institute, The Internet Of Things: Mapping The Value Beyond The Hype, June 2015, file:///C:/Users/CHUCK/Downloads/Unlocking_the_potential_of_the_Internet_of_Things_Full_report.pdf

following suit with its Galaxy S5. NFCs have numerous other applications from pairing devices, to sharing files, launching apps, or even automating complex systems. NFC chips and tags are so small and lightweight that they could eventually be integrated into the Internet-of-Things to get information from advertisements to prescriptions, and from keyless access to public services by merely waving your smartphone to collect the information. **Beacons**, or proximity technology, use small, inexpensive, low-powered devices that enable accurate location finding and communications. Beacons transmit small amounts of data via Bluetooth Low Energy (BLE) up to 50 meters, which is longer than the NFC devices operate best within a very close range. Consequently, beacon are typically used for indoor locations (where GPS usage is limited) via a standalone device or in conjunction with BLE enabled mobile devices. For example, when a customer is in a retail store, the store's beacon communicates with a customer's smartphone to display special offers, products or services. Beacon-enabled apps are also being used in sporting venues to provide information and navigation, in social events to match strangers with common interests, on the job to remind employees of work related tasks, in hotels as replacement for room keys, at airports to provide flight and gate information, in restaurants to enable mobile payments through point of sale systems, and in classrooms to identify and track students. Beacons are embedded in the leading IOS (Apple's IBeacon) and Android (Google's Eddystone) smartphones as well as other nondescript devices like light bulbs. GE's beacon-equipped LED lighting fixtures can track shoppers and cut costs within stores by using embedded iBeacons.

Overall, the IoT will garnish the greatest gains from interoperability improvements as interconnected systems work together more efficiently and intelligently. Better data analytics will also produce significant gains. Today, only a small fraction of available data is analyzed and even a smaller fraction of information is used in decision-making. With the introduction of NTR technologies, like artificial intelligence agents and machine learning, data analytics and decision-making will be improved by orders of magnitude.

Much of the innovation in the IoT is being fueled by young dynamic companies, new workforce entrants (Generation Y and Z), small vendors and startups. A recent Gartner Strategic Planning Assumption posited that, "By 2017, 50% of IoT solutions will originate in startups less than three years old.[184]" Gartner believes that network access to global engineering services and Asian manufacturing supply chains, "almost anyone can create IoT solutions driven by either market need or pure imagination to create new niches and address consumer or business needs." Gartner also predicts that there will be no dominant IoT platform or ecosystem for the next several years, so almost every major IoT player will be aggressively seeking small niche companies that may have innovative IoT applications and solutions.

- Nine   Sectors: file:///C:/Users/CHUCK/Downloads/Unlocking_the_potential_of_the_Internet_of_Things_Full _report.pdf
- Manufacturing.. Manufacturing has continued to adapt — first shifting to low-cost labour, then to tax holiday havens, and now to lowest landed total costs (a mixture of shipping, labour, taxes, real estate, etc.) — all the while embracing technology innovation of which

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[184] Gartner, Focus on Startups and Small Vendors as Drivers for IoT Innovation, 26 June 2015, G00278817, https://www.gartner.com/doc/3083422?ref=unauthreader&srcId=1-3478922254

sensors and connectors have become increasingly important. Sensors are one of the most important parts for modern factory automation systems. Today, McKinsey estimates economic impact of $600 billion to $1.2 trillion per year based on cost savings using robots compared to the cost of an equivalent number of workers.[185] "The number of industrial robots installed globally by 2025 will rise to 25 million, up 15 million from the current level, implying 25% to 30% average annual growth in robot sales, which is considerably higher than the average growth rate over the past two decades."

- Agriculture. http://dupress.com/articles/second-green-revolution-and-internet-of-things/?id=us%3a2em%3a3na%3adup2891%3aawa%3adup%3a021616&elqTrackId=7d243036f4f14227a6d365b4c27ab3f9&elq=64077731720146b8a61eaad873bc14ec&elqaid=15465&elqat=1&elqCampaignId=4730 Micro-farming represents a fair and equitable earnings solution for millions of low-wagers and the ecological solution for the world's burgeoning human population that is expected to reach 10 billion people by 2050. Micro-farming involves profitable and ecologically sustainable harvest of mixed livestock and plant crops on tiny land areas ranging from urban plots up to several acres in size. Integrating new e-business/e-commerce applications with emerging agriculture/aquaculture/ hydroculture technologies will make micro-farming economically feasible for millions of Americans, especially those interested in building integrated and sustainable communities.

http://policy.bcs.org/sites/policy.bcs.org/files/digital%20economy%20Final%20version_0.pdf
Key issues: BCS believes that the key issues affecting the success of the digital economy are:
☐ Cultivating a trusted environment for technology-enabled innovation to thrive,
☐ Achieving the right balance to stimulate innovation and business growth while protecting the rights of the individual, intellectual property and privacy,
☐ Actively address cyber vulnerability and the threat of attack and/or misuse,
☐ Cultivating a fully digitally-literate society so that netizens are able to use information and technology to take advantage of the growing digital economy.

Strategy, not Technology, Drives Digital Transformation
http://marketing.mitsmr.com/DL2015/57181-MIT-Deloitte-Digital2015.pdf?cid=1

Future of Grocery, Neilson, Digital Is Redefining The Grocery Shopping Experience, April 2015, http://www.nielsen.com/content/dam/corporate/us/en/reports-downloads/2015-reports/nielsen-global-e-commerce-new-retail-report-april-2015.pdf
- One-quarter of online respondents say they order grocery products online, and more than half (55%) are willing to do so in the future
- Growth of online grocery shopping is driven in part by the maturation of the digital natives—Millennials and Generation Z
- Willingness to use digital retailing options in the future is highest in Asia-Pacific, Africa/Middle East and Latin America regions

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[185]Oxford/ Citi GPS, Technology At Work, The Market for Industrial Robotics, February 2015, Page 40, http://www.oxfordmartin.ox.ac.uk/downloads/reports/Citi_GPS_Technology_Work.pdf

- E-commerce is well suited for stock-up and specialty-needs retailing because it can offer deeper product selections than may be available in brick-and-mortar stores.
- Use of online or mobile coupons and mobile shopping lists are the most cited forms of in-store digital engagement in use today.
- For in-store retailing, large stores have a sales volume advantage, but smaller formats are growing more rapidly

McKinsey Report Attached

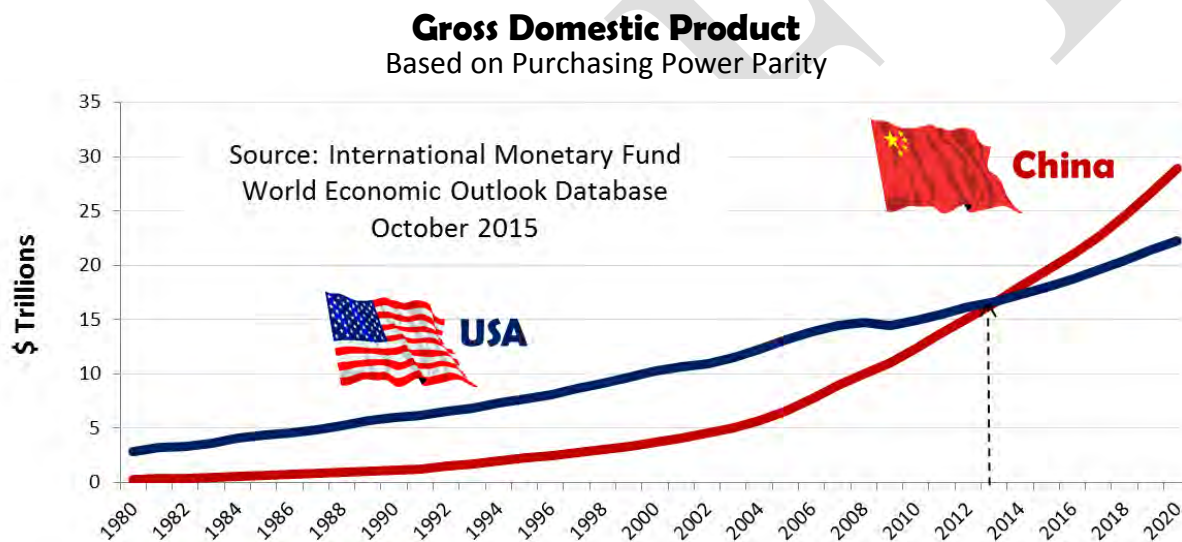file:///C:/Users/CHUCK/Downloads/MGI_Impact_of_Internet_on_economic_growth.pdf

U.S. Trade in Digitally-Deliverable Services, 2014: http://www.esa.doc.gov/economic-briefings/digitally-deliverable-services-remain-important-component-us-trade

NTR-China's Quest for Network and Digital Dominance (Case Study)

While the Internet Technology Revolution (ITR) of the 1980/90s and the emerging Network Technology Revolution (NTR) originated in America, these technology revolutions are no longer unique to the United States. China represents the greatest U.S. near-peer competitor for NTR global dominance with emphasis on mastering the emerging digital economy in order to elevate hundreds of millions of rural poor from poverty. China's transition from a physical (mainly manufacturing) economy to a digital economy is both rapid and impressive. Jobenomics contends that China's unified economic strategic vision and public-private partnership is more mature and competitive than the United States' business-as-usual approach.

According to President Xi's opening address of the 2016 G20 Summit in Hangzhou, China, "Modernizing a big country with a population of more than 1.3 billion is an endeavor never undertaken in the history of mankind....turning China into the world's second biggest economy, the biggest trader of goods and the third largest direct overseas investor."[186]

Gross Domestic Product
Based on Purchasing Power Parity

Source: International Monetary Fund
World Economic Outlook Database
October 2015

Based largely on China's manufacturing and employment miracle, China recently overtook the United States in GDP purchasing power parity (i.e., relative value of the U.S. dollar compared to the Chinese yuan) to become the world's most powerful economy. While China has reached parity with the United States in GDP purchasing power parity, it still is a developing country with a GDP per capita of only $8,280 ($14,189 based on GDP purchasing power parity) compared to $55,904 for the United States in 2015.[187] According to McKinsey & Company, the explosive growth of China's emerging middle class is not over yet. By 2022, McKinsey estimates that more than 75% of China's urban consumers will earn middle-class wages from $9,000 to $34,000 a year—up from only 4% in year

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[186] Centre for Research on Globalization, China's President Xi Jinping's Opening Address of G20 Summit: A New Blueprint for Global Economic Growth China's President Xi Jinping's Opening Address of G20 Summit: A New Blueprint for Global Economic Growth, 4 September 2016, http://www.globalresearch.ca/chinas-president-xi-jinpings-opening-address-of-g20-summit-a-new-blueprint-for-global-economic-growth/5543895
[187] International Monetary Fund, , World Economic Outlook Database, October 2015, http://www.imf.org/external/pubs/ft/weo/2015/02/weodata/weoselgr.aspx

2000. In purchasing-power-parity terms, this wage range is between the average income of Brazil and Italy.[188]

As the Chinese have proven, small business creation provides for income opportunity and wealth creation for many hundreds of million people. Over the last two decades, the Chinese have been able to lift 700 million people out of poverty. However, this is the past. The future is not so certain. President Xi agrees and stated in his G20 opening remarks that China has reached a "deep water zone where tough challenges must be met". The manufacturing miracle that has lifted so many people out of poverty is replete with challenges including overcapacity, pollution, debt, inefficient state-owned enterprises and a middle-income trap.

A slowing international global economy, lower exports, increasing competition and protectionism exacerbate the challenge to economic reform. According to Xi, China has reached a new historical starting point, a new normal, which requires China to both reform foster new drivers of economic and social development. As part of China Five Year Plan, the guiding principle for China's economic future, as articulated by Xi, is termed "supply-side economic reform". Unlike the Reaganomics free market definition of supply-side economics, the Chinese version calls for more central planning of the economy and changing the Chinese economy's growth drivers, growth model and economic structure to a digital age innovation-driven development strategy. As stated by Xi, "the combination of the virtual (digital) economy and the real economy will bring revolutionary changes to our way of work and way of life."

China's Strategic Challenges
Source: The World Bank Database
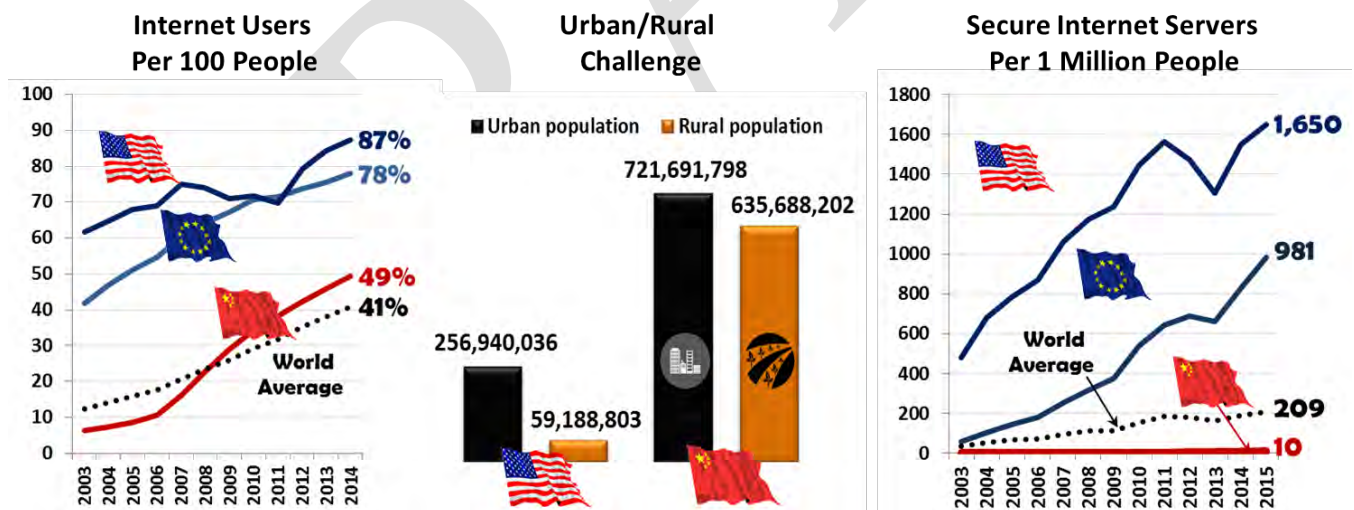
From an NTR perspective, China faces three strategic challenges: balancing income disparities between the rural poor and increasingly affluent urban middle-class; increasing internet penetration rates in rural communities; and securing their networks and e/m-commerce.

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[188] McKinsey & Company, Mapping China's middle class, June 2013,
http://www.mckinsey.com/insights/consumer_and_retail/mapping_chinas_middle_class

Providing network and digital economy services to poor agriculturally-oriented rural communities is more of a challenge than rich metropolitan areas with better infrastructure and industries. Today, China has over 636 million people in rural areas (47%) and 722 million people in urban areas (53%), compared to 59 million rural (19%) and 257 million urban (81%) in the United States. Of China's 31 first-level administrative divisions (22 provinces, 4 major municipalities and 5 autonomous regions, not including Hong Kong and Macau special administrative regions), three major municipalities (Tianjin, Beijing and Shanghai) take the top three positions in terms of in terms of purchasing power parity (PPP) in 2015, $30,611; $30,136; and $29,245 respectively, according to the IMF World Economic Outlook April 2016 database.[189]

The top richest thirteen provinces and municipalities (all urbanized areas located on China's Pacific Coastal region with the exception of Inner Mongolia that has prospered due it mineral wealth and low population) averaged $21,264 compared to the poorest eighteen rural provinces and autonomous regions that averaged $10,592, or half as much as the top thirteen and one-quarter of the top three cities. The bottom three provinces, Guizhou, Yunnan and Gansu, averaged $8,463, $8,227 and $7,419, or almost one-third the amount of the top thirteen and one-quarter of the top three cities. Similar disparities exist in employment and education between the richer and poorer administrative divisions. As discussed later, China is aggressively addressing these disparities largely through the use of NTR technologies, systems, processes and services.

While making significant progress over the last decade, China's percentage of internet users (49%) is only slightly better than the world average (41%) and significantly below the United States (87%) and the European Union (78%), according to The World Bank Database.[190] Other sources put the percentage of Chinese and United States internet penetration in 2016 as high is 89% and 52%, respectively. Of the 649 million internet Chinese users, 86% (557 million) accessed the internet by phone. Undaunted by these limitations, China is assiduously exploiting the Network Technology Revolution not only to overcome domestic inequities but to become a world-class model for the rest of the world, including the United States that has comparable challenges in balancing inequalities between rich/poor and urban/rural American communities.

Perhaps the greatest challenge to China's quest for NTR national and global ambitions is the lack of network security and vulnerability to cyber-attacks and malfeasance. According to World Bank statistical comparisons, China has 10 secure internet servers (secure servers are servers using encryption technology in internet transactions) per one million people compared to a worldwide average of 209, a European Union average of 981 and a U.S. average of 1,650. As discussed later, China is steadfastly developing its domestic network-centric ecosystem, implementing protectionist policies bars foreign competition, and enforcing an internal regulatory environment that prioritizes government oversight over individual privacy.

As reported by Bloomberg Businessweek citing reputable sources such as PwC, FireEye and Beijing law firm and the U.S.-China Business Council, "hackers are having a field day on China's wild web".[191]

[189]International Monetary Fund, World Economic Outlook (WEO) database, April 2016 edition, http://www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx
[190] The World Bank, Data, Internet users (per 100 people), http://data.worldbank.org/indicator/IT.NET.USER.P2
[191] Bloomberg Businessweek, Hackers Are Having a Field Day on China's Wild Web, 27 September 2016, http://www.bloomberg.com/news/articles/2016-09-27/hackers-are-having-a-field-day-on-china-s-wild-web

According to the report, 400,000 domestic hackers cost the Chinese economy $15 billion a year. A 2016 PwC survey of 330 chief executive officers and IT directors of foreign and domestic companies operating inside China and Hong Kong reported a 417% year-over-year increase in detected security incidents (hacking, malware, ransomware, stolen data and other network breaches of databases and proprietary records). Hacking of mobile payment systems and records, the mainstay of over half of all Chinese consumers, is especially vulnerable. Chinese government control over cybersecurity is exacerbating the rise of Chinese cybercriminal enterprises, which left unchecked could upend China's quest for using the NTR as way to rise hundreds of millions of Chinese poor out of poverty as it did in China's manufacturing miracle over the last several decades. Manufacturing enterprises tend to be more centralized and controllable than digitally networked enterprises.

According to The Center for Global Enterprise (CGE), an international nonprofit research institution, there are 176 platform companies worldwide, each with a market valuation of over $1 billion, worth a total of $4.3 trillion in 2016. Asia is the home of 82 companies with a market value of $930 billion, followed by North America with 64 companies valued at $3,123 billion, Europe with 27 companies valued at $181 billion and the rest of the world with 4 companies valued at $69 billion.[192]

Major Network Platform Companies 2016
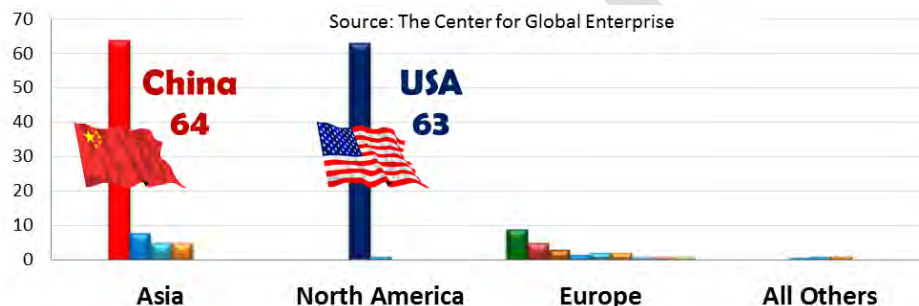
China and the United States dominate the worldwide network platform business with 64 and 63 major companies respectfully. China's platform companies include major integrated platform conglomerates (Alibaba, Tencent, Baidu and XiaoMi) and scores of smaller transactional companies (e-tailing, e-commerce, entertainment, etc.). U.S. major companies (Apple, Google, Microsoft, Amazon, Facebook and a dozen others) are currently much larger and have a greater global reach.

The U.S. platform companies are not only integrated and transactional, but are also foundational in terms of innovation and investment. An innovation platform is a technology, product or service that serves as a foundation on top of which other firms develop complementary technologies, products or services. To a large extent, China's platform companies have been built on U.S. foundational platforms. However, China's platform companies are becoming more integrated and innovative at a breathtaking pace within a government-backed strategic framework that is being implemented across China.

China's Strategic NTR Framework can best be characterized by Chinese Premier Li's March 2015 address when he urged the Chinese people to "ignite the innovative drive of hundreds of millions of

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[192] The Center for Global Enterprise, The Rise of the Platform Enterprise: A Global Survey, January 2016, http://thecge.net/wp-content/uploads/2016/01/PDF-WEB-Platform-Survey_01_12.pdf

people". According to the Hong Kong Economic Journal, the oldest and preeminent Chinese business newspaper, Premier Li was referring mainly to the "new China" that is driven by China's online revolution (aka the Network Technology Revolution).[193]

As a result of central government planning, municipalities across China have designated 129 special high-tech zones that have been approved by the State Council and are equipped with the latest NTR technologies, processes and systems to enable mass production of innovative and entrepreneurial startups. The United States has four analogous high-tech hubs in San Francisco (Silicon Valley), New York City, Boston and Seattle.

China has 1.4 billion citizens compared to America's 320 million. Both countries have approximately 20 million students enrolled in higher education. However, China's higher education growth rate has been explosive—up from 1.4% in 1978 to 20% in 2015[194]—and is likely to continue expanding at current rates with a state-driven, high-technology curriculum emphasis. According to U.S. National Science Foundation, China is the world's number-one producer of undergraduates with degrees in science and engineering (49% of all Chinese bachelor's degrees compared to 33% in the United States).[195]

Chinese students now make up 31% of all international college students at U.S. universities, according to data from the Institute of International Education. In the 2013/2014 school year, 304,040 Chinese students studied in the U.S., an increase of 10.8% from the previous year and a five-fold increase over the previous decade. In the 2013/2014 school year, 13,763 U.S. students studied in China, a decrease of 4.5% from the previous year. Fields of study for international students in America are Business & Management (20%), Engineering (20%), Math & Computer Science (12%) and Intensive English (5%)—fields necessary to compete in the global digital economy. Approximately two-thirds are enrolled in undergraduate programs and one-third in post-graduate (Master's, Doctoral and Professional) programs.[196]

Chinese R&D and S&T Growth

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[193] Hong Kong Economic Journal (ejinsight), How China is replicating Silicon Valley on a grand scale, 24 July 2015, http://www.ejinsight.com/20150724-how-china-is-replicating-silicon-valley-on-a-grand-scale/, also reported by Bloomberg Business, China Wants Silicon Valley's Everywhere, 23 July 2015, http://www.bloomberg.com/news/articles/2015-07-23/china-wants-silicon-valleys-everywhere
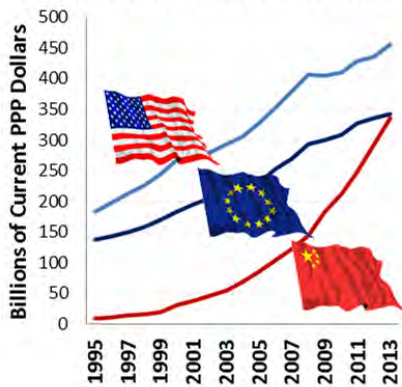
[194] China Education Center, http://www.chinaeducenter.com/en/cedu.php

[195] U.S. National Science Foundation, National Science Board Science & Engineering Indicators 2016, https://www.nsf.gov/statistics/2016/nsb20161/#/, http://www.nsf.gov/statistics/2016/nsb20161/#/report/chapter-4/cross-national-comparisons-of-r-d-performance

[196] Institute of International Education (IIE) with support from the U.S. Department of State's Bureau of Educational and Cultural Affairs, Open Door Data, retrieved 8 September 2016, http://www.iie.org/Research-and-Publications/Open-Doors/Data/International-Students/Leading-Places-of-Origin#.V9F-9vkrJQI

Gross Domestic Expenditures on R&D
Source: U.S. National Science Foundation

China's Science & Technology Development Statistics
Source: National Bureau of Statistics of China (NBS)

	2000	2015	△
R&D Personnel (Manyears)	922,000	3,933,000	327%
Technical Market Transaction Value (100 million yuan)	651	9,835	1411%
Expenditures on R&D (100 million yuan)	896	14,220	1487%
Science & Technology Patents (Number Granted)	105,345	1,718,200	1531%

According to statistics from both the U.S. National Science Foundation and the Chinese National Bureau of Statistics (NBS), the growth of Chinese technology has explosive over the last several decades. [197] [198] This growth is likely to continue unabated with more and more R&D and S&T focused on the Network Technology Revolution and related e-commerce and service industries. According China's Administration for Industry and Commerce, in 2015, China created over 4.4 million new companies, a 22% gain over the previous year, of which 78% were service industry startups.[199] China's service industries now account for about half of China's GDP valued added by industry, whereas manufacturing equates to about one-third value added, according to the NBS.

China's Access to Digital Toolsets and Intellectual Capital.   Digital toolsets and intellectual capital are largely free for the taking. According to James McQuivey, Vice President at Forrester Research and the leading analyst tracking the development of digital disruption, China has a well-trained, motivated and entrepreneurial labor force that has access to technologies, distribution partners, supply chains and physical infrastructure that "China didn't have to pay for because the rest of the world had already seen fit to create them".[200]

What can't be freely received can be relatively easily acquired (or hacked) in today's global economy. According to Randall Coleman, the FBI's Counterintelligence Division, "China is the most dominant threat we face from economic espionage". In 2015, the FBI experienced a sharp spike of economic espionage investigations (up over 53% over last year) and that China's state-sponsored state-sanctioned corporate espionage constituted the bulk of the thefts. [201] [202]

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[197] U.S. National Science Foundation, National Science Board, Science & Engineering Indicators 2016, http://www.nsf.gov/statistics/2016/nsb20161/#/

[198] National Bureau of Statistics of China (NBS), Statistics on Science and Technology Development, http://data.stats.gov.cn/english/tablequery.htm?code=AB0304

[199] China Administration for Industry and Commerce, 14 January 2016, http://www.cicn.com.cn/zggsb/2016-01/14/cms81467article.shtml

[200] James McQuivey, Digital Disruption: Unleashing the Next Wave of Innovation, Figure 1-1: Digital Disruption Creates One Hundred Times the Innovation Power, Page 11.

[201] CNN, FBI sees Chinese involvement amid sharp rise in economic espionage cases, 24 July 2015, http://www.cnn.com/2015/07/24/politics/fbi-economic-espionage/

[202] Federal Bureau of Investigation, Testimony of Randall C. Coleman, Assistant Director, Counterintelligence Division, Statement Before the Senate Judiciary Committee, Subcommittee on Crime and Terrorism, Washington, D.C., 13 May 2014, https://www.fbi.gov/news/testimony/combating-economic-espionage-and-trade-secret-theft

China's state-driven economic masters are skilled at one-way transactions. If a company wants to do business in China, intellectual capital transfer is part of doing business. For example, in order for Boeing to sell airplanes in China, it is required to manufacture significant portions of the airframe in China along with providing the intellectual capital to do so. The same is true in the digital economy. However, Chinese e-commerce sights are largely closed to imported products and services, but wide open to exported Chinese products and services.

Many major U.S. corporations are now voluntarily training Chinese how to compete in the global digital economy. For example, Tim Cook, Apple's CEO, has visited China a half-dozen times since he took over for Steve Jobs (who never visited China) in 2011.[203] In 2016, Cook visited China twice and announced that Apple will build its first Asia-Pacific research and development center in the country, largely to boost its flagging iPhone Chinese sales. Sales in Greater China, once touted as Apple's next growth engine, decreased by a third in mid-2016, after having more than doubled a year earlier.

According to Reuters, to further curry favor with Beijing, in May 2016, Apple announced an investment of $1 billion on a ride-hailing application made by Didi Chuxing, a Chinese transportation network company headquartered in Beijing and major competitor to American-based Uber in China.[204] In July 2016, Uber decided to pull the plug in China and merged with Didi Chuxing. Apple is also translating its hardware operating language (iOS) into Mandarin Chinese to make it easier for 850 million native Mandarin speakers to build iOS apps and compete in the highly lucrative app market that is currently dominated by American app developers. In defense of Apple's Mandarin initiative, the iPhone is China's leading high-end smartphone. In addition, the United States has more apps-related job openings than it can fill. American companies in the medical, health and business services fields have shortfalls of over 50%.

It remains to be seen if Chinese app developers will augment or replace U.S. workers in this vital industry. A win-win proposition will require a balanced, reciprocal and transparent playing field. President Reagan used the Russian proverb doveryai no proveryai (trust, but verify) when dealing with the Russians. Perhaps, American politicians and business leaders should be familiar with the equivalent term in Chinese, xìnrèn, dàn yào héchá, when dealing with emerging NTR technologies, processes and systems that underpin the rapidly evolving global digital economy.

Retrospectively, the trust-but-verify adage has proven to be wise advice for many American companies that have invested billions of NTR-related dollars in China. While China continues to the largest market for Apple's iPhone, other U.S. companies have not fared as well including Google, Facebook, Amazon and Uber. Each company has their own version regarding their failed attempt to exploit the world's largest emerging market. Some point to the anti-competitiveness aspects of the Great Firewall, Chinese internet surveillance and censorship laws that were designed to protect China from network malfeasance.[205] Others point to Chinese domestic competition that is aided and

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[203] Bloomberg BusinessWeek, 10-23 August 2015 Technology Section, Developers Teach Apple Chinese, Page 36
[204] Reuters, Apple to increase investment in increasingly tough China, 16 August 2016,
http://www.reuters.com/article/us-apple-china-idUSKCN10R14G
[205] The Great Firewall of China is a major element of the Golden Shield Project designed to identify and block unfavorable data from foreign countries and is operated by the Ministry of Public Security. Great Firewall hardware was designed and provided by mostly U.S. companies, like Cisco Systems.

abetted by the Chinese government. Others claim that their Chinese partners draft on initial Western investment and create clones or knockoffs to usurp the market after it matures and risks are reduced. The Chinese response to these claims is that Chinese markets have always been for the Chinese. One-way transactions were and will continue to be a Chinese priority until the Chinese economy is fully developed. From a Chinese perspective, a better adage is caveat venditor (let the seller beware) or ràng màijiā yào dāngxīn in Chinese.

Running any kind of social network in China, especially as a foreign company, is extremely formidable business proposition. Chinese e-commerce companies are advantaged by anti-competition Western policies, like the government's Great Firewall, the main instrument to achieve internet censorship in China, Chinese media bias, public support of things made in China and the lack of understanding on Chinese cultural norms. WeChat serves as an excellent example. WeChat is China's leading messaging app, created and produced by Tencent, dwarfs Facebook's WhatsApp, the world's leading messaging app with 900 million active user, that is freely available in China. WeChat has over 700 monthly users, contains features (voice, browsing, games, purchase and pay online, send money, manage credit card bills, check news, book appointments or hail a cab) that are tailored to Chinese users and accounts for more than one-third of all the time spent online by Chinese mobile users, which will be very difficult and expensive Facebook to offer in China. More importantly, WeChat is an example of an innovative multi-application provider of interest to Western companies, like Facebook, Google and Microsoft, which are interested in WeChat as an overall mobile operating system as opposed to a mere messaging application.

Chinese Investment Capital. China's strategic vision also includes private sector business investment as part of a national Public Private Partnership (PPP) initiative to develop China's infrastructure. According to the World Bank from 2010 through 2014, gross domestic investment in fixed assets (plants, machinery, equipment and infrastructure) in China was 48% of GDP compared to 19% in the United States. China's gross fixed capital formation has been spectacular, up over tenfold ($409 billion in 2000 to $4.6 trillion in 2014 versus comparable U.S. expenditures of $2.4 trillion in 2000 to $3.5 trillion in 2014) since year the turn of the century.[206]

The bulk of "private sector" investments were from state-owned banks that account for more than 20% of China's fixed asset investment. Investments from private firms have dropped from a high of 35% in 2006 to 2% as of 2016 in fixed assets as calculated by a percentage increase from a year earlier.[207] While China's private investment firms are weary of major physical fixed asset schemes, they are very interested in financing digital infrastructure initiatives from broadband to e-commerce to small and micro business development PPPs.

In regard to the small and micro business PPP investment strategy, the Vice Chairman Zhou of the China Banking and Regulatory Commission recently stated that "commercial banks must utilize the government's current policy to further support their financial services to micro and small businesses". Furthermore, Zhou stated that the CBRC had a high tolerance for non-performing micro and small business loans (currently 3% to 4%) since these businesses are essential to Chinese domestic

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[206] The World Bank, Gross fixed capital formation (current US$), China, http://data.worldbank.org/indicator/NE.GDI.FTOT.CD?locations=CN
[207] The Economist, A sponge wrung dry, 17 September 2016, http://www.economist.com/news/finance-and-economics/21707192-chinas-private-investors-keep-their-hands-their-pockets-sponge-wrung-dry

economic growth. As of May 2014, micro and small business loans were $3.5 trillion (up 17% from a year earlier) compared to U.S. small business loans of $0.6 trillion. [208] [209]

Chinese investment capital does not only come from the quasi-private sector but also from the Chinese central government itself as part of an effort to spur entrepreneurship and stimulate a flagging economy. According Bloomberg data, over the last two year the Chinese central government has opened 1,600 high-tech incubators for startups backed by a $340 billion government-guided venture capital fund that comes from tax revenue and state-backed loans. In addition to the central government fund, each of the 23 provinces, 4 municipalities (Beijing, Tianjin, Shanghai, Chongqing) and 5 autonomous regions are creating their own venture capital funds. For example, Hubei Province in Central China raised $30 billion of their $150 billion goal. [210]

Chinese investment capital is also being effectively used in American NTR-related startups, like Snapchat and Lyft. According to CBInsights, a U.S. datamining company, 2015 saw more than 140 deals including $1B+ financings with Chinese investor participation into SoFi, Uber, and AirBnB. As of May 2016, 40 deals were struck with American tech startups with Chinese investor participation. Since 2010, California took 280 tech startup Chinese investment deals and New York agreed to 40 deals. The most active Chinese NTR conglomerates included Tencent, Alibaba and Renren. In 2016, the rate of Chinese investment appears to be slowing to approximately 100 deals as projected by CBInsights. [211] The mostly likely reason for this slowdown is due to increased Chinese investment in Chinese NTR-related firms that are integral to the emerging Chinese digital economy.

Chinese Private Sector Support. American companies are currently the NTR world leaders. However, this is changing. Chinese companies (like Tencent, a social media company; Alibaba and JD.com e-commerce companies; Baidu, a search company; Renren, a social networking service; Xiaomi, the leading Chinese smartphone manufacturer; and NetEase, an online services company) are rapidly assuming global NTR leadership in their respective domains.

The Alibaba Group serves as an excellent example-- positioning itself to be a global leading NTR conglomerate specializing in e-commerce. Started in 1999 by Jack Ma, a former Chinese English teacher in Hangzhou, Alibaba's rise has been historic. Today, Alibaba's twin pillars the Amazon-like Taobao/Tmall online shopping sites and PayPal-like Alipay online payment system. Alibaba reported a gross merchandise volume of online sale at $485 billion in FY 2016, which is higher than $482 billion of revenues reported by Walmart in its fiscal year 2016. 330 million people made purchases on Alibaba sites last year, spending an average of $1,200. Alipay is now the world's largest with 400 million registered users compared to 188 million for PayPal. Alibaba is also aggressively expanding

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[208] Reuters, China pushes for more small business lending despite bad loans rising, 8 May 2015, http://www.reuters.com/article/2015/05/08/us-china-economy-idUSKBN0NT0O320150508

[209] U.S. Small Business Association, Small Business Lending in the United States 2013 (Published December 2014), Table B. Value of Small Business Loans Outstanding by Loan Type and Size through June 2014, https://www.sba.gov/sites/default/files/2013-Small-Business-Lending-Study.pdf

[210] Bloomberg Technology, Inside China's Historic $338 Billion Tech Startup Experiment, 8 March 2016, http://www.bloomberg.com/news/articles/2016-03-08/china-state-backed-venture-funds-tripled-to-338-billion-in-2015

[211] CBInsights, The Rise Of Chinese Investors Into US Tech Companies, 19 May 2016, https://www.cbinsights.com/blog/chinese-investment-us-tech-startups/

into e-business related R&D, search, cloud computing, smartphones, finance, crowd funding, private equity, news, messaging, online music, television, motion pictures and sports.

According to Jack Ma, Alibaba was founded "to **champion small businesses**, in the belief that the internet would level the playing field by enabling small enterprises to leverage innovation and technology to grow and compete more effectively in the domestic and global economies." Alibaba's vision to champion small business creation via the NTR will facilitate prosperity and employment growth to a far greater extent than Google, Microsoft, CISCO, Facebook, IBM or Apple's narrower product and services-oriented mission/value statements. Ma's strategic vision fits within China's strategic framework to become the world's leading economic power. Founder Jack Ma committed Alibaba to create 100 million global micro-entrepreneur jobs in 2010s via the emerging digital economy—he is well on his way to accomplishing this goal in China.[212]

Jack Ma is also the leading advocate for international e-trade focused on small and medium-sized businesses worldwide. As Chair of the G20's SME Development Taskforce[213], Jack Ma pioneered the concept of an Electronic World Trade Platform (eWTP) that would reduce the threshold effect, faced by small and medium-sized businesses to participate in cross-border e-trade, also known as cross border electronic commerce. The problems many small and medium-sized businesses face today in e-trade include limited access to markets, export opportunities, trade finance, and regulatory requirements. As envisioned by Ma, the eWTP would be a duty-free and tax-free global free trade zone for small business engaged in e-commerce.

Alibaba's global leadership has been largely underwritten by Americans, starting with U.S. developed NTR technology, processes and systems and major investment by Yahoo and Wall Street's largest ($22 billion) initial public offering ever at $68 per share. Despite China's recent economic downturn and Alibaba's aggressive horizontal and global expansion expenditures that dropped Alibaba's stock price to $57 per share in August 2015, rebounded by 74% in August 2016 to $99 per share. Most analysts maintain their bullish views on Alibaba Group's future. Jobenomics agrees and believes that Alibaba has positioned itself well to respond to China's economic downturn and China's strategic financial needs—building a viable middle class and transitioning China from a physical to a digital economy. Alibaba sales increase indicates an increase in domestic consumption that is vital to Chinese economic growth. To a large extent, China's economic future depends on the success of Alibaba and other NTR-centric Chinese conglomerates. The same is true for the United States in regard to companies like Amazon, other leading NTR-centric American corporations and emerging enterprises.

China's phenomenal double-digit economic growth has been overwhelmingly manufacturing and urban centric. In order to keep growing, the Chinese government is now pursuing an e-commerce strategy for rural economic development with emphasis on provincial micro-business creation. Chinese companies like, Alibaba and JD.com, are central to this e-commerce strategy. Even with China's economic downturn, Chinese online consumption grew 33% in 2015, compared to U.S. online sales growth of 15%. The top 500 largest online retailers serving the Chinese e-tailing marketplace

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[212] NING, 100millionjobscrisis, Video, 23 November 2009, http://yunusasia.ning.com/video/100millionjobcrisis-1

[213] The G20 consists of Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Republic of Korea, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, the United States and the European Union (EU).

grew by an astonishing 57% in 2015. The top 500 is represented by approximately 400 Chinese companies, 50 American companies and 50 other international companies. The growth rate of for the 50 American e-tailing companies in China was 24% compared to 71% for the Chinese counterparts.[214] American growth was due to popular U.S. iconic products, like iPhones, which are increasingly being replaced by higher quality Chinese products and knockoffs.

Alibaba's phenomenal growth was due largely to urban (Shanghai, Beijing, Tianjin, Guangzhou, etc.) customer loyalty programs, aligning e-commerce to social and entertainment networks, and the creation and financing of approximately 10 million new Chinese microbusinesses. By investing in the rural population, which is roughly the same size as the 700 million-strong urban population or twice the size of the entire U.S. population of 320 million, Alibaba hopes to develop a huge new customer loyalty base that has been previously shutout of China's economic miracle. Alibaba has been aggressively reinvesting its capital reserves in developing a rural e-commerce platform and acquiring peripheral companies and technology to augment this platform. Alibaba is investing $2 billion in training locals, providing free computers, arranging startup financing, and establishing a logistical supply chain to connect 100,000 villages to its e-commerce platform by 2018.

With its revolutionary business model, Alibaba's Ant Financial has grown to a $60-billion company in just three years and is set to revolutionize the world of finance, with emphasis on rural China. Officially known as Zhejiang Ant Small & Micro Financial Services Group, Ant Financial has its own financial network, money market fund (Yu'ebao) and a credit scoring system with 400 million active users. Just as the name "ant" implies, Ant Financial focuses on the little guy. Most of the active users are poor people who are not rich enough to meet minimum bank deposit standards or invest in the stock market. In addition, Ant Financial loans are aimed at helping over 100 million Chinese micro businesses, with emphasis on impoverished rural communities. [215]

In times past, the regime in Beijing would have been skeptical of Alibaba's grand plan of building millions of microbusinesses at the base of China's economic pyramid, but times are different now. The regime knows that domestic household consumption (36% in China compared to 69% in the United States[216]) must increase significantly in order to please the masses and allow the new Chinese digital economy to grow without dependency on the rest of the world as is the case with today's manufacturing-oriented economy.

The regime also knows that its large private sector businesses can create small businesses faster and better than the government can. In June 2015, Premier Li publicly stated that the central government is supporting (via tax breaks, underwriting small business loans, and cutting red tape) "migrant workers, college graduates and army veterans who wish to return to their rural hometowns to start new businesses, part of a national campaign to boost entrepreneurship and employment". The Chinese government is also supporting e-commerce companies, like Alibaba, to set up "consumption

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[214] Internet Retailer 2016 China 500, 2016 China 500 Executive Report, https://www.internetretailer.com/shop/2016-china-500-executive-report.html

[215] Cheung Kong Graduate School of Business Knowledge Center (Beijing), Will Ant Financial Become Wildly Successful Like Taobao?, 24 May 2016, http://knowledge.ckgsb.edu.cn/2016/05/24/internet-finance/will-ant-financial-become-wildly-successful-like-taobao/?utm_campaign=shareaholic&utm_medium=email_this&utm_source=email

[216] The World Bank, Household final consumption expenditure, etc. (% of GDP), retrieved August 2015, http://data.worldbank.org/indicator/NE.CON.PETC.ZS

finance" firms and offering these companies equal access to public services (social insurance, housing, education and healthcare) in order to encourage netizens to seek new careers or start microbusinesses in rural regions.[217]

Chinese e-Commerce Boom. According to a Nielsen Global Survey, 98% of Chinese respondents made online purchases during the year with emphasis on household consumables and other products. From June 2014 to June 2015, sales of groceries climbed 52%, beverages 72% and products 86%. In addition to purchasing, the entire Chinese retail experience is being transformed by new NTR technology from the retail experience through the complete supply chain and delivery services. According to the report, most Chinese consumers still prefer using their computers to make online purchases but Chinese mobile purchases are increasing rapidly in comparison to the rest of the world. "Chinese dependence on mobile phone apps to place orders is far higher than in other surveyed countries, with 98% meal delivery services, 95% baby and children products, 91% IT and mobile goods and 90% packaged grocery food, were made via apps on smartphones." The use of digital payment systems in China is far higher (86%) than the average (43%) of the 26 surveyed countries. [218]

The Chinese e-Commerce boom has come at an incredible cost to private sector NTR giants like Alibaba, Baidu and Tencent that has collectively invested tens of billions of dollars in consolidating and buying market share in China's rapidly growing e-economy. In 2015, China's on-demand sharing economy totaled $1.95 trillion with over 500 million on-line customers. To generate this level of interest, up from near zero a decade earlier, three NTR giants had to offer generous and deep discounts on almost every product and service in a brutal competition to build brand and market share. Now that industry consolidation is almost complete and market share is dominated by three mega-conglomerates, the wave of steep discounting and lucrative reward programs for Chinese consumers may be at an end. Rather than building a loyal customer base, they built an ecosystem dependent on bargain hunting. It will be interesting to witness if Chinese e-commerce will continue to boom if addicted consumers undergo a radical withdrawal from steeply discounted products and services. As prices increase more and more Chinese consumers may consider saving rather than bingeing too-good-to-be-true prices. Chinese are some of the most notorious savers in the world.

Chinese Private Sector e-Commerce Banking. The partnership between the Chinese government, state-owned industries and the private sector with the Chinese digital economy strategic framework is not without problems, but on the whole the partnership is making some remarkable strides even in unproven NTR technologies. Blockchain serves as an excellent example in as much as blockchain technology provides a means for people to share reliable and tamper-proof lists of information known as distributed ledgers.

Unlike America's digital giants, blockchain technology is being aggressively pursued by China network and financial technology (fintech) giants, such as Baidu, Tencent and Alibaba. These fintech pioneers already have more clients and payments systems than the entire, predominantly government-owned, Chinese banking system, and are using NTR technology, systems and processes to create new Chinese-dominated global banking system.

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[217] Xinhua News Agency, Xinhuanet, China supports entrepreneurship in rural areas, 10 June 2015, http://news.xinhuanet.com/english/2015-06/10/c_134315560.htm
[218] Nielsen Global Survey, China Maintains Robust E-Commerce Growth, 1 March 2016, http://www.nielsen.com/cn/en/insights/news/2016/china-maintains-robust-e-commerce-growth.html

In June 2016, Baidu, China's Google, invested $60 million in the U.S.-based Circle Internet Financial to expand in China using Circle's proprietary bitcoin blockchain and artificial technology that allows Chinese clients to access a highly-secured money transfer and payment network. Circle's technology allows customers to sign up via email or text, snap a picture of their debit card, credit card or bank account to pay or get paid instantly at no charge without limits on how much they send, receive or cash out. Circle China has been created as an independent company with local investors to capitalize on China's masses that are comfortable with social media payments and money transfer.

On 31 May 2016, a 31-member group launched the Financial Blockchain Shenzhen Consortium that will collaborate on the creation of group-wide blockchain projects focused on the development of a global securities trade platform and services for offering credit, digital asset registry and invoice management. Financial Blockchain Shenzhen Consortium consists of Tencent, owners of WeChat that has more than 760 million users; Ping An Bank, one of China's biggest government-owned financial conglomerates; and 29 other notable Chinese and international finance and tech firms.

In July 2016, Alibaba's Ant Financial and the Microfinance Management arm of China's Foundation for Poverty Alleviation concluded an agreement to jointly help lift people lift out of poverty with the aid of the internet and blockchains to more than 300 national and provincial counties by 2020. Donors on Alibaba's "Ant Love" charity platform will be able to track transaction histories and gain a clearer understanding of how their donations are used.[219] [220] [221]

Implementation of blockchain technology in China will be much different from the Western approach of employing blockchains from within the banking system. China intends to utilize fintech industries, like those described above, to push technology into government-controlled institutions. To do so, the Chinese government has instituted a half-way house, called the China Ledger Alliance (aka ChinaLedger), which will be managed by a non-profit research institution (Wanxiang Blockchain Labs). ChinaLedger is currently an alliance of a dozen regional commodity exchanges, equity exchanges and financial asset exchanges with the aim of creating an open source blockchain protocol. Numerous leading Western blockchain and network technology experts are participating as key members of ChinaLedger's "advisory" counsels. As reported by China Daily, the leading English-language news organization in China, blockchain technology will be used in China's fledgling social security system that currently has $285 billion under management (the United States Social Security Trust Fund is $2.8 trillion) but increasing at a rate of 25% per year.[222]

According to Citigroup, "financial-technology companies in China have passed a 'tipping point' in disrupting the banking industry owing to their surging number of customers….Chinese fintech firms have now gained considerable market share in e-commerce and third-party payments, and are faster

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[219] Coindesk, Blockchain Startup Circle Raises $60 Million Amid China Expansion, 23 June 2016, http://www.coindesk.com/circle-china-60million-series-d/, and 31 Chinese Firms Form Financial Blockchain Consortium, 24 June 2016, http://www.coindesk.com/financial-blockchain-shenzhen-consortium-launch/

[220] Blockchain News, China's Internet Behemoth Alibaba to Roll Out Blockchain Tech for Payments, 12 July 2016, http://www.the-blockchain.com/2016/07/12/chinas-internet-behemoth-alibaba-roll-blockchain-tech-payments/

[221] Circle, https://www.circle.com/en/about, and https://www.circle.com/en

[222] China Daily, Social security funds to use blockchain, 4 September 2016, http://www.chinadaily.com.cn/bizchina/2016-09/04/content_26692415.htm

than lenders in offering alternatives to traditional banking services". [223] According to The Wall Street Journal, "the future of banking is in China", namely with tech companies that "use internet payment systems as a wedge into an array of money-management services". [224]

Conclusion. It will be interesting to see if China can replicate its manufacturing economic miracle in the digital world.

A pessimist would argue that a centralized economy controlled by ideological forces will eventually stifle creativity offered by a free and open marketplace. An optimist would argue that while only half of its netizens are currently connected to the internet, China's rate of internet user growth has been significant, especially considering population size and geographical constraints of the country.

Furthermore, an optimist would counter with an assertion that China is likely to succeed based on China's strategic framework, commitment to higher education and training, access to "free" digital toolsets and intellectual capital, a generous amount of investment capital for business development and enthusiastic private sector support.

Jobenomics takes the position that China will likely achieve NTR dominance over in China and its strategic partners, but is likely to fall short of global dominance unless its digital economy becomes more transparent, open and reciprocal with all of its global trading partners. NTR dominance does not have to be a zero-sum game but will likely be, especially over the next decade. Jobenomics believes that the emerging digital economy offers a unique ecosystem where China and the United States could cooperate to create a global digital economy that would lift all economies to the benefit of the global whole.

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[223] Bloomberg Technology, China Fintech Passed Disruption Tipping Point, Report Says, 31 March 2016, http://www.bloomberg.com/news/articles/2016-03-31/china-fintech-passed-disruption-tipping-point-citigroup-says

[224] The Wall Street Journal, The Future of Banking Is in China, 2 June 2016, http://www.wsj.com/articles/the-future-of-banking-is-in-china-1464802904

NTR Disruption Will Upend Millions of Businesses and Billions of Jobs

The NTR will be both brilliantly innovative and creatively disruptive. Brilliant innovation and creative disruption go hand-in-hand. Brilliant innovation disrupts the status quo by producing something new, more efficient or more worthwhile. The technological combination of big data, cloud computing, semantic webs, mobile robotics, ubiquitous computing, machine learning, national broadband and the Internet of Things will disrupt, displace, or even destroy, existing markets, occupations and the labor force. America is likely to be the first country to deal with NTR disruption since it has the dominant players and the largest free-market economy.

Revolutionizing Labor Forces

The BLS defines labor productivity is defined as real output per labor hour, and growth in labor productivity is measured as the change in this ratio over time. Labor productivity growth is what enables workers to produce more goods and services than they otherwise could for a given number of work hours.

Labor productivity is a major macroeconomic indicator regarding economic growth potential. From a Jobenomics perspective, it is the macroeconomic indicator that decision-makers least understand and subsequently is often absent in labor force policy-making. Labor productivity growth can generally be interpreted as improvements or rising standards of living in the country. Labor productivity decline can generally be associated with lower living standards, middle-class deterioration and increased welfare reliance.
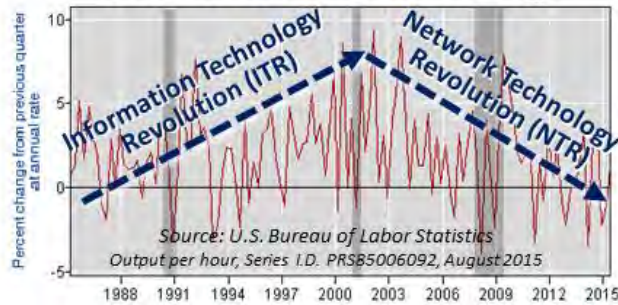
Labor productivity measures how much a worker produces in an hour compared to what each worker is earning to perform the job. Productivity depends on essentially three elements: physical capital (equipment and facilities), human capital and new technology.   Robust economies can afford to invest in all three elements.   Ailing economies force investors to choose between these elements or investing elsewhere.   Productive workers use existing physical capital more efficiently.   Less productive workers drive up labor costs and makes products and services less competitive in a global marketplace. High domestic labor costs forced employers to outsource labor overseas.   The NTR will allow employers and their investors to replace foreign labor with domestic machines and automated systems.

According to a Citi GPS study, advanced economies (United States, United Kingdom, Germany, France and Japan) face a productivity paradox that has slowed from 4% in 1965-75, to about 2% from 1975-2005 and 1% from 2005-2014.[225]   As indicated by this decline, the ITR and NTR has not positively impacted productivity across the Western world, However, the vast majority of productivity experts believe that automation will eventually drive productivity growth over time—perhaps significantly.

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[225] Oxford /Citi GPS Study, Technology At Work v2.0, Impact of Automation on Productivity, Page 61, January 2016, http://www.oxfordmartin.ox.ac.uk/downloads/reports/Citi_GPS_Technology_Work_2.pdf

U.S. Labor Productivity

Percent change from previous quarter at annual rate

Information Technology Revolution (ITR)

Network Technology Revolution (NTR)

Source: U.S. Bureau of Labor Statistics
Output per hour, Series I.D. PRS85006092, August 2015

1988 1991 1994 1997 2000 2003 2006 2009 2012 2015

As shown above, during the Information Technology Revolution (ITR), technology was a major factor in enhancing human capital, which in turn, increased labor productivity by making workers more efficient. While it is still too early to tell, the NTR appears to have the opposite effect. Rather than enhancing humans to be more efficient with existing physical capital, the NTR is replacing humans via automation.   As skilled labor becomes less available or too costly, employers are turning to automation in order to augment, displace and/or oust the existing labor force. While automation has been replacing manual labor for decades, as evidenced by factory floor robotics, emerging NTR technologies, processes and systems are replacing cognitive skills, jobs and occupations at greater and greater rates. Since 86% of all American jobs involve service-providing industries as opposed to 14% in goods-producing industries, automation of cognitive skills will have significantly more labor force impact than caused by automating jobs that are comprised of mostly manual labor.

Productivity experts try to explain the productivity lag in terms of how productivity is measured or that the NTR has not yet achieved its full productive potential. Jobenomics disagrees and asserts that labor productivity metrics are increasingly irrelevant as a major economic indicator.
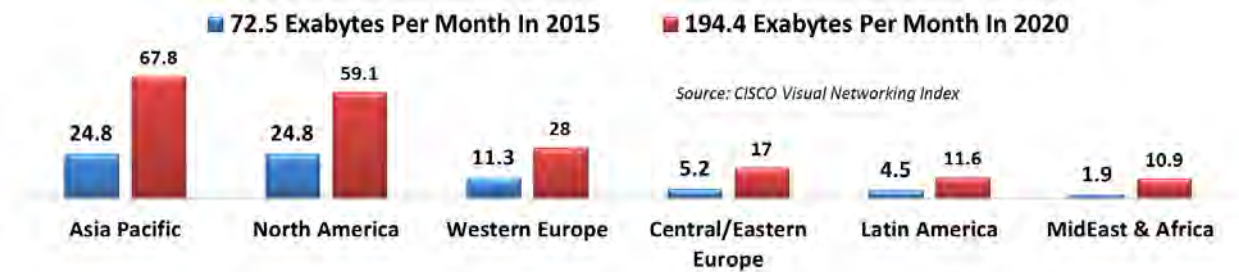
The U.S. labor force worked the same number of hours (194 billion hours[226]) in 1998 as they did in 2014 despite the fact that the population grew by 40 million people, thousands of new businesses were created and GDP per capita grew by 61% ($32,950 to $53,000).   In other words, output increased without increasing labor hours used. Gains in output such as these are indicative of growth in labor productivity primarily due to technology and higher-skilled workers.   Technology and higher-skilled workers go hand-in-hand.   As shown in the graphic, the ITR enabled workers to become more productive and the NTR replaced lower-skilled workers, thereby elevating the average skill level of the workforce.

Upending Business

Global Internet Is Forecast To Triple In the Next Five Years
Source: Cisco Visual Networking Index

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[226] BLS, http://www.bls.gov/opub/btn/volume-3/what-can-labor-productivity-tell-us-about-the-us-economy.htm

72.5 Exabytes Per Month In 2015   **194.4 Exabytes Per Month In 2020**

Source: CISCO Visual Networking Index

	Asia Pacific	North America	Western Europe	Central/Eastern Europe	Latin America	MidEast & Africa
2015	24.8	24.8	11.3	5.2	4.5	1.9
2020	67.8	59.1	28	17	11.6	10.9

Global internet (IP) traffic is projected to triple over the next five years, rising from 72.5 exabytes per month in 2015 to 194.4 in 2020. Asia Pacific will be the largest consumer and MidEast/Africa will be the fastest growing. Consumers will be responsible for 84% of the internet traffic and business 16%. Internet video will devour 57% of total internet traffic and 83% of consumer traffic. Global mobile data traffic will increase eightfold from 3.6 exabytes per month in 2015 to 30.4 in 2020 [227].

The ITR was dominated by goods-producing industries that sold hardware and software to consumers. The NTR will be dominated by network-centric industries that will own and operate the hardware/software and will provide tailored services to consumers via subscriptions. Personal digital devices cost hundreds of dollars versus thousands of dollars for personal computers and related peripherals. The billions of dollars that are lost in personal computer sales should be offset by billions of dollars made in subscription services by cloud and content providers. It is not inconceivable that competition will drive the cost of handheld devices to near zero as an incentive for long-term contracts for services, much in the same way telephone companies do today with cell phone services.

Transforming Money, Currency, Trade and Investment.

In terms of investment, traditional investors gave priority to locally owned opportunities secured by tangible assets financed with fiat currencies. In a digital economy, priority is placed on globally shared opportunities secured and financed by derivatives and digital currencies.

Fiat paper currencies (currencies government declares by fiat to be legal tender but not backed by a physical commodity) are increasing being challenged by counter-cultural and foreign entities. The U.S. dollar is a fiat currency backed by nothing other than the faith and guarantees of the US government. Today the U.S. dollar is the world's reserve (anchor) currency that is held in significant quantities by governments and institutions as part of their foreign exchange reserves. The American dollar is the world's foremost hard currency used by 60% of the world. The euro is the world's second largest reserve currency used by 25% of the world. The British pound, Japanese yen and French franc are the anchor currencies make up most of the remaining 15%. In addition, the dollar is the currency commonly used in international transactions (e.g., petrodollars) as well as government and private sector holdings and retirement accounts since the dollar is considered the foremost safe-haven currency.

Faith in the U.S. dollar is eroding and American hegemony (leadership and dominance) is challenged by emerging economies, such as China. In light of China's rise as a global economic super power, China wants its currency, the yuan (officially "renminbi" or "people's currency"), to play a more

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[227] CISCO, Cisco Visual Networking Index: Forecast and Methodology, 2015–2020, Table 1, http://www.cisco.com/c/dam/en/us/solutions/collateral/service-provider/visual-networking-index-vni/complete-white-paper-c11-481360.pdf

predominant role in the world's economy. Consequently, China and many other parts of the world are looking for a new reserve currency to replace the dollar. Alternatives to the dollar include switching to a new international currency, creating a new international currency linked to a "basket" of currencies or commodities, or introducing an entirely new system of digital currencies. The NTR and emerging digital economy makes the latter opinion more viable, at least in part.

Many prognosticators believe that digital money will eventually replace traditional forms of money. Digital transactions are replacing cash. Cash represents 40% of U.S. transactions compared to credit card, debit card and electronic banking payments represent 49%. Text and mobile payments only represent 1% but are increasing exponentially with the advent of smartphones and digital wallets. Smartphone usage is up from 19% 2009 to 65% in 2014.[228] A digital wallet refers to an electronic device that allows an individual to make electronic commerce transactions. According to the CEO of Starbucks, over 7 million digital wallet transactions per week represent 16% of Starbucks total revenue. The next incarnation is likely to be digital money that exists purely in electronic form. Citibank states that digital money holds the promise of stimulating economic growth and creating more efficient business and consumer financial flow for emerging and developed countries alike. The use of digital money reduces the "friction" of exchanging currencies and withdrawing cash, while increasing accountability and traceability associated with traditional money. Equally important, digital money could increase financial inclusion of 2.5 billion working age people in emerging economies that do not have access to formal financial services. Via cellphones that are widely used by even the poorest of people, billions could gain access to the digital economy.[229]

Blockchains are structured data that create distributed digital ledgers and/or records of shared transactions on an integrated network of computers. Each transaction is digitally signed to ensure authenticity without the need for a central authority. Blockchains use mechanisms to achieve consensus on transactions, define known participants and exclude outside interlopers. Examples include: currency (Bitcoins and electronic cash systems), payment systems (to send money), digital assets (to create and manage digital assets such as stocks, bonds, derivatives, titles and loyalty rewards), verify data (to record and authenticate data, files and business processes) and smart contracts (to execute and record contracts without third-party interference). Distributed ledgers maintain a complete historical record of who owns what and to whom what is owed. These ledgers could potentially create a new global, cross-border financial system without the need for government or major bank control or intervention.

The IBM Institute for Business Value with the support of the Economist Intelligence Unit surveyed 200 banks in 16 countries on their experience and expectations with blockchains. According to the IBM survey, 15% of the banks in our study expect to have blockchains in commercial production by 2018 and 66% by 2020.[230] In September 2016, Bank of America Merrill Lynch (the world's third largest investment bank after JPMorgan Chase and Goldman Sachs) announced collaboration with Microsoft Azure-powered Blockchain as a Service (BaaS) technology to transform global trade finance. This

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[228] Neilson, The Digital Consumer, February 2014, http://www.nielsen.com/content/dam/corporate/us/en/reports-downloads/2014%20Reports/the-digital-consumer-report-feb-2014.pdf
[229] Citi bank, Getting Ready for Digital Money, January 2014, http://icg.citi.com/icg/sa/digital_symposium/docs/DigitalMoneyIndex30012014.pdf
[230] BM Institute for Business Value, Leading the pack in blockchain banking - Trailblazers set the pace, 2016, file:///C:/Users/CHUCK/Downloads/GBP03467USEN.PDF

collaboration is uniquely significant since more than 75% of the world's largest banks and financial institutions use Microsoft Azure.

The digital economy is much more than digital money that is largely used for consumptive purposes. The larger part of the digital economy involves digital transactions used for ownership, investment and trade. The most vivid example of digital transaction economy is the world's stock markets that are valued at approximately $55 trillion dollars. Stock market transactions have been electronically traded for decades. With the advent of new digital applications the speed of these transactions has been dramatically improved giving rise to robo-trading to the demise of individual investors. The digital economy has also given rise to the derivatives market that is estimated at $1.2 quadrillion, or 10 times total world GDP or 20,000 times the size of the value of the all the world's stock markets.[231] [232]

Derivatives are financial instruments created to permit the risk associated with an underlying security to be sold and/or partitioned away from the primary holder of the underlying security. Derivatives started as hedges against risk in the agricultural sector insure farmers from unexpected crop failures. Derivatives were later extended to home ownership when the U.S. government created mortgage-backed securities (MBS). Using bundled mortgage-backed securities as the baseline asset, new derivatives and exotic financial instruments were created. As shown, layers of options, swaps, arbitrages were wrapped around the MBS and their underlying residential real estate asset (the home). Eventually, these layers became worth orders-of-magnitude more than the underlying mortgage that was "secured" by borrowers, many of whom were financially unstable (subprime) borrowers. When these subprime borrowers defaulted on the loans, the layers of derivatives collapsed, which in turn created the Great Recession of 2007 to 2009.[233]
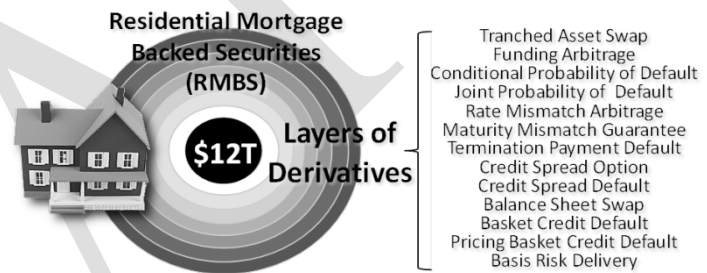
Since the Great Recession, the derivatives market has increased in value with newer forms of exotic currencies governed by a relatively small number of major financial institutions. Hopefully they will govern with prudence. In 2002, Warren Buffet described derivatives a "time bombs" and "financial weapons of mass destruction." Thirteen years later, Buffet still maintains his view that derivatives pose a threat to the global economy and financial markets.[234]

Invading Privacy: Big Brotherhood.

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[231]Investopedia, Derivatives market, http://www.investopedia.com/ask/answers/052715/how-big-derivatives-market.asp
[232] The World Bank, Market Capitalization,
http://data.worldbank.org/indicator/CM.MKT.LCAP.CD/countries?display=graph
[233] Amazon, Jobenomics, 24 August 2010, http://www.amazon.com/Jobenomics-Plan-America-Million-Jobs/dp/0984617000/ref=sr_1_1?ie=UTF8&qid=1447513190&sr=8-1&keywords=Jobenomics
[234] Exchange Traded Funds Daily, 22 June 2015, http://etfdailynews.com/2015/06/22/warren-buffett-derivatives-are-still-weapons-of-mass-destruction-and-are-likely-to-cause-big-trouble/

Not all disruptions to privacy are unwanted. Many have practical uses. Geofencing is one such example. Geofencing is a location-based application that lets administrators send messages to recipients entering a defined geographic area. Ankle bracelets use geofencing. Fleet managers use geofencing to keep drivers on route and on schedule. Via geofencing, security managers are alerted if employees enter unauthorized areas or if RFID-tagged equipment is not where it should be. Shopping malls use geofencing to send coupons to customer cellphones when near a participating store.

On the other hand, many disruptions to privacy are unwanted. Resolving right-to-privacy against the right-of-the-public to obtain relevant information will prove to be a difficult and complex process. In the physical world, the right-to-privacy is part of most legal traditions that restrains government and institutional actions that threaten a person's right to seclusion, confidentiality and personal autonomy. The virtual world is not yet limited to such traditions and may be largely immune to such limitations.

The Internet is the world's largest ungoverned space not bound by territory and largely immune to political, legal and institutional forces. The era of the cyber-paparazzi is just beginning. Damaging information will be very hard to delete once it goes viral. The "Celebgate" scandal—the hacking of approximately 200 nude celebrity photos in August 2014—shows that even stored cloud data may not be secure from invasions of privacy. As evidenced by the hacker attacks to millions of big-box store customer accounts and the Assange/Snowden leaks of classified government data, intrusion of highly secured data is, and will continue, to be an issue. Consequently, traditional privacy rights will be extremely difficult to preserve in tomorrow's ultra-networked Internet-of-Everything world where everything of significance is recorded, cataloged and stored. The NTR will make the delete button largely obsolete, especially for those with the intent and resources to retrieve even the most secure or supposedly destroyed digital data.

Big Data has already spawned a billion dollar a year data-brokering industry that lacks transparency and accountability. Data-brokering involves the collection of information from the zettabytes of data within the realm of Big Data to produce detailed portraits of individual Americans and their buying habits. According to a Federal Trade Commission report[235], data brokers collect personal information about consumers from a wide range of legal sources (public and private records, online activities, social media, credit card purchases, loyalty programs, magazine subscriptions, etc.) and provide it for a variety of purposes, including consumer profiling, identity management, marketing, political campaigns and fraud detection. Profiles are often used to measure creditworthiness, insurance, employability, as well as inclusion or exclusion from social groups. Profiles are often sold without the individual's knowledge or ability to correct false or misleading information. It is a sad aspect of today's society that data brokers often know more about individuals than do their family and friends.

With the exception of politicians and celebrities, most people's personal identity outweighs their online identity. With the advent of the NTR, this is likely to change, especially for the millennial generation that was born into the digital age and have invested significant time and energy posting intimate details of their lives in social media. Most of this online information is captured in some

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[235] Federal Trade Commission, Data Brokers, May 2014, http://www.ftc.gov/system/files/documents/reports/data-brokers-call-transparency-accountability-report-federal-trade-commission-may-2014/140527databrokerreport.pdf

data center and ripe for harvesting. A person's online identity is becoming more and more important as people's lives are correlated, cataloged and assigned to various economic, social, demographic, religious, political, cultural, geographic, educational and splinter groups.   It is conceivable that an online identity rating could be as important as today's credit rating. Identity managers will be needed to help individuals manage their online identity as well as correct or redact incorrect, misleading or malevolent content.

The European Court of Justice's decision to introduce a mechanism for individuals to delete private information from Google will be a bellwether case that will be closely watched. Even if the European Court is successful, it only addresses the tip of a very big data-storage iceberg.   Redaction of data that may reside in multiple locations with zettabytes of other data will be challenging to entirely identify, retrieve, redact and verify.

50% of the jobs lost in the Great Recession were middle-skill jobs with only 2% of the gains since the recession required middle-skills. Society for Human Resource Management (SHRM) Foundation, http://futurehrtrends.eiu.com/wp-content/uploads/sites/2/2014/06/SHRM_Middle_skilled_jobs.jpg

DATAMINE: http://www.slideshare.net/sap/99-facts-on-the-future-of-business-in-the-digital-economy

End-user portals for the digital economy are stationary and mobile devices that can access digital products store digital content or buy digital content. These devices include: public and private personal computers (PCs) and laptops, mobile phones and smartphones, personal tablets, min-tablets, e-readers, and public and private gaming consoles and hand-held gaming devices. The era of stationary PCs and public stationary devices are giving way to private hand-held mobile devices. **ENTER ECYCLINGUSA DATA**

Mobile Device Industry.   Today, *(Smartphones, Pads, Tablet) communications, apps and digital content (music, movies, TV shows, books and magazines).*

According to Cisco Systems, global mobile data traffic will grow 10-fold from 2014 to 2019. In 2014, 59% (4.3 billion people) of the world's population were mobile users in 2014. By 2019, 69% of global population (5.2 billion) is projected to be mobile users. In the United States, mobile data traffic will grow 7-fold from 2014 to 2019, a compound annual growth rate of 47%, with 290 million (86% of the U.S. population) mobile device users. China and India's mobile data traffic will grow 13-fold to 1.1 billion (74% of China's population) and 896 million (67% of India's population) mobile users by 2019. By 2019, global mobile data traffic applications will be 72% video, 19% web and other data, 7% streaming video and 2% filesharing, compared to 55%, 36%, 8% and 1% respectively in 2014. [236]

data traffic by 2019, compared to 55% at the end of 2014.

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[236] Cisco Systems, VNI Mobile Forecast Highlights, 2014 – 2019,
http://www.cisco.com/assets/sol/sp/vni/forecast_highlights_mobile/index.html

Video reached half of global mobile data traffic by year-end 2013 or earlier.

Streaming Audio will be 7% of global mobile data traffic by 2019, compared to 8% at the end of 2014.

Filesharing will be 2% of global mobile data traffic by 2019, compared to 1% at the end of 2014.

Web and other data will be 19% of global mobile data traffic by 2019, compared to 36% at the end of 2014.

http://www.ctia.org/your-wireless-life/how-wireless-works/wireless-quick-facts

Worldwide combined shipments of devices (PCs, tablets, ultramobiles and mobile phones) are estimated to reach 2.5 billion units in 2015 (1.9 billion mobile phones, 290 million mobile devices and 253 million traditional PCs and notebooks).[237]

SEE VisionMobile-Developer-Economics-Q3-2014-light.pdf in file

Rising Cybercrime/Cyberterrorism: The New Normal.

The NTR will usher in an era of cybercrime that could literally facilitate the largest negative transfer of wealth in history. A landmark study conducted by CSIS and McAfee[238] estimates that the annual cost of global cybercrime is between $300 billion and $1 trillion with more than half this amount focused on four major countries: United States, China, Japan and Germany. The study also calculates that cybercrime cost the United States over 200,000 jobs last year and predicts that the number of job losses will grow steadily as more businesses and individuals move online globally. The most important cost of cybercrime is the damage it does to national economies due to the theft of intellectual property, the negative effect it has on innovators and investors, and the additional costs of securing networks, recovering from cyber-attacks and fixing damaged reputations.

The difference between cyberterrorism and cybercrime is subtle, but powerful. The former is largely motivated by ideology and the latter by greed.   As bad as cybercrime may be, cyberterrorism could be much worse, especially if conducted by well-financed state-sponsored organizations with the intent to disrupt the stability of countries or destabilize the global balance of power.   In a world defined by different ideologies, cyberterrorism could become the weapon of choice that can be deployed directly or as a clandestine element of indirect warfare via surrogates who can provide plausible deniability for the originator.   As a superpower, the United States tends to prefer direct warfare. America's less-resourced enemies tend to prefer the asymmetric advantages of indirect warfare to exploit America's largest vulnerability—its openness. Since the NTR is a global revolution, NTR technology, processes and systems will be available to a wide array of American adversaries.

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[237] Gartner, Gartner Says Global Devices Shipments to Grow 2.8 Percent in 2015, 19 March 2015, http://www.gartner.com/newsroom/id/3010017

[238] Center for Strategic and International Studies and McAfee study: *Net Losses: Estimating the Global Cost of Cybercrime*, June 2014, http://csis.org/files/attachments/140609_rp_economic_impact_cybercrime_report.pdf

Properly orchestrated, NTR could be used as a weapon of mass disruption by cyberterrorists.

Cybercrime and cyberterrorism will be growth industries for the foreseeable future. Consequently, it is imperative that government and major civilian institutions collect and publish data on adversaries and establish policies that will mitigate risk to the constituents they serve. Today, the advantage is on the side of hackers and attackers as opposed to defenders. Consequently, the United States will need much more than an effective cyber-defense. State-of-the-art cyber-offence weapons and cyber-ISR (intelligence, surveillance and reconnaissance) assets will be needed as well. Without cyber-offence and cyber-ISR, major state-sponsored cyber-terror organizations cannot be held at bay. For countries like Iran, Russia and China, a form of cyber-MAD (mutually assured destruction) could hold enemies at bay as was done during the Cold War. For non-state actors like ISIS and Al Qaeda, MAD probably will not be effective. However, cyber-ISR would be effective in identifying terrorists and their supporters, and the cyber-offense could take down their web-based command, control, recruiting and financial systems.

Until major policy changes are made and actions implemented, cybercrime and cyberterrorism are likely to be deleterious to the U.S. economy and employment to the tune of hundreds of billions of dollars and millions of jobs. NTR corporations should play a major role in counter-cybercrime and counter-cyberterrorism, since they are the ones who are building the very systems that could lead to their demise.

NTR the Way Forward

Jobenomics defines micro-businesses as very small (1-19 employees) and self-employed (0 employees other than the owner) businesses. While the vast majority of micro-businesses stay small, some do not. Bill Gates and Steve Jobs started a micro-business in 1975/76 and became the pioneers of the Internet Technology Revolution. Today, Gates' Microsoft and Jobs' Apple are worth over $1 trillion, employ 225,000 people, and have facilitated the creation of millions of micro-businesses and tens of millions of other jobs. The NTR has the same potential as its ITR predecessor if today's pioneers enable the creation of millions of micro-businesses.

In the same way that the industrial age upended the agricultural age, the NTR will enable the information age to upend the industrial age and transform the American labor force as well as the very nature of work. Micro-business will likely play a much larger role than ever before.

NTR-enabled temporary alliances that can rapidly respond to short-term tasks are ideally suited for micro-businesses that tend to be more eager and entrepreneurial than big business. Either by nature or by necessity, contingency workers are entrepreneurial, are a reasonable response to today's changing marketplace, and offer firms workforce flexibility during seasonal or uncertain times. On the negative side, firms can take advantage of contingency workers who often receive lower wages than permanent workers. Since many contingency workers are not employees, they are not subject to labor and employment laws, nor does the firm has to pay employee-related benefits and taxes. The way to mitigate many of these negatives is to encourage contingency workers to incorporate their own micro-businesses that will provide tax revenues, labor and employment.

Jobenomics believes that an American NTR Micro-Business Initiative could boost American employment by over 20 million people within a decade. Most government and big business pundits consider this wishful thinking. But ask any small business owner or serial entrepreneur if this is doable and they would say "Absolutely!" If the CEOs of America's leading NTR corporations collaborated to monetize the social networks that they control, millions of new U.S. micro-businesses could emerge. Jobenomics invites CEO participation to build local business generators that mass-produce micro-businesses at the base of America's economic pyramid. The objective of the Jobenomics Community-Based Business Generator initiative is to increase birth rates of startup businesses, extend the life span of existing businesses, and increase the number of employees per business.

Jobenomics predicts that the NTR could enable the mass production of millions of micro-businesses. The NTR could be the great business equalizer that allows home-based, self-employed businesses to compete globally with much larger firms. Today, WWW 2.0 social networks focus mainly on media, entertainment and shopping. Tomorrow's WWW 3.0 social networks may be able to monetize the World Wide Web, creating tens of millions of new jobs. eBay, a WWW 2.0 startup in 1995, is now a multi-billion dollar enterprise located in over 30 countries, with 31,500 employees that enable millions of global micro-businesses. If properly supported, WWW 3.0 could create dozens of eBay 3.0-like enterprises.

As mentioned earlier, Alibaba defines its role as a small business champion and is aggressively supporting millions of business startups and existing business expansion in China. In 2013, two of Alibaba's web stores (Taobao's consumer-to-consumer store and Tmall's business-to-consumer store) handled $240 billion in sales, more than eBay and Amazon combined, and are on track to handle $1 trillion per year[239] in transactions with emphasis on small business. Alibaba provides free startup services and micro-business loans as part of their network services. According to Alibaba, their micro-business loan book is over $2 billion/year with a non-performing-loan ratio below 2%. With an average loan of $8,000, Alibaba underwrites approximately 250,000 micro-businesses per year.

If Mark Zuckerberg used Facebook to monetize social networks, millions of new jobs could be created. If John Chambers spent as much time developing the Internet of Business as opposed to CISCO's Internet of Things, millions of new businesses could be created. If Tim Cook turned Apple's creative energy to creating NTR-optimized iBusiness devices, billions of people around the world could be given the opportunity to conduct or build a business. The same is true of Jeff Bezos and Amazon, Satya Nadella and Microsoft, Larry Page and Google, Ginni Rometty and IBM, as well as the rest of the American CEOs involved in the NTR.

Small business is the engine of the U.S. economy. According to the U.S. Small Business Administration[240] there are 17,700 big businesses and 28.2 million small businesses with fewer than 500 employees. Of the 28.2 million small businesses, approximately 5 million are employers and 23 million are self-employed. As reported by the ADP National Employment Report[241], small businesses

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[239] International Business Times, Alibaba IPO: 5 Reasons Why The Stock Is Not Overvalued, 19 Sep 2014, Gordon Orr, Chairman of McKinsey Asia, http://www.ibtimes.com/alibaba-ipo-5-reasons-why-stock-not-overvalued-1692191
[240] U.S. Small Business Administration, Office of Advocacy, http://www.sba.gov/sites/default/files/advocacy/FAQ_March_2014_0.pdf
[241] ADP National Employment Report, http://www.adpemploymentreport.com/

employ 77% of all private sector Americans with a total of 88.7 million employees—5 times the amount of large corporations (1000+ employees). Very small businesses with fewer than 19 employees employ 65% more than all large corporations combined (29.7M versus 18.0M). Since the beginning of this decade, small business has produced 73% of all new American jobs. This is an amazing statistic, considering the adverse lending environment, mounting regulation, and the pittance of government funds allocated to small businesses.

Jobenomics believes the four U.S. micro-business sectors with the highest growth potential are Generation Y-owned, Women-owned, Minority-owned, and Veteran-owned businesses. In this regard, Jobenomics has been collaborating with experts on how to enable micro-business creation in these four sectors. Their recommendation was to create a holistic web-based platform with back office and subscription services for startups. This platform would provide a turnkey solution including e-commerce, secure cloud computing, semantic webs, financing, loans and mentoring. These services would initially be free to encourage the participation of aspiring entrepreneurs and contingency workers who would like to be business owners.

If Jobenomics can help create thousands of highly-scalable micro-businesses, via the Network Technology Revolution, America writ-large can facilitate creation of millions of micro-businesses that would transform the U.S. economy. With the leadership and commitment of the leading NTR corporations, 2015 could be a break-out year for small businesses that traditionally have been the primary source of employment for entry-level workers and the long-term unemployed.

Digital Natives, Ethnology, Ideology and Mentorship. Ethnology involves a branch of study that analyzes cultures in regard to their development, differences and relationships between various demographic groups. As in China, the NTR is transforming the U.S. economy from a traditional economy based on person-to-person transactions to a digital economy that is increasingly relying on machine-to-machine interactions. Netizens that adapt to this transformation will prosper. Those who don't, will not. Unlike China, the United States does not have a strategic vision or a unified public-private partnership to address emerging digital economy opportunities and disparities. The average Screenager compulsively communicates online 10-times as much as Millennials and 100-times the baby boomer generation.

Jobenomics' focus is on business and jobs creation, both of which, in combination, drive economic expansion. From an NTR perspective, Jobenomics sees three major cultural transformations now occurring in U.S. labor force that will have a dramatic effect on the economy and employment. The three transformations include (1) the **contingent workforce** becoming the dominant factor in the U.S. economy, (2) new labor force entrants will be much a more **NTR-savvy generation** than previous generations, which will require substantial changes to the way business is being currently conducted, (3) those who cannot adapt will be relegated to the rapidly growing **not-in-the-labor-force** netherworld of perpetual familial and government assistance, (4) the growing **power of the American small business** community and (5) the **transformation of the American industrial base**.

America's NTR-Savvy Generation.

Romans 12: forego the world and transform the renewal of your mind analogy per se for GenZ the truly digital natives in an analog world.

154 million NTR-savvy Generation Y (Millennials) and Generation Z (Screenagers) will transform the American labor force. As the world transitions from a traditional economy to a digital economy, these NTR-savvy generations will either make or break America as a global economic power.

154 Million NTR-Savvy Gen Yers and Zers Will Transform The American Labor Force

Generation	Born	Oldest Age In 2015	U.S. Population Millions In 2015		Predominant Technology Culture	Predominant Business Asperations
Gen Z, Screenagers	1996-	19	87	27%	NTR	Entrepreneurial
Gen Y, Millennials	1980-1995	35	67	21%	ITR/NTR	Aspiring-Entrepreneurial
			154	47%		
Gen X	1966-1979	49	62	19%	Analog/ITR	Intrapreneurial
Baby-Boomers	1946-1965	69	79	24%	Analog Systems	Quasi-Traditional
Great Gen	1912-1945	103	32	10%	Mechanical Systems	Traditional Employee
		Total Population	326	100%		Source: Jobenomics, U.S. Census Bureau, Ryan-Jenkins

Millennials and Screenagers represent a unique cadre of people in terms of previous generations. To many in older generations, they are the most coddled generations in history, free of any major conflicts, highly educated and lacking for any major necessity. Gen X/Yers do not agree. Their world is dominated by old folks that control the bulk of the wealth, businesses and jobs that are increasingly hard to find in a slow-growth economy and outsourcing. In times past, with the exception of a few renegades, newcomer fantasies succumbed to old folkways. However, old folkways may not have their former drawing power due to emerging network technology and the digital economy.

REDO For these individuals, entrepreneurial activities are preferred over intrapreneurial (entrepreneurial-oriented employees inside large organizations) and traditional occupations.

72% of surveyed Screenagers want to start their own business and 72% of Millennials still at "regular" jobs want to quit within two years and be entirely independent[242]. While much of this is just wishful thinking, the Network Technology Revolution just might provide many of these Millennials and Screenagers with the tools to makes their dreams come true. Conversely, the Network Technology Revolution might be the only answer for many Millennials and Screenagers who may not fit in the corporate world or the traditional labor force. Integrating them into a baby-boomer culture is a big challenge for business since they have distinct expectations and timelines that are often incompatible with today's career paths.

Of the two groups, the Millennials should be easier to integrate because of their ties to their boomer parents, team-orientation and can-do self-confidence. However, Millennials are generally not willing to trade lifestyle for a career, which makes start-ups, small businesses and self-employment more appealing workplace options. Little is known about Generation Z, the children of Generation X, who are just being to enter the labor force. While Gen Y and Z share many commonalities, they are vastly different. Gen Z is called Screenagers for a reason. They are truly the network-technology that is addicted to mobile-on-the-go pad, tablets and smartphones that are extensions to their persona.

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[242] Ryan Jenkins Next Generation Catalyst, 7 Emerging Millennial and Generation Z Trends For 2015, http://ryan-jenkins.com/2015/02/05/7-emerging-millennial-and-generation-z-trends-for-2015/, Global Messaging, Beyond Facebook: How to Market to a New Generation, https://www.globalmessaging.co.uk/index.php/beyond-facebook-market-new-generation/ &

Two-thirds of the Screenagers list gaming as their main hobby and communicate with images, emoticons (emotional icons) and emojis (ideograms or pictographs) that are more suited for the virtual world than the real world. The biggest traditional workplace challenges for Screenagers include very short attention spans, less developed face-to-face interpersonal skills, and preference of unstructured environments. If placing a Millennial is a challenge, placing a Screenager is likely to be much harder.

The good news is that the NTR is already transforming the U.S. labor force from a full-time to contingent jobs, which are more suitable for Millennials and Screenagers. Jobs will increasingly be dissected into discrete tasks, which, in turn, will be addressed by temporary collectives and virtual organizations. Team collaborative and management tools will further create "contextual" work environments that rapidly form, perform, and then reform to address subsequent tasks. Partitioning codes and algorithms will make projects even more manageable by breaking up large segments of it into smaller chunks that can be handled easily by an amalgamation of dispersed workers. Via the NTR, enterprise-level management is likely to become more decentralized and performed by remote virtual (human and automated) organizations and namespaces working in parallel with lightly staffed headquarter personnel who will function as controllers of distributed tasks and teams.

More and more brick and mortar edifices will give way to hoteling and mobile computing. Contingency workers (consultants, independent contractors, independent professionals, temporary contract workers, part-time workers, seasonal workers, freelancers, etc.) will continue to replace full-time employees. Contingent work will significantly boost micro-business growth as contingency workers become the norm, up from 31% of the U.S. labor force in 2008 to an estimated 40% in 2020[243]. According to U.S. Census Bureau projections[244], Americans under 35 years of age will represent 46% of the U.S. population by 2020—good news for Millennials and Screenagers who excel in changing, mobile, contextual and contingent work environments.

Millennials prefers to be called the "We Generation" in contrast the more derogatory "Me Generation" phrase associated with their baby-boomer grandparents. Whether this epithet is worthy of Generation Y remains to be seen, but is increasing being used to market interested NTR-related concepts. For example, WeWork is a coworking concept that is targeted for the cultural eccentricities of the We Generation. WeWork sublets office space for self-employed contingent workers. According to their website[245], WeWork's mission (movement) is to create a world where people work to make a life and not just a living—inspired, entrepreneurial, authentic, tenacious, grateful and together. Founded in 2010, WeWork is now the fastest-growing consumer of office space occupying more than 3,000,000 square feet of office space in 42 locations in 15 "high IQ" cities mainly in the United States. Office space includes a wide variety of amenities (offices, desks or just common spaces) replete with food (free beer), office equipment and supplies, IT and back office support, and 24/7 social networking with over 20,000 "creators and entrepreneurs" in WeWork's prominently We-Gen worldwide network. Valued at $5 billion, WeWork market capitalization is over twice its rival Regus that has 2,500 locations in 110 countries. WeWork's ambitions go well beyond coworking and extend into coliving. Later this year, WeLive is scheduled to go live in an upscale suburb of

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[243] Bloomberg Business Week, 20-25 October 2014 Edition, Companies/Industries, Page20

[244] U.S. Census Bureau, Table 9. Resident Population Projections by Sex and Age: 2010 to 2050
http://www.census.gov/compendia/statab/2012/tables/12s0009.pdf

[245] WeWork, https://www.wework.com

Washington DC called Crystal City, Virginia. Crystal City residents can live, shop, and work without going outside, due to its extensive integration of office buildings and residential high-rise buildings using underground corridors. With WeLive, residents can now live-work-shop-play in an ultra-modern network centric ecosystem specializing on the contingent, self-employed, We-Gen (and upcoming Y-Gen) labor force. Whether WeWork is the office of the future or a $5 billion waste of space (as postulated by Bloomberg Business[246]) is uncertain. What is for certain is that the idiosyncrasies of Gen Y/Z coupled with the brilliantly innovative and creatively destructive qualities of the NTR will transform the way that Americans live-work-shop-play.

Annual Average Expenditures in 2014
Source: BLS Consumer Expenditure Survey
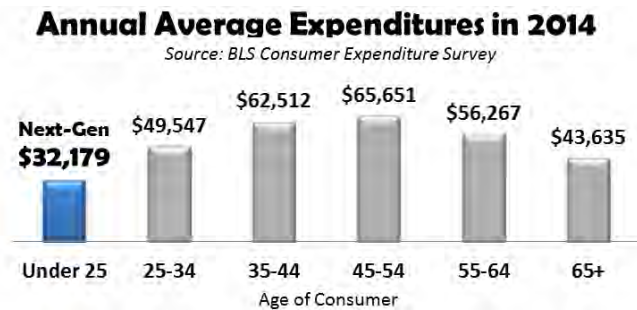
According to the BLS' Consumer Expenditure Survey 2014, the annual average expenditure of the Next-Gen Americans under 25-years of age was $32,179.[247]

Potential Next-Gen Consumption Changes

Sources: BLS Consumer Expenditure Survey 2014 Fata, Jobenomics Forecast	In 2014		In 2024		
	Under 25	25-34	25-34	Change	
Food	$4,423	$6,632	$6,632	0%	
Housing	$11,459	$17,404	$8,000	-54%	Downsize/Rent
Transportation	$6,167	$8,908	$3,000	-66%	Taxi/Car Share
Entertainment	$1,319	$2,418	$3,594	49%	**NTR Increase**
Insurance/Pensions	$2,240	$5,472	$2,240	-59%	Reduce/Delay
Other expenditures	$6,571	$8,713	$8,713	0%	
	$32,179	$49,547	$32,179	-35%	

2014 Level

Given the cultural differences and economic priorities of Screenagers who spend 7 hours a day online (11 hours per day if listening to music is included), it is likely that next-generation consumers will have significantly different spending habits than former generations. The above graphic shows a hypothetical projection if Screenagers maintained their lifestyles at $32,179 rather than increasing to $49,547, the level currently maintained by today's Millennials. Maintaining the same quality-of-life would not be that difficult by delaying child bearing, downsizing housing or renting, using applications like Uber or car sharing to eliminate major transportation expenditures, and reducing or delaying retirement savings and depending on government healthcare. Reduction in consumption by the Next-Gen could reduce U.S. GDP consumption as much as 5% ($1 trillion per year) by 2024, which would have a profound economic impact.

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[246] BloombergBusiness, Is This the Office of the Future or a $5 billion Waste of Space?, 21 May 2015, http://www.bloomberg.com/news/features/2015-05-21/wework-real-estate-empire-or-shared-office-space-for-a-new-era-
[247] BLS, Consumer Expenditure Survey 2014, Table 1300, http://www.bls.gov/cex/2014/combined/age.pdf

One would think that the NTR would liberate Gen Y from high-priced urban areas, but the opposite is currently the case as that digital economy has made urban clusters, like Silicon Valley and other "innovation" areas a magnet for new jobs and high-paying careers. [248] Generally speaking, innovation areas are communities with a high amount of skilled workers. College and university towns tend to be associated with high skill areas. Affluent areas are also replete with skilled workers, due to their ability to afford higher and better education and STEM degrees. Cities and communities with large pools of under educated, poor and unemployed workers tend to have high concentrations of unskilled workers. While NTR achievements have created a number of new careers and industries, these advancements have largely benefitted disproportionally skilled communities and correspondingly hurt unskilled communities, like inner-cities and old manufacturing oppidans like Detroit and Cleveland.

The average size of a new American single-family home is approximately 3,000 square feet at an average cost of $365,000. The monthly mortgage cost at 4% on a 30-year loan for a $350,000 is $1,742, which is unaffordable for most new workforce entrants. Consequently, Gen Z/Yers are trending toward micro-living accommodations. The Small House Movement includes individuals and families that have downsized to 1000 square feet or less. In 2015, the average size of a new American single-family home was approximately 2,700 square feet. are typically less than 500 square feet. Tiny homes are often mounted on mobile platforms to avoid municipal bylaws and property taxes associated with larger stationary homes.

Online Shopping Behavior. http://www.nielsen.com/content/dam/corporate/us/en/reports-downloads/2016-reports/connected-commerce-report-jan-2016.pdf
America's Growing Cadre of Able-Bodied Citizen Departing the Labor Force.
, 154 million NTR-savvy Generation Y (Millennials) and Generation Z (Screenagers) will transform the American labor force.
Georgetown Study: https://cew.georgetown.edu/wp-content/uploads/Good-Jobs_Full_Final.pdf

Your paper brain and your Kindle brain aren't the same thing http://www.pri.org/stories/2014-09-18/your-paper-brain-and-your-kindle-brain-arent-same-thing

Out of 6.6 million jobs added in the recovery, 2.9 million (44%) were good jobs (>$53,000), 1.9 million jobs (29%) created in the recovery were middle-wage jobs ($53,000 to $32,000), and compared to just 1.8 million (27%) low-wage jobs (< $32,000). 14% of good jobs are part-time compared to 20% of middle-wage jobs and 38% of low-wage jobs. Since the end of the Great Recession in 2010, part-time employment has persisted among low-wage jobs, while the share among middle-wage and good jobs has declined to near prerecession levels. In addition to wages, full-time low-wage earners have significantly less employee benefits (health insurance and retirement plans) than other earners. Part-time workers in all categories generally have to provide for their own benefits, if any.

The Growing Power of the American Small Business Community.

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[248] Oxford/Citi GPS, The Concentration of New Work and the Rise of Innovation Cities, February 2015, Page 64, http://www.oxfordmartin.ox.ac.uk/downloads/reports/Citi_GPS_Technology_Work.pdf

Jason Lanier, Who Owns the Future?:

Lanier's fundamental point is that power and wealth have drifted upward in the digital economy and toward what he calls "Siren Servers." These giant information-gathering "services" — ranging from Facebook and Google to giant financial players and the government surveillance industry — take data that we all provide freely (and, often, enthusiastically) and use their advantages in data collection to build enormous economic fiefdoms. He suggests a way to re-engineer our networked world to recreate a middle class.

- The internet-based economy has created wealth for only a selected few collecting, analyzing and monetizing data provided "free" from masses of people.
- Software could become the final industrial revolution.
- "The internet has destroyed more jobs than it has created." Page 19
- "If we go on as we are, we will probably enter into a period of hyper-unemployment, and the attendant political and social chaos." Page 8
- Stagnant economies are a zero-sum game that creates winners and losers. Growing economics generate surplus that can be managed to provide wealth to the creators of new applications as well as the users that provide data and intellectual capital. Today, the preponderance of wealth flows overwhelmingly to the creators.
- The net centric enterprises that currently manage the information economy (Amazon, Google, Facebook, etc.) provide information and entertainment value to their users, but few monetary rewards. As the information economy supersedes today's traditional economy, this disparity will increasingly undermine America's middle class. It will also eventually undermine the net centric enterprises that are inadvertently shrinking markets that sustain the middle-class workforce. While driving down prices for consumers has economic benefit, information systems are used by Large online and retail enterprises use NTR technology to obtain, search and analyze consumer data to competitively price products. Small businesses lack this advantage and have lost significant market share as a result. Lower margins means less employment for these small businesses that employ 80% of all Americans. In order to an information economy to flourish, it needs to provide enough online income opportunity to grow the overall economy at rates that will enable the creation and sustenance of many micro-enterprises.
- NTR is ushering in an era of a new fiat currency accounted and disbursed in a net centric information economy increasing characterized by micro-tasking and micro-payments proportional to the degree of contribution and value. Micro-payments can consist of traditional forms money (cash), new forms of currency (bitcoins), credits or even barter. Powerful networks that handle gargantuan amounts of data and never forget are ideally suited to managing new forms of fiat currency. However, without proper protocols, standards and scrutiny, an information economy is rife for exploitation, manipulation and corruption. NTR technologies, processes and systems currently serve their corporate masters who via their automated agents know more and react faster to economic opportunities than the general public. Automated high frequency trading serves as an example that provides significant advantage to high-tech financial institutions over small investors.

- Top-down networks will continue to dominate and control the information economy for the foreseeable future. However, top-down networks can greatly benefit by supporting network forms of collaboration between peer-to-peer entities and various communities-of-interest. By

enabling and encouraging mashups (peer-to-peer work from more than one source) creatively and derivative works can flourish. The term mashup is often used in music where artists combine audio and video from various sources to create something entirely new. In web parlance, mashups tend to personalize and customize data and content to create applications like Wikipedia, destination maps and tailored applications for different communities-of-interest. More importantly from a Jobenomics perspective, mashups tend to propagate and create new mashups and businesses. Large, powerful and well-resourced top-down corporations supported by multitudes of fast moving, creative peer-to-peer mashups could well be the answer to a robust information economy and employment.

- The internet should remain free with equal access and transparency for all. Data and intellectual capital provided to the internet should be semi-free. Users should have the opportunity to contribute information free of charge to build a following. As their brand matures, these users should be afforded the opportunity to capitalize on their contributions to provide income. Today's information economy is simply not doing enough for the people not at the top of America's social/economic pyramid. To make an information economy meaningful, digital workers would be paid directly their contributions or indirectly for past contributions. Direct payment could be cash or credit. Indirect payments could be royalties, discounts, or free services. As the digital information economy matures, more and more people could receive hundreds of micro-payments or thousands of nano-payments for their ongoing contributions.

- To make a digital economy work for workers at all levels, requires new protocols that will: (1) provide system-wide transparency, (2) assign value for time and contributions, (3) protect digital-rights of users and contributors, (4) secure content and domains from copying, piracy and scamming, (5) adjudicate disputes, and (6) administer judgments to insure integrity of the entire online financial ecosystem. In the same way that spam-filters block junk mail and security software blocks malware, these new protocols would block offenders and dubious entities/URLs from the digital information economy.

U.S. e-commerce companies should play a large role in domestic microbusiness development in order to build brand and facilitate overall domestic economic growth and employment. In Jobenomics lexicon, there are three general startup assistance categories: business incubators, business accelerators and business generators. Business incubators tend to focus high-tech, silver bullet innovations that have extraordinary growth and employment potential. Business accelerators focus on expanding existing businesses in order to make them larger and more profitable. The Jobenomics business generator concept involves mass-producing small and self-employed business with emphasis on lower-tech but plentiful services businesses at the base of America's economic pyramid. America's leading e-commerce company is beginning to implement domestic microbusiness development programs but not to the extent of Asian web-only companies.

Launched in 2006, Amazon Mechanical Turk[249] is a network hub that provides an online labor pool usable by corporations, governments and individuals for tasks of any scale. Amazon Mechanical Turk is a marketplace for work that requires human intelligence. The Mechanical Turk service gives businesses access to a diverse, on-demand, scalable workforce and provides contingent workers a selection of several hundred thousand tasks for bid. According to Amazon, Mechanical Turk is based on the premise that there are many tasks that a large temporary workforce can do much more effectively than computers.

As originally designed, Mechanical Turk was ballyhooed as the panacea for the task-oriented contingent labor force. Unfortunately, it has fallen short of its original goals. Since it is a top-down system, Amazon controls the master database as opposed to a two-way system that allows workers to collaborate with peers.   Peer-to-peer relationships are important to form sustainable communities of knowledge workers and service industries. Top-down systems often denigrate the labor force by lowering wages and outsourcing trivial tasks that cannot otherwise be accomplished by automated systems. According to the prestigious Massachusetts Institute of Technology[250], by 2010 Amazon Mechanical Turk was failing to deliver on its core promise and had become a site where 40% of all tasks were spam. Today, Amazon Mechanical Turk is providing higher quality output but it is still sub-optimized for creating wealth. However, Jobenomics contends that success of network hubs like Amazon Mechanical Turk is essential for the success of our emerging information economy and that Amazon will achieve its original design goal of providing fair value for the task-oriented labor force.

In July 2015, Amazon started Amazon Launchpad[251] for startups to launch, market, and distribute their products to hundreds of millions of Amazon customers across the globe. The program offers a streamlined onboarding experience, custom product pages, a comprehensive marketing package, and access to Amazon's global fulfillment network. In addition, Amazon is working with more than 25 venture capital firms, startup accelerators, and crowd-funding platforms to bring startups into the program. Jobenomics applauds Amazon's Launchpad initiative and believes that this program may have greater wealth creation potential than Mechanical Turk, although both are synergistic and necessary.
Amazon Launchpad can help all three categories from mass employment created by a single high-tech solution (e.g., Apple and IBM) to mass employment created by millions of new lower-tech services micro-enterprises. American micro-businesses with less than 20 workers currently employ approximately 70% more workers than large corporations with more than 1,000 employees. Initiatives like Amazon Launchpad can help make this percentage even larger and, more importantly, hire millions of contingent and low-skill workers that are not ideally suited for full-time work in the corporate world.

Information obtained from data-mining is also used to gain control over markets and force weaker companies out of business. Two examples include predatory pricing (pricing goods or

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[249] Amazon Mechanical Turk, https://www.mturk.com/mturk/help?helpPage=overview
[250] MIT Technology Review, How Mechanical Turk is Broken, 3 January 2010, http://www.technologyreview.com/view/416966/how-mechanical-turk-is-broken/
[251] Amazon Launchpad, http://www.amazon.com/gp/launchpad/signup

services at such a low level that other suppliers cannot compete) and high-frequency trading (automated trading algorithms that allow stock market traders to scan and execute exchanges in mini-seconds in order to provide a huge advantage in the open market).

   o Predatory pricing has helped companies like Walmart to become the largest employer in the United States with 1.3 million employees (2.2 million worldwide) and Target, Kroger, Home Depot with approximately 350,000 employees each. The rise of Walmart has been extraordinary and has redefined the global retail market. Because of the massive scale it works on, Walmart can afford to price its merchandise at a lower-than-traditional price, providing its shoppers with "Everyday Low Prices". On the other hand, the rise of Walmart contributed to closure of tens of thousands of small businesses, demise of thousands of American-made consumer products (it is estimated that 90% of Walmart products are manufactured overseas), and erosion of the American middle-class. According to a recent analysis reported by Forbes[252], "Walmart's low-wage workers cost U.S. taxpayers an estimated $6.2 billion in public assistance including food stamps, Medicaid and subsidized housing…. Walmart told analysts last year that the company has captured 18 percent of the SNAP (food stamp) market…$13.5 billion out of $76 billion in food stamp sales in 2013."   On the bright side, Walmart has begun to institute a number of programs to mitigate its adverse social impact on American small businesses and low-wage earners as well as "thinking in broader terms about what an item actually costs society to produce and deliver – from the bottom to the top of the supply chain – the 'true' cost of a product". According to Walmart's 2015 Global Responsibility Report[253],

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AltSchool: https://www.altschool.com/about-us#about-us.
http://www.npr.org/2015/05/07/404859293/altschool-promises-to-reimagine-education-for-the-2030s

Founded and run by a former Google engineer and using $133 million worth of funding from the founder of Google and other venture and philanthropic sources, AltSchool is a collaborative community of micro-schools that uses outstanding teachers, deep research, and innovative creative collaboration tools to offer a personalized, whole child learning experience for the next Generation Z. AltSchool's goal is to do away traditional educational methods by implementing data capture and analysis that is used to tailor ("personalize") lessons and social interactions to a student's interests and educational needs.

AltSchool's engineers and educators are developing technology and software that function as "an operating system for education" in order to foster "introspective, conscientious and entrepreneurial" Gen Z learning. Children have tablets and laptops, which they use to complete a personalized "playlist" of lessons, projects and activities, updated each day. Classrooms are outfitted with fisheye-lens cameras, for a 360-degree view at all times, sound recorders with RFID/GPS-equipped wearable

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[252] Forbes, Report: Walmart Workers Cost Taxpayers $6.2 Billion In Public Assistance, 15 April 2014, http://www.forbes.com/sites/clareoconnor/2014/04/15/report-walmart-workers-cost-taxpayers-6-2-billion-in-public-assistance/
[253] Walmart, 2015 Global Responsibility Report, http://www.corporatereport.com/walmart/2015/grr/2015_WALMART_GRR.pdf

devices (in development) to track students movements—all of which enable educators and parent to evaluate learning progress, subject interest, social interactions and emotional issues (from Eureka moments to meltdowns). For students that cannot attend at the classroom, teleconferencing and educational robots are provided. AltSchool also uses digital tools to help teachers develop Personalized Learning Plans and to capture student progress and to create platforms for efficient classroom administration so teachers have more quality face-to-face time with their students.

AltSchool is currently operational in eight K-8 schools in San Francisco, Palo Alto and Brooklyn with plans to expand to 20 schools in the near future. Students are selected from a diverse cross-section of communities. Typical tuition is $21,000 per year with 1/3 of the low-income students on scholarships.

Etsy, an online marketplace for arts and crafts, enables artisans to reach global markets even from deprived areas. Founded in 2005 in the New York City borough of Brooklyn, Etsy now has 1.7 million active sellers with 35 million items for sale, and 26.1 million active buyers who purchased $2.4 billion items from nearly every country in the world. Via the NTR, Etsy connects creative entrepreneurs to shoppers looking for things they can't find anywhere else.[254]

Classroom interactive audio/visual management systems: security + automated and interactive education

http://thejournal.com/Articles/2015/08/11/3-Key-Trends-in-AV-Technology-for-Schools.aspx?Page=2

Hierarchically linked microblogs/microposts. Microblogs are incorporated in different websites.

Application-Centric IT Management. Three applications categories: active, test and inactive. https://www.techopedia.com/2/31264/trends/what-exactly-is-application-centric-it-management?utm_campaign=newsletter&utm_medium=best&utm_source=09022015

he State Of Mobile And The App Economy In 2015 http://www.forbes.com/sites/eladnatanson/2015/05/26/the-state-of-mobile-and-the-app-economy-in-2015/ In 2015 the app economy, the revenue driven through mobile apps and related activities, is expected to reach as $100 billion. http://www.forbes.com/sites/roslynlayton/2015/01/09/2015s-100-billion-dollar-question-what-drives-the-mobile-app-economy/ The global app economy was worth $ 53Bn in 2012, and expected to rise to $ 68Bn in 2013. It is growing at a 28% CAGR between 2012 and 2016, reaching $143 Bn in 2016. In 2012, the global app economy accounted for 18% of the combined app services & handset market. We estimate that by 2016 the contribution of the app economy will rise to 33% of the combined market, equivalent to half of the handset market. http://www.developereconomics.com/report/sizing-the-app-economy/

40 Zettabytes by 2020. http://www.appdevelopersalliance.org/infographics/data-flow

Microjobs:

http://techwelkin.com/micro-jobs-opportunities-top-websites-freelance-work

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[254] Etsy, About, https://www.etsy.com/about/?ref=ftr

http://www.flexjobs.com/About.aspx

http://www.flexjobs.com/jobs

Most Desirable Companies With Flexible Jobs

Source: Flexjobs Database

Google	McKinsey & Company	Pfizer	Electronic Arts – EA
Apple	General Electric – GE	Unilever	L-3 Communications
Facebook	Johnson & Johnson	Fox	NBC Universal
Microsoft	Netflix	Sephora	Forbes Media
Nike	Bloomberg	Lockheed Martin	Hilton Worldwide
Walt Disney Company	Twitter	Samsung Electronics	Whole Foods Market
Tesla Motors	Yahoo	Boeing	IBM
Procter & Gamble	Under Armour	The New York Times	Oracle
Starbucks	Adobe	Warner Bros.	Exxon Mobil
Shell	Salesforce	Coca-Cola	Airbnb
Amazon	ESPN	Goldman Sachs	Sony Pictures

According to Flexjobs, "each of these 44 employers offers some combination of work flexibility including part-time schedule, temporary, freelance, telecommute, alternative schedule, and flexible schedule."[255] A "flexible job" is defined as a professional-level job that has a telecommuting, flexible schedule, freelance, seasonal, or part-time component. And people seek out flexible work for a variety of reasons: work-life balance, family, time savings, and commute stress. In 2016, the fastest-growing flexible job categories (out of over 100,000 job listings in 50 Flexjobs categories) include Government & Politics, Engineering, Project Management, Communications and Travel & Hospitality.[256]

https://microworkers.com/

https://www.taskrabbit.com/how-it-works

https://www.fiverr.com/

https://www.elance.com/

https://microworkers.com/

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[255] Flexjobs, 44 Most Desirable Companies with Flexible Jobs, by Ann Rozier, 27 March 2016, https://www.flexjobs.com/blog/post/most-desirable-companies-with-flexible-jobs/

[256] Flexjobs, 5 Flexible Job Categories on the Rise, 1 August 2016, https://www.flexjobs.com/blog/post/flexible-job-categories-rise/

http://www.forbes.com/sites/moneybuilder/2012/07/27/cant-get-a-job-get-a-microjob/
DOWNSIDES

http://techwelkin.com/micro-jobs-opportunities-top-websites-freelance-work GOOD

https://www.mturk.com/mturk/welcome AMAZON MECHANICAL TURK (200,000+ HITs: Human Intelligence Tasks) https://www.mturk.com/mturk/help?helpPage=worker#how_complete_hit

Wool & the Gang (WATG)[257], a British e-tailor, is a combination tech startup and social club that specializes in knitting designer clothes for the Facebook generation. Today, WATG is featured in major fashion magazines, such as Vogue and Teen Vogue, with knitting clubs in dozens of major cities across the United States and United Kingdom. WATG sells its own brand of quality knitting supplies as well as ready-made clothing. However, this e-tailor has created a fashion sensation by designing and producing on-demand, custom-made apparel for clients around the global using an army of knitters, many women, that band together in social clubs to knit, socialize and earn supplemental income. WATG knitters (called gangstas) earn approximately 78% of the sale price of the item, which is significantly higher than most e-commerce communities. WATG corporate makes money via advertising, supply sales (the gangstas must buy and use wool from WATG) as well as 22% of the sales price. From a Jobenomics NTR perspective this is a win-win model that can be replicated across many other product lines and industries.

The White House, United Nations and World Bank are embracing a concept called Cash on Delivery Aid (COD Aid) that pays for measurable and verifiable progress on specific outcomes.[258] What these organizations are beginning to understand is that giving money directly to aid recipients is often more beneficial than disbursing funds to large organizations or charities with high overheads. Via NTR software, philanthropic, humanitarian and government institutions can bypass middlemen and go directly to recipients for measureable and verifiable projects, especially small businesses that can generate jobs at the base of a nation's or community's economic pyramid. Backed by investors, like LinkedIn (a leading U.S. NTR company), two Harvard-trained development economists (Paul Niehaus and Michael Faye) recently started a network-centric company (Segovia) that is dedicated to fighting the global hunger epidemic that affects nearly 4 billion people. Segovia integrates data and decision-making in a secure, scalable, closed-loop system to make teams faster, safer, more accurate, and ultimately better able to deliver to those in greatest need.[259] Instead of donating near-term goods and services, the Segovia model gives poor families cash to invest in their long-term needs, which has resulted in cutting the number of hunger days by half and increasing family earnings by one-third.[260] From a Jobenomics perspective, this kind of technology could be applied to small business creation in financially-distressed communities. In addition to cash infusion, NTR systems could monitor and assess progress as well as providing back-office support for those engaged in the digital economy.

PhoenixMart tenants can be found both offline (in-person within PhoenixMart) and online through our   Interactive   E-Commerce   Marketplace.[261]

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[257] Wool & the Gang, http://www.woolandthegang.com/
[258] Center for Global Development, Cash on Delivery Aid, http://www.cgdev.org/initiative/cash-delivery-aid
[259] Segovia, http://www.thesegovia.com/about#mission
[260] TechCrunch, With Reid Hoffman's Backing, Development Economists Build Segovia, A Startup That Tackles Poverty, 1 October 2015,http://techcrunch.com/2015/10/01/segovia/
[261] PhoenixMart, http://phoenixmart.com/#promise

http://www.forbes.com/sites/larrymyler/2015/07/31/phoenixmart-largest-convergence-marketplace-in-the-western-hemisphere/ Yiwu Bazaar in China, DragonMart in Dubai or PhoenixMart in Arizona are places where the traditional and digital economies intersect. PhoenixMart is a more than 1.5 million square-foot trade center connecting thousands of North American manufacturers, wholesalers and distributors with domestic and global buyers. It's designed as a comprehensive sourcing marketplace combining worldwide variety of quality products at competitive prices in one convenient location. This combination of collaboration, e-commerce, logistics, frequent trade events and exceptional services connects each tenant and their products directly to the marketplace. PhoenixMart is the centerpiece of a much larger master-planned complex entitled North American Logistic, Trade and E-commerce City (NALTEC). A master-planned 585 acre community developed for the purpose of business convergence. Anchored around the PhoenixMart site, NALTEC will include commercial and residential buildings, hotels/resort, restaurants and entertainment centers—a place not only to work, but to live and be entertained in a hybrid traditional/digital economic environment.

 focuses on results, encourages innovation, and strengthens government accountability to citizens rather than donors. Under COD Aid, donors would,

The top 10 internet and technology trends for 2014 https://agenda.weforum.org/2014/01/the-top-10-internet-and-technology-trends-for-2014/
1. The Internet of things
2. Wearable devices
3. Augmented reality. The market for augmented reality mobile apps is predicted to grow this year and, according to Juniper Research, revenues will reach $5.2 billion by 2017. http://www.mobilemarketer.com/cms/news/research/14159.html
4. Big data and machine learning algorithms
5. 3D printing
6. Intraday delivery
7. Mobile payment and virtual currencies. NFC-enabled devices, digital wallets and Beacon, PayPal's new wireless payment solution, are steadily reaching the mass market, allowing consumers to pay for things without a wallet or cash.
8. Electric cars
9. E-Learning

industrial Internet of Things http://www.cnbc.com/id/101599574#.

Top 10 Strategic Technology Trends for 2015

Merging the Real World and the Virtual World	1	Computing Everywhere
	2	The Internet of Things
	3	3D Printing
Intelligence Everywhere	4	Advanced, Pervasive and Invisible Analytics
	5	Context-Rich Systems
	6	Smart Machines
The New IT Reality Emerges	7	Cloud/Client Computing
	8	Software-Defined Applications and Infrastructure
	9	Web-Scale IT
	10	Risk-Based Security and Self-protection

http://www.computerworld.com/article/2692619/gartner-lays-out-its-top-10-tech-trends-for-2015.html

1: Computing Everywhere. To Gartner, this simply means ubiquitous access to computing capabilities. Intelligent screens and connected devices will proliferate, and will take many forms, sizes and interaction styles. Cearley warned that IT departments are not well suited for the design challenges involved in ubiquitous availability, and said companies may need to acquire the expertise. (He may have been pointing to Capital One, which recently acquired Web design firm Adapative Path.)

2: The Internet of Things (IoT). Clearley's advice to IT managers is to experiment, get ideas going and empower individuals in IT organizations to develop uses for connected devices and sensors. Cearley believes IoT has enormous potential to deliver value to businesses, and said even small sensors that can detect problems in equipment before failure occurs, can save a business thousands of dollars.

3: 3D printing. The technology has been around since 1984, but is now maturing and shipments are on the rise. While consumer 3D printing gets a lot of attention, it's really the enterprise use that can deliver value.

4: Advanced, Pervasive and Invisible Analytics. Every application is an analytical app today. Advanced, Pervasive, Invisible Analytics. Analytics will continue to grow propelled by the Internet of Things, creating large pools of data. Every app will need to be an analytic app. But big data isn't the most important thing: instead we'll need big questions and big answers.

5: Context Rich Systems. Knowing the user, the location, what they have done in the past, their preferences, social connections and other attributes all become inputs into applications. Context-Rich Systems, Thanks to embedded intelligence and analytics, systems will become alert and responsive to their surroundings. Expect context-aware security as well as other trends.

6: Smart Machines. As an example, Cearley pointed to global mining company Rio Tinto which operates autonomous trucks, to show the role smart machines will play.

7: Cloud and Client Computing. This highlights the central role of the cloud. An application will reside in a cloud, and it will be able to span multiple clients.

8: Software Defined Applications and Infrastructure. IT can't work on hard coded, pre-defined elements; it needs to be able to dynamically assemble infrastructure, said Cearley.

9: Web-Scale IT. This is akin to adopting some of the models used by large cloud providers, including their risk-embracing culture and collaborative alignments. Web-scale IT methodology pertains to designing, deploying and managing infrastructure at any scale and can be packaged in a number of ways to suit diverse requirements and can scale to any size of business or enterprise. It is not a single technology implementation, but rather a set of capabilities of an overall IT system.

10: Security. In particular, Gartner envisions more attention to application self-protection.

Solar mobile commentary ETR. Net-Zero Communities. Wireless homes. Innovation Districts[262], Innovation Clusters[263] "Innovation clusters require six key ingredients: skills, skills and talent, accommodating policy frameworks, infrastructure, low costs (especially in the early stages), a good lifestyle offering to draw talent, and finally good luck, whether geography (proximity to key markets), historical accidents or even good fortune."

Generation Z. If marketers thought they threw out the playbook with millennials, they need to know that Gen Zers aren't even playing on the same field. Gen Z consumers range from ages 2 to 19, though the target range for marketers lies from ages 11 to 16. These youngsters, born after 1995 and unaware of a world without internet, live a life that seems a million miles removed from the hopes, dreams and morals of previous generations. http://www.businessinsider.com/afp-generation-z-born-in-the-digital-age-2015-2#ixzz3bAaJotce

Artificial intelligence, human brain to merge in 2030s, says futurist Kurzweil. Ray Kurzweil, Google's director of engineering and a noted futurist and inventor, envisions a more co-operative future. He says the human brain will soon merge with computer networks to form a hybrid artificial intelligence. "In the 2030s we're going to connect directly from the neocortex to the cloud," said Kurzweil, speaking at the Exponential Finance conference in New York on June 3. By linking our brains to cloud computers, claims Kurzweil, humans could expand the limits of our own computing ability — and eventually, upload our own brains to the cloud.http://www.cbc.ca/news/technology/artificial-intelligence-human-brain-to-merge-in-2030s-says-futurist-kurzweil-1.3100124

Properly structured and supported the NTR can lift tens of millions of financially distressed Americans out of poverty. Most Americans would prefer a life of self-sufficiency as opposed to a life of

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[262] Brookings, The Rise of Innovation Districts: A New Geography of Innovation in America, by Bruce Katz and Julie Wagner, May 2014, http://www.brookings.edu/~/media/Programs/metro/Images/Innovation/InnovationDistricts1.pdf
[263] The Economist Intelligence Unit, Innovation Clusters: Understanding Life Cycles, March 2015, http://destinationinnovation.economist.com/wp-content/uploads/sites/3/2015/12/ICUL1.pdf

dependency on public or familial assistance. People on the fringes of the U.S. labor force represent ideal candidates that innovative NTR solutions could provide. Two such groups include young parents and retiring baby boomers.

Young Parents.   Having a child is an expensive proposition and many young adults are deferring having children for financial reasons. The cost for infant care, toddler care and school-age care has risen to the point that deters many from starting a family or restricts young parents from entering the workforce. According to Child Care Aware of America[264], the average annual cost of center-based daycare in the United States is approximately $12,000 per child.

In 2013, New York had the daycare highest costs and Louisiana had the lowest as shown. Also shown is the percentage cost for single mothers and two-parent families for each state. As a percentage of median income, the costs for a licensed Child Care Center are prohibitive for most single mothers two-parent families. Consequently, only 35% of 11 million children of working parents younger than five have access to some type of licensed child arrangement, such as a child care center, preschool or Head Start.   The remaining 65% of children are attended by: relatives or friends; some form of licensed, legally unlicensed, or illegal home-based daycare; or left unattended or abandoned. Needless to say, daycare represents a huge drain on the economy and labor force, as well as a major deterrent to child bearing in an aging nation.

Child Care Center Cost		
Infant/Toddler	Pre-School	School-Age
New York $14,508	$12,280	$11,352
Louisiana $5,655	$4,882	$1,086

Cost of Care as % of State Median Single Mother Income		
Infant/Toddler	Pre-School	School-Age
New York 56.0%	47.4%	43.9%
Louisiana 29.4%	25.4%	5.7%

Cost of Care as % of State Median Two-Parent Family		
Infant/Toddler	Pre-School	School-Age
New York 15.9%	13.4%	12.4%
Louisiana 6.9%	6.0%	1.3%

Source: Child Care Aware of America

Retiring Baby Boomers.   According to AARP (formerly the American Association of Retired Persons)[265], the majority of long-term services and supports are provided by family members, but the supply of family caregivers is not keeping pace with future long-term support services. Today, the ratio of potential caregivers for every person in the high-risk years of 80-plus is 7:1. Fifteen years from now, the ratio will be 4:1. The majority of retiring baby boomers rely on family members who will likely be unable to provide support due to a shrinking base of caregivers, the hollowing-out of the American middle-class wage earners, longer lifespans with increased age-related maladies (like Alzheimer's), and inadequate retirement resources. Only 60% of baby boomers report having any retirement savings, up sharply from 20% five years ago.[266]

In addition to retirement costs, aging baby boomers face serious healthcare challenges. By 2020, older Americans are projected to need 20 million personal-care, assisted-living or managed-care

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[264] Child Care Aware of America, Parents and the High Cost of Child Care, 2014 Report, usa.childcareaware.org

[265] AARP, The Aging of the Baby Boom and the Growing Care Gap: A Look at Future Declines in the Availability of Family Caregivers, August 2013, http://www.aarp.org/content/dam/aarp/research/public_policy_institute/ltc/2013/baby-boom-and-the-growing-care-gap-insight-AARP-ppi-ltc.pdf

[266] Insured Retirement Institute, Boomer Expectations for Retirement 2015, http://myirionline.org/docs/default-source/research/iri-boomer-expectations-for-retirement-2015-fifth-annual-update-on-the-retirement-preparedness-of-the-boomer-generation_2.pdf?sfvrsn=2

beds. Today, only 3 million such beds are available. Building new elder-care facilities are not the answer with financially strapped senior citizens who cannot afford typical $5000 to $15,000/per month fees for these facilities. As a result of these factors, baby boomers will either have to work longer, find ways to supplement retirement income, or rely on government entitlement and welfare programs, which are already unaffordable. It would also help the families of the elderly, who are often faced with the difficult choice of leaving work to care for an elderly parent, or finding an expensive nursing home.

If properly planned and implemented, the NTR can provide solutions to financially-challenged young people considering child bearing and retiring baby boomers as well as providing relief to strained government budgets. A national Direct-Care Initiative for elder care and child care would involve in-home services provided by large, medium, small and micro businesses managed by community-based direct-care centers equipped with the latest NTR technology, processes and systems. A number of factors are expected to lead to job growth in direct-care including: (1) growing population, (2) longer life expectancy, (3) chronic and age-related disease growth, (4) improved service-providing technology and (5) increasingly generous healthcare and welfare programs.

Rise of the Single-Person Household. One of the key changes is the increase in single-person households: adults living alone. Between 2000 and 2014, the number of single-person households increased from 26.6 million to 34.2 million and by 2030 single-person households are projected to reach 41.4 million.

Deloitte University Press, Single-person households: Another look at the changing American family, Behind the Numbers, November 2015, http://dupress.com/articles/single-person-households-and-changing-american-family/?id=us:2em:3na:dup1488:eng:dup:111915:&elq=b6e87b560b0b4ff6b0fab8180cfa61c9&elqCampaignId=4301&elqaid=13658&elqat=1&elqTrackId=ab5926cf54734615b09ef00ae3d4378a

US Census Bureau, "Families and living arrangements: Marital status," October 21, 2015, https://www.census.gov/hhes/families/data/marital.html.

Today, direct-care jobs are primarily funded through public funds. A national direct-care initiative, designed around a community information and coordination center, could be largely paid by the elderly who need some assistance to retire at home or working families who can't afford the high cost of daycare. According the Bureau of Labor Statistics, in-home personal care service sector is projected to increase by 1.3 million jobs (a 70% growth rate compared to 14% for all U.S. occupations) from 2010 to 2020 with a median pay of approximately $20,000. While $20,000 is well below the $33,000 median pay for all occupations, it is attractive to new workforce entrants and retirees who need supplemental income. Community-based direct-care centers would also help establish and manage home-based child care and elder care businesses to attend to parents and the elderly who need assistance or personal care. Today, only 8% of child care arrangements are conducted in a caregiver's own home. This percentage could be expanded significantly and safely if managed by a direct-care center.

Micro and self-employed businesses are ideally suited to provide direct-care, either on full-time, part-time or task-oriented contingent workers. These businesses are reality easy to start and are the types

of business that will provide opportunities for job seekers with personal care skills, especially those with maternal skills. The principal role for government (federal, state and/or local) would be to set up the direct-care program, help train potential care providers, provide proper oversight and quality control, and fast-track policies, regulations and licensing arrangements conducive to in-home care. By unleashing the power of new technology, it is not unreasonable to expect a quadrupling of the current in-home personal care employment growth rate. The net result could be approximately 5 million net new jobs and hundreds of thousands of new micro businesses. If Airbub (a trusted community marketplace for people to list, discover, and book unique lodging accommodations around the world) can grow from zero to 500,000 homes in 34,000 cities in eight years, direct-dare centers could implement home-based child/elder care accommodations in hundreds of thousands U.S. households in a relatively short period of time.

Direct-care centers would also use principles associated with time-banking. Time banking is an opt-in system, with members earning time credits by providing such as elder care, child care, home care, and various other forms of community outreach and mentoring. Time-banking is not a new concept. TimeBanks USA is a 20-year old registered 501C3 non-profit organization headquartered in Washington DC with a network in 32 countries with over 200 active independent TimeBanks in the United States.[267] California is state with the largest number of TimeBanks with 38 locations. The largest TimeBanks are located in Allentown, Pennsylvania with 750 members, followed by Washington, DC with 736 members and Kent, Ohio with 688 members.[268] Typically, time credits are created by bartering skills for services that are recorded using time banking software. Direct-care centers could help monetize these skills and services by creating microbusinesses that could either trade or sell services. Using elder care for example, healthy 60-year olds could provide services to ageing 80-years. Initially the 60-year old would provide pro bono services either for altruistic reasons or to establish credentials for future in-kind credits or paid task-oriented, part-time or full-time employment. By providing a way monetize time credits, direct-care centers could help expand and accelerate the time banking movement as well as creating microbusinesses and jobs. Direct-care centers could also help establish and fund new time banks as well as managing time credit exchanges. These exchanges could be in the form of tax-deductible charitable services, credits for in-kind future services, or for cash.

Microsoft, IBM, Hewlett-Packard, Oracle and Cisco are already transitioning from expensive equipment to more NTR-related services. Oracle and Microsoft are now selling cloud-based subscription services. Cisco is pursuing the "Internet of Things"….

Social networking companies like YouTube have recently allowed their superstars to make money from their on-line videos, the vast majority of YouTube produces contribute freely without compensation. Jobenomics encourages leading U.S. social network companies (Facebook with 1.5 billion registered accounts, WhatsApp with 800,000 accounts, Facebook Messenger with 700,000 accounts, Twitter with 320,000 accounts, Instagram with 300,000 accounts, and a dozen other growing social networks with approximately 2 billion accounts) to consider implementing a graduated rewards program starting with a minimum threshold with nano-payments advancing to micro-payments and finally to royalty payments. Such a system would be a win-win for the social

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[267] TimeBanks USA, http://timebanks.org/about/
[268] Directory of TimeBanks, http://community.timebanks.org/

networking companies that would attract new contributors as well as providing existing contributors a means to monetize their work. Jobenomics asserts that such a system of fractional payments is vitally important to the growing contingency workforce and new Generation Z ("Screenagers" borne after 1996, now 19 years old and younger) workforce entrants.

Google's current-generation data center networks deliver enough bandwidth to read the entire scanned contents of the Library of Congress in less than one-tenth of one second (technically: more than 1 petabit per second of total bisection bandwidth, or enough capacity for 100,000 servers to exchange information at 10 gigabits per second per server). http://www.eweek.com/servers/google-gives-glimpse-inside-its-massive-data-center-network.html

Is technology making us more creative? http://www.theguardian.com/media-network/2015/jun/18/technology-creative-creativity-web-content

Increasingly, smaller custom information technology equipment companies are replacing larger established companies. The Open Compute Project[269] is an example of how small companies can design and manufacture their own equipment. The project, which originated with three engineers in Facebook's Prineville Oregon data center, resulted in custom-designed servers, power supplies, server racks and battery backup systems that lead to an energy efficiency gain of 38%, while costing 24% less. In addition, Facebook has established a collaborate dialogue to offer lessons-learned to any business interested in developing a more efficient computing infrastructure. At the 2014 Open Compute Summit, Facebook announced that it saved an average of $400 million per year in IT infrastructure costs, saved enough energy to power 40,000 homes for a year, and mitigated CO_2 emissions equivalent to taking 50,000 cars off the road for a year. Goldman Sachs and Fidelity Investments have been ardent supporters of Facebook's Open Compute Project, and are deploying no-name equipment manufacturers their own datacenters. These financial services giants are no longer willing to be locked-in to general-purpose computing infrastructures controlled by IT equipment giants who often take years to provide customized services at high costs. According to Bloomberg, this year, Goldman Sacks will build 70% of its servers using open source hardware manufacturers[270&271].

Open source software is akin to the open source hardware espoused by the Open Compute Project. Open source software is software whose source code is available for modification or enhancement by anyone. According to the Open Source Initiative[272], "Open source is a development method for software that harnesses the power of distributed peer review and transparency of process. The promise of open source is better quality, higher reliability, more flexibility, lower cost, and an **end to predatory vendor lock-in"** (author's emphasis). The banking industry, led by Bank of American and Wells Fargo, has embraced open source software for the majority of their software development resulting in cost savings as much as 80% on project costs[273].

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[269] Open Compute Project, http://www.opencompute.org/about/
[270] Bloomberg Businessweek, 18 -24 May 2015, Technology, "I just feel like I can't get out of this box", page 32
[271] EnterpriseTech Systems Division, Goldman Sachs And Fidelity Bank On Open Compute, 29 January 2014, http://www.enterprisetech.com/2014/01/29/goldman-sachs-fidelity-bank-open-compute/
[272] Open Source Initiative (OSI), http://opensource.org/about
[273] American Banker, Open Source's Promise, 1 July 2012, http://www.americanbanker.com/btn/25_7/open-source-developement-software-offerings-1050409-1.html

Open source hardware and software principles have resulted in David & Goliath stories like SpaceX. In May 2015, SpaceX broke a decade-long monopoly of a mega-joint venture between Lockheed Martin and Boeing, called United Launch Alliance (ULA), for the United States Air Force's Evolved Expendable Launch Vehicle (EELV) program. Founded in 2002 as a basic garage-shop operation, SpaceX now designs, manufactures and launches advanced rockets and spacecraft. SpaceX's Falcon 9 rocket was built using open source principles that allowed SpaceX to build their own hardware and software for the rocket as well as launch and monitoring stations at a fraction of the cost of its ULA competitor. Even more important, SpaceX built its own US-produced rocket engine compared to ULA that used a Russian-built rocket engine to lift classified US government payloads in orbit. In addition to the engine and mobile launch stations, SpaceX designed and built its own motherboards, circuitry, radios, flight computers and servers, thereby reducing costs of industrial-grade equipment by a factor of up to 20-to-1[274]. According to SpaceX's website, its next generation Falcon Heavy rocket will "lift more than twice the payload of the next closest operational vehicle, the Delta IV Heavy, at one-third the cost"[275].

Second Life is the world's largest user-created 3D world. Second Life is an online virtual world, developed by San Francisco-based Linden Lab and launched on June 23, 2003; and which in 2014 had about 1 million regular users. Second Life users (also called Residents) create virtual representations of themselves, called avatars and are able to interact with other avatars, places or objects. They can explore the world (known as the grid), meet other residents, socialize, participate in individual and group activities, build, create, shop and trade virtual property and services with one another. It is a platform that principally features 3D-based user-generated content. Second Life also has its own virtual currency, http://www.lindenlab.com/products/second-life http://secondlife.com/whatis/ http://en.wikipedia.org/wiki/Second_Life

A favorite theme many speakers -- especially futurists -- like to invoke is that we've passed the industrial revolution, or even the information revolution that superseded it, and we're now in some kind of "post-information" revolution. Some people, especially on the European side of the pond, have another name for it, calling it "Industry 4.0." "Industry 4.0" was the brainchild of the German government, and describes the next phase in manufacturing -- a so-called fourth industrial revolution. The phases consist of the following: Industry 1.0: Water/steam power, Industry 2.0: Electric power, Industry 3.0: Computing power, Industry 4:0: Internet of Things (IoT) power http://www.zdnet.com/article/industry-4-0-its-all-about-information-technology/

Like electricity was to mankind in the 20th century, broadband will be in the 21st century. National digital infrastructures will bring high-speed internet connections to every home and business as part of a national digital infrastructure, which will make individuals and communities more competitive globally. The next generation national digital infrastructure will feature a combination of fixed line and wireless broadband connections that will offer affordable, open-access data networks. Currently, only 2/3 of all Americans have access to broadband. The U.S. National Broadband Plan envisions the fastest and most extensive wireless networks of any nation with affordable access for every American. The plan will promote robust competition, reform antiquated standards, policies and laws

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[274] Bloomberg Businessweek, 18 -24 May 2015, The Irrational, Inhuman, Interstellar Odyssey of Elon Musk, Page 58
[275] SpaceX, Falcon Heavy, http://www.spacex.com/falcon-heavy

and reallocate spectrum use, which is vitally important to mobile computing traffic (smart phones, pads and tablets) that is growing at a rate of 300% per year.

Transformation of the American Industrial Base.

The Future of Productivity and Growth in Manufacturing Industries 9 Technologies:
The Nine Pillars of Technological Advancement
1. Big Data and Analytics
2. Autonomous Robots
3. Simulation
4. Horizontal and Vertical System Integration
5. The Industrial Internet of Things
6. Cybersecurity
7. The Cloud
8. Additive Manufacturing
9. Augmented Reality

Many of the nine advances in technology that form the foundation for Industry 4.0 are already used in manufacturing, but with Industry 4.0, they will transform production: isolated, optimized cells will come together as a fully integrated, automated, and optimized production flow, leading to greater efficiencies and changing traditional production relationships among suppliers, producers, and customers—as well as between human and machine. In Germany, Industry 4.0 will lead to a 6% increase in manufacturing employment (6.1 to 6.5 million in Germany, 12.3 to 13.1 in the United States for a net gain of 800,000 jobs)

https://www.bcgperspectives.com/content/articles/engineered_products_project_business_industry_40_future_productivity_growth_manufacturing_industries/?chapter=2#chapter2

http://www.wired.com/2015/05/artificial-intelligence-pioneer-concerns/

Artificial intelligence agents are already working with humans as well as replacing cognitive jobs.

In December 2007, Baidu became the first Chinese company to be included in the NASDAQ-100 index (NASDAQ: BIDU).   Today, Baidu is a major Chinese web services conglomerate that dominates the China market and is second worldwide to Google regarding search. Duer is an AI app that runs on Android or iOS platforms is advertised as an app that can recognize images more reliably than humans and better than American technology. In 2015, China reached 550 million online shoppers (almost three times the amount of U.S. online shoppers), up from 140 million in 2010. Baidu is investing heavily in Online-to-Offline (O2O) e-commerce that connects the online digital world to the offline physical world via mobile networked devices. Early O2O applications found consumers online and brought them into real-world stores. Tomorrow's Duer-O2O-agents will enable consumer-created avatars to search, shop and pay online via without consumers having to go to the store. This is particularly appealing to bifurcated countries, like China, that have vast populations of rural poor that have limited access to stores and shopping centers that are extant in Chinese urban areas. Compared to the United States, China has a much larger rural population—most of whom have mobile phones or soon will have access due aggressive government and corporate e-commerce giants like Baidu, Alibaba, JD.com, Tencent and Xiaomi. India is soon to follow suit with its current 250 million user base and vast untapped rural population.

Urban/Rural Populations Of The U.S., China and India
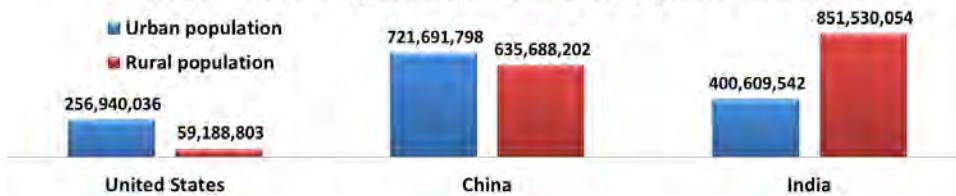
The main advantage of the NFC over other proximity card technology (e.g., 3D barcodes and RFID tags) is that it can be connected to the cloud and via the cloud to other NTR devices and ultimately the Internet of Everything. Once connected, the NFC can act as a credential (that identifies the user), a reader (that can be used to replace access control and payment systems or even replace the needs for traditional tickets) or a peer-to-peer system (that connects third party NFC devices and applications with the cloud for a wide range of actions and applications).

Many experts forecasts that NFC-enabled devices will eliminate credit and debit cards and eventually a cashless society. In this regard, banking institutions are watching the United Arab Emirates (UAE) that could potentially be the first cashless country[276]. As part of the UAE's Smart Government Initiative has identified over 90 services provided by government departments requiring digital payment. In June 2014, the UAE formally launched their Mobile Wallet program that is designed to allow comprehensive digital payment solutions that interface with all banks operating in the UAE. The project also incorporates the facility for smart phones and other digital devices to be used for cashless purchasing in UAE retail and other outlets, as well as a means to store and transfer money.

NFC-enabled devices, tied to cloud-computing data centers, will be more secure and more convenience since they will be able to replace all cards that contain consumer information. NFC-enabled devices will be able to facilitate banking and financing information transactions via on-line payment and accounting applications. Point of sale transactions will also be more secure since the NFC chip passes a "token" or digital representation of your card that is known only to the bank or issuer of the card. These tokens are used only once and replaced for the next transaction.

GPS-enabled devices will provide NFC geo-location information in case of theft—a feature not currently available for theft of a wallet or card. As an interim step of embedding NFCs in smart phones, Visa is asking card holders to opt in to a new service, called Visa Mobile Location Confirmation, which uses the geo-location features on mobile devices to pinpoint where consumers are at the time of credit or debit card transactions as well as alert the card issuer of any unusual transactions that could indicate theft or fraudulent behavior. Other financial institutions, like MasterCard and Barclays, are implementing biometrics (finger print, facial and voice) applications in smart devices to enhance security. Combined with other micro-technologies, ½ inch NFCs in glass

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[276] Gulfnews, Mobile Wallet is launched in UAE, Digital payment solutions will combine the latest technology and banking security standards, 4 June 2014, http://gulfnews.com/business/banking/mobile-wallet-is-launched-in-uae-1.1343077

capsules are being relatively painlessly injected under the skin for ultimate security and convenience[277].

NFCs are likely to be very disruptive to banking institutions that rely on payment systems that are governed by a stable system of laws, rules and standards that effectively transfers money that is linked to regulated banking institutions. There are essentially three methods payment systems: cash, non-cash and cashless. For millennia cash (paper/coin, checks) was king. With the advent of computers, a number of non-cash alternative electronic payment systems emerged including credit cards, internet banking and e-commerce payment systems, which have overtaken the traditional cash payment system. With the advent of smartphones, mobile payments (where the mobile phone is used as a real-time payment method) have emerged and are growing at exponential rates (61% per year[278]). The report also suggests that m-payments may ultimately give way to alternative forms of hidden/unreported currency such as gift cards, money transfer operations, payment aggregators (U.S. PayPal, China's Alipay), virtual currencies (e.g., bitcoins and peer-to-peer payment systems) and prepaid mobile wallets. NFC-enabled devices are likely to accelerate the use of cashless transactions and payments.

Artificial intelligence will create the next industrial revolution, experts claim[279]. The fourth industrial revolution, which is sometimes referred to as Industry 4.0, is the vision of the 'smart factory', where cyber-physical systems monitor physical processes, create a virtual copy of the physical world and make decentralised decisions. These cyber-physical systems communicate and cooperate with each other and humans in real time over the Internet of Things. Dan O'Hara, Senior Lecturer in English, New College of the Humanities, explained that this fourth industrial revolution will not be the same kind of "hollowing out" of jobs that we saw during the last one. "It [won't be] manual labour replaced by automation, but it'll be the hollowing out of middle-income jobs, medium-skilled jobs," he said. "The industries that will be affected the most from a replacement with automation are construction, accounts and transport. But the biggest [industry] of all, remembering this is respective to the United States, is retail and sales."

Internet of Things technologies (RFID, UGF, NFC) and challenges: http://www.networkworld.com/article/2928052/internet-of-things/internet-of-things-breathes-new-life-into-rfid-technology.html?nsdr=true

The Network Technology Revolution (NTR) could produce tens of millions of net new U.S. jobs. On the other hand, a recent Oxford University study estimates that the NTR could eliminate tens of millions of U.S. jobs due to computerization. Jobenomics believes that both predictions are correct. If so, we should maximize the former and mitigate the latter. To do so, the United States needs a strategic framework that is accepted and promulgated by the major NTR corporations, political decision-makers and leading opinion-leaders.

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[277] The Telegraph, Man embeds computer chips in hands to store Bitcoin, http://www.telegraph.co.uk/technology/news/11220577/Man-embeds-computer-chips-in-hands-to-store-Bitcoin.html
[278] Capgemini/RBS, World Payments Report 2014, https://www.worldpaymentsreport.com/
[279] The Inquirer, Artificial intelligence will create the next industrial revolution, experts claim, 14 May 2015, http://www.theinquirer.net/inquirer/news/2408538/artificial-intelligence-will-create-the-next-industrial-revolution-experts-claim

In order for the NTR to produce the maximum number of net new jobs, America needs a strategic framework that maximizes business creation and growth, while simultaneously mitigating business failures. Unfortunately, this framework currently does not exist. American decision-makers and opinion-leaders talk a lot about the importance of small businesses—the engine of the U.S. economy— but their approach to small business creation is laisse faire. Small businesses (<500 employees) employ 77% of all private sector Americans for a total of 91 million employees—almost 5 times the amount of large corporations (1000+ employees each).

If property orchestrated, the NTR could significantly boost business startups, as well as keeping them in business longer. A recent Kauffman Foundation Study finds that net job growth occurs in the U.S. economy <u>only</u> through startup firms. According Kauffman, most city and state government policies that look to big business for job creation are doomed to failure because they are based in unrealistic employment growth models. "It's not just net job creation that startups dominate. While older firms lose more jobs than they create, those gross flows decline as firm's age. On average, one-year-old firms create nearly 1,000,000 jobs, while ten-year-old firms generate 300,000. The notion that firms bulk up as they age is, in the aggregate, not supported by data."[280]

The NTR could create millions of U.S. small businesses if leading American NTR corporations focus on helping our tech-savvy generation monetize social networks and start NTR-related goods-producing and service-providing businesses. Unfortunately, America's current social media focus is more on entertainment than e-commerce. While the former is nice-to-have, the latter is in the need-to-have category in order increase employment, build business, and grow the economy. From a Jobenomics perspective, more American companies need to champion small businesses that would be enabled by NTR technologies, processes and procedures. The NTR can accelerate all economies around the world. It does not have to be a zero-sum game.

Conclusion

In conclusion, the Network Technology Revolution can be either a blessing or a curse depending on how it is managed. If managed properly, it can generate millions of new businesses and tens of millions of new jobs. If poorly managed, the effects of computerization could potentially eliminate tens of millions of current U.S. jobs, as well as disrupt the U.S. economy. From a Jobenomics perspective, the onus is on the leading NTR corporations—the pioneers of the 21st century digital age. It is within their capability, and self-interest, to maximize the benefit of the emerging NTR technologies, processes and systems that they are developing. If they don't, others around the world will, as history attests.

The phrase "Nation of Shopkeepers" first appeared in *The Wealth of Nations* by Adam Smith in 1776. Smith believed that when individuals pursue their self-interest, they indirectly promote the greater good of society. Smith argued that merchants, seeking their own self-interests, contribute significantly to the commonwealth by producing vital goods, services and tax revenues. Without this "invisible hand," societies would be incapable of effectively pursuing self-sufficiency, prosperity and

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[280] Kauffman Foundation, The Importance of Startups in Job Creation and Job Destruction, 9 Sep 2010, http://www.kauffman.org/what-we-do/research/firm-formation-and-growth-series/the-importance-of-startups-in-job-creation-and-job-destruction

wealth creation. Jobenomics agrees and believes that the United States is likely to further evolve into a "Nation of Small Businesses" as we exploit economic opportunities enabled by the Network Technology Revolution.

As reported by Forbes, it is estimated that pornography accounts for as much as 30% of the data transferred over the Internet every day and occupies more bandwidth that Amazon, Twitter or Facebook.[281] The large amount of big data for these porn sites is hosted in large data centers that are owned and managed by cloud service providers (not necessarily those listed) who collect subscription fee and advertising revenue from porn providers. According to one of Forbes's sources, a single porn provider (YouPorn) hosts approximately 100 terabytes in the cloud and serves 100 million page views per day.[282]

1. **Big Data**
2. **Cloud Computing**
3. **Semantic Webs**
4. **Augmented and Virtual Reality**
5. **Mobile Computing**
6. **Ubiquitous Computing**
7. **5G Broadband**
8. **Spatial Sensing**
9. **Robotics**
10. **Mechatronics**
11. **Nanobotics**
12. **Telepresence**
13. **Geo-Location**
14. **Near-Field Communications**
15. **Machine Learning**
16. **Deep Learning**
17. **Memetics**
18. **Biometric s**
19. **Blockchains**
20. **Multifactor Credentialing**
21. **Emotive Surveillance**
22. **Identity Management**
23. **Anonymity Networks**
24. **Ambient Intelligence**
25. **Artificial Intelligence**
26. **Intelligent Agents**
27. **Computer Vision and Pattern Recognition**
28. **Natural Language Processing**
29. **Speech Recognition**

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[281] Forbes/Tech, 14 November 2015, http://www.forbes.com/sites/michaelthomsen/2015/11/14/pornhub-says-its-gaming-audience-dropped-10-the-day-fallout-4-came-out/

[282] ExtremeTech, Just how big are porn sites?, A real-world example, 4 April 2012, http://www.extremetech.com/computing/123929-just-how-big-are-porn-sites/2

Women in IT 2016, Deloitte, Technology, Media & Telecommunications Predictions 2016, http://docs.media.bitpipe.com/io_10x/io_102267/item_465972/Deloitte-TMT-predictions-2016.pdf

Gender imbalance in IT has been recognized as an issue since at least 2005. In 2014, women represent 24% of total U.S. IT workforce, which is the average for most developed countries. According to a Deloitte study, "only 18% of US university computer science graduates in 2013 were women. And that was down from 1985, when 37% of graduates were women."

Women often leave the IT industry because of long hours, few networking opportunities and a perceived male-domination of hi-tech industry culture.

Keeping women in high-tech fields is big challenge, report finds, The Washington Post, 12 February 2014:
http://www.washingtonpost.com/business/economy/keeping-women-in-high-tech-fields-is-big-challenge-report-finds/2014/02/12/8a53c6ac-93fe-11e3-b46a-5a3d0d2130da_story.html

http://www.huffingtonpost.com/2015/03/27/women-in-tech_n_6955940.html

http://www.talentinnovation.org/_private/assets/Athena-2-ExecSummFINAL-CTI.pdf

http://searchbusinessanalytics.techtarget.com/definition/smart-city?utm_medium=EM&asrc=EM_ERU_55374450&utm_campaign=20160406_ERU%20Transmission%20for%2004/06/2016%20(UserUniverse:%202010939)_myka-reports@techtarget.com&utm_source=ERU&src=5497491

The Bureau of Labor Statistics (BLS) defines the contingent workforce as the portion of the labor force that has "nonstandard work arrangements" or those without "permanent jobs with a traditional employer-employee relationship".

The "contingent" workforce could be the predominant source of employed U.S. labor by 2030, or sooner, depending on economic conditions and seven ongoing labor force trends. Today, Jobenomics estimates the contingent workforce to be 60,000,000 employed Americans or 40% of the total employed workforce. By 2030, this will rise to 80,000,000, or 50%, of the total employed workforce.

U.S. Contingent Workforce Size Estimates 1998 to 2030

	BLS/GAO 1995 CWS	BLS/GAO 1999 CWS	BLS/GAO 2005 CWS	GSS 2006	GSS 2010		Jobenomics 2016 Est.	Jobenomics 2030 Est.
Employed	123,208,000	131,494,000	138,952,000	143,150,000	138,438,000		149,703,000	160,000,000
Contingent Workforce	39,549,768	39,448,200	42,519,312	50,531,950	55,790,514		59,881,200	80,000,000
	32.1%	30.0%	30.6%	35.3%	40.3%		40.0%	50.0%

Source: GAO Contingent Workforce Report (GAO-15-168R), Tables 3 & 4, 20 April 2015   *Source: Jobenomics*

Jobenomics' 2016 estimate of 40% for core and non-core contingency workers is roughly equivalent to the GAO's high water mark of 40.4% of the U.S. labor force in 2010[283] and Bloomberg's contingency workforce estimate of 40% for 2020.[284] Jobenomics' 2016 estimate is similar to estimates from other developed economies. For example, in Japan, contingent workers (non-regular workers) accounted for up to 50% of younger Japanese workers and 40% of the total Japanese labor force in 2014, up from 10% in 1990.[285]

Defining the Contingent Workforce. To understand the contingent labor force, it is necessary to first know what U.S. government agencies (Bureau of Labor Statistics, Census Bureau, Government Accountability Office and others) say about part-time, temporary, nonstandard, independent, or workers with "alternative" work agreements, who are collectively defined as contingent workers.

According to an April 2015 study by the Government Accountability Office (GAO), compared to the standard workforce, the size, character, earnings and benefits of today's contingent workers are largely unknown to U.S. Department of Labor and U.S. policy-makers. Quoting the GAO, "there is a lack of consensus on how to define contingent work, in part because researchers focus on different aspects of the labor market. Some definitions focus on job tenure or the precariousness of work, while some focus on employer-employee relationships. Available data thus produces varying estimates of the size of this workforce, depending on definition. Available data also does not fully enable analysis of trends in the size of the contingent workforce or the effects of economic cycles, such as the recent recession." [286]

As a result, there is no government consensus on the magnitude of the contingent workforce. Estimates vary from a low as 5% to a high of 40% of the total U.S. employed workers in 2016. Jobenomics asserts that 40% is the most reasonable estimate. Jobenomics also asserts that this percentage will continue to increase and exceed 50% of the employed labor force by 2030, or sooner, based on seven labor force trends, described herein, and the state of the economy. Unlike standard employment growth, contingent employment will increase whether the economic conditions are positive, neutral or negative. Neutral and negative economies usually reduce full-time labor and increase part-time contingent labor and task-oriented work.

Generally speaking, policy-makers view the contingent workforce a relatively insignificant portion of the U.S. labor force. They also view contingent workers more as a governmental liability than a public asset. The prevailing view of policy-makers is that most contingent workers receive lower wages and fewer employer-provided retirement and health benefits compared to standard workers. As a result, these workers are compelled to turn to government welfare and other means-adjusted programs for assistance. While this is true for the low-end of the contingency workforce, it is not necessarily the case for top-end contingency workers who chose nonstandard work as a matter of choice.

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[283] U.S. Government Accountability Office, Contingent Workforce: Size, Characteristics, Earnings, and Benefits, 20 April 2015, http://www.gao.gov/products/GAO-15-168R
[284] Bloomberg Businessweek, 20-25 October 2014 Edition, Companies/Industries, Page 20
[285] Asia-Pacific Journal, Scott North, "Limited Regular Employment and the Reform of Japan's Division of Labor", The Asia-Pacific Journal, Vol. 12, Issue 15, No. 1, April 14, 2014, http://www.japanfocus.org/-Scott-North/4106/article.html
[286] U.S. Government Accountability Office, GAO-15-168R, Contingent Workforce: Size, Characteristics, Earning and Benefits, 20 April 2015, http://www.gao.gov/assets/670/669766.pdf

Largely due to the current standard workforce focus of labor force survey questions, policy-makers are unaware of the fact that contingent work is no longer an aberration, but a key component of the labor force (60 million contingent workers versus 90 million standard workers). In addition, a growing number of contingent workers do want full-time jobs and traditional careers. 90% of independent contractors and self-employed workers reported in the last BLS Contingent Workforce Survey that they would not prefer a different type of employment from the one they have.[287] Uber drivers, app developers, fracking industry wildcatters and knowledge workers are just some of many examples of the upside of the growing contingent workforce in occupations that did not even exist a decade ago.

The Bureau of Labor Statistics (BLS) defines the contingent workforce as the portion of the labor force that has "nonstandard work arrangements" or those without "permanent jobs with a traditional employer-employee relationship". The BLS further makes a distinction between contingent and alternative employment agreements. According to a BLS special supplemental survey conducted in February 2005 (the last contingent workforce survey conducted by the BLS), "Contingent workers are persons who do not expect their jobs to last or who reported that their jobs are temporary. They do not have an implicit or explicit contract for ongoing employment. Alternative employment arrangements include persons employed as independent contractors, on-call workers, temporary help agency workers, and workers provided by contract firms."[288]

A 2015 GAO report, entitled the "Contingent Workforce: Size, Characteristics, Earnings, and Benefits", grouped contingency workers into two categories: core and non-core. The core category includes agency temps, direct-hire temps, on-call workers and laborers and contract company workers who are characterized as low wage earners who are subjected to nonstandard work arrangements out of necessity. Core workers cede control over their work making them economically dependent on employers. Consequently, a disproportionate number of these involuntary core workers are subject to exploitation in terms of wages and benefits. The non-core category includes independent contractors, self-employed workers and standard part-time workers who work fewer than 35 hours per week as a matter of choice and are economically independent by volition.

From a social science perspective, the major difference between core and non-core work involves social compact, an implicit contract for remuneration and protection in exchange for surrendering personal liberties. Relational employer-employee social compacts that evolved over the 20th Century are now less enforceable in today's transactional society. Relational social compacts emphasize mutual-interests whereas transactional social compacts promote self-interests. Relational compacts better accommodate low-skilled, risk-adverse, vulnerable core contingent workers who are dependent on near-term wages and benefits. Transactional compacts favor skilled non-core contingent workers who tend to be more self-directed, entrepreneurial and self-supporting.

Consequently, Jobenomics believes that America needs a dual contingent workforce strategy to (1) minimize low-end core contingent workers and (2) maximize top-end non-core contingent workers with emphasis on individuals and occupations with the highest need and potential.

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[287] Ibid, Job Satisfaction, Table 12: Estimated Percentage of Workers Who Want a Different Type of Employment, 2005
[288] U.S. Bureau of Labor Statistics, Contingent and alternative employment arrangements, retrieved 23 January 2016, http://www.bls.gov/cps/lfcharacteristics.htm#contingent, and http://www.bls.gov/news.release/pdf/conemp.pdf
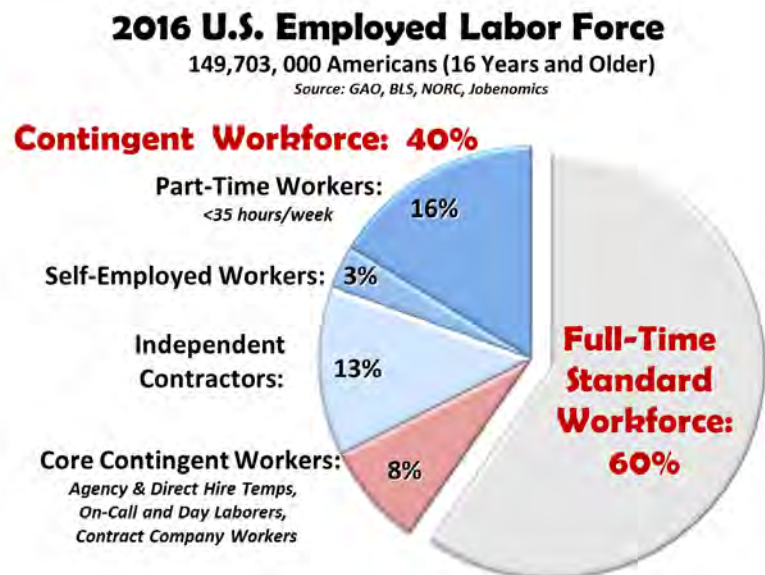
According to many labor force experts, new workforce entrants (e.g., Generation Z "Screenagers", and Generation Y "Millennials") prefer contingent work over standard work for a number of reasons including self-direction, variety, flexibility, skill development, as well as a general disillusionment with traditional corporate social compacts and promises that have proven to be short-lived with older generations. Millennials also understand that standard workforce growth is highly dependent on a growing economy, whereas contingent workforce growth is more resistant to economic fluctuations.

The rise of the contingent workforce is not unique to the United States. Furthermore, contingent work is being embraced by foreign policy-makers to a greater extent than in America. Japan serves as an example. Japanese contingent workers (called non-regular workers) accounted for up to 50% of younger Japanese workers and 40% of the total Japanese labor force in 2014, up from 10% in 1990.[289] In 2015, Japanese Prime Minister Shinzo Abe announced policies to make it easier for companies to dismiss standard workers in favor of contingency workers in order to make Japanese companies more competitive. An aging Japanese population will also fuel contingent work growth in Japan as retired workers and older women are seeking part-time work to supplement income in a struggling national economy.

Policy-makers in other parts of Asia and many countries in Western Europe are also actively preparing for the possibility of contingent work becoming the dominant element of their national labor force. China's 13th Five-Year Plan, a roadmap for the nation's development from 2016 to 2020, emphasizes the need to create a policy environment that can foster homegrown contingent workforce development and investment with emphasis on micro and self-employed businesses engaged in the emerging digital economy (e-business and e-commerce).

Estimating the Size of the Contingent Workforce. Out of approximately 150 million (nonfarm and farm) employed American workers in 2016, 60 million people are in the contingent workforce (part-time, self-employed, contracted workers, temps and day laborers).

According to a recently released Harvard study, from February 2005 to November 2015, almost all employment growth (9.7 million) in the U.S. labor force occurred in the contingent workforce (9.4 million) as opposed to the standard labor force.[290]

2016 U.S. Employed Labor Force
149,703, 000 Americans (16 Years and Older)
Source: GAO, BLS, NORC, Jobenomics

Contingent Workforce: 40%
Part-Time Workers: <35 hours/week 16%
Self-Employed Workers: 3%
Independent Contractors: 13%
Core Contingent Workers: Agency & Direct Hire Temps, On-Call and Day Laborers, Contract Company Workers 8%
Full-Time Standard Workforce: 60%

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[289] Asia-Pacific Journal, Scott North, "Limited Regular Employment and the Reform of Japan's Division of Labor", The Asia-Pacific Journal, Vol. 12, Issue 15, No. 1, April 14, 2014, http://www.japanfocus.org/-Scott-North/4106/article.html
[290] Harvard University and NBER, The Rise and Nature of Alternative Work Arrangements in the United States, 1995-2015, Lawrence F. Katz and Alan B. Krueger, 29 March 2016, page 7-8, https://krueger.princeton.edu/sites/default/files/akrueger/files/katz_krueger_cws_-_march_29_20165.pdf

To understand size of the U.S. labor force and its contingent workforce component, one must have a basic knowledge on how data is collected by the government.

The two primary sources of data are from joint Census Bureau/BLS household surveys and BLS industry surveys. The "Household" survey collects data via the Current Population Survey (CPS) and the "Establishment" payroll survey via the Current Employment Survey (CES).[291]

- CPS Household data is collected monthly from a sample from over 60,000 American households and includes comprehensive data on the labor force, the employed, and the unemployed classified by such characteristics as age, sex, race, family relationship, marital status, occupation and industry attachment. The CPS also provides data on the characteristics and past work experience of those not in the labor force. The CPS includes all workers, nonfarm and farm, and estimates current employment at 150 million.

- CES Establishment data is collected monthly from a sample of approximately 143,000 businesses and government agencies representing approximately 588,000 worksites throughout the United States. The primary statistics derived from the CES survey are monthly estimates of employment, hours, and earnings for the nation, states, and major metropolitan areas. CES produces estimates on the number of employees on nonfarm payrolls, average hourly earnings, average weekly earnings, and average weekly hours.[292] The CES includes only nonfarm workers and estimates current employment at 144 million.

CPS and CES data are reported in the BLS monthly Employment Situational Report and various BLS Supplements to the Current Population Survey. The monthly BLS Employment Situational Report is a widely read government report used for policy-making in the United States. BLS Supplements are also important since they provide a significant level of detail for public and private analyses. It is important to recognize that these BLS reports and supplements are focused mainly on standard workers who are employed by nonfarm, industry-centric and employer-providing firms. Agricultural (farms and ranches) and nonstandard (contingent) worker data is sparse and episodic due to historical precedent and budgetary constraints.

The BLS Employment Situational Report's focal point is on the "civilian noninstitutional population" that consists of three main categories: "Employed", "Unemployed" and "Not in Labor Force". To be Employed, one must have a job. To be Unemployed, one must be looking for a job. To be Not-in-Labor-Force, one must be an able-bodied adult who is neither employed nor unemployed.

The overwhelming amount of BLS statistical labor force data is centered on statistics relating to the 144 million nonfarm Employed Americans, who are accounted in three general sectors (private sector goods-producing, private sector services-providing and government) that are subdivided into 13 industry groups and further subdivided into 130 industries. Since the BLS defines contingent workers as those without "an explicit or implicit contract for long-term employment", their focus is on the temporary nature of work. Consequently, those that chose not to work or work outside traditional labor occupations receive less scrutiny.

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[291] U.S. Bureau of Labor Statistics, Household vs. Establishment Series, http://www.bls.gov/lau/lauhvse.htm#hvse
[292] BLS, CES Survey Frequently Asked Questions, http://www.bls.gov/web/empsit/cesfaq.htm

Jobenomics applauds the work the BLS accomplishes with standard industries, but believes that the U.S. government should allow the BLS to evaluate at super sectors, like energy and healthcare, and major trends, like the contingent workforce and Not-in-Labor-Force group, with the same intensity.

To a lesser degree, BLS Employment Situational Report contains data on 15 million Unemployed Americans who are accounted in six unemployment categories from U1 Long-Term Unemployed to U3 Officially Unemployed to U6 Unemployed and Underemployed. To a minimal degree, the BLS reports on the 95 million people who are categorized in a single Not-in-Labor-Force category that is reserved for able-bodied Americans who can work but chose not to work for a variety of reasons. Jobenomics sees the evergrowing Not-in-Labor-Force, which has grown by 25.9 million Americans since year 2000, as impactful to the U.S. labor force as the rise in the contingent labor force. The Unemployed and Not-in-Labor-Force is addressed in detail in the Jobenomics U.S. Unemployment Analysis.

The CPS is also used to collect data for a variety of other studies. Supplements cover a wide variety of topics depending on the needs of the supplement's government sponsor, including a BLS sponsored Contingent Workforce Supplement (CWS).[293] A total of five CWSs were conducted by the BLS in 1995, 1997, 1999, 2001 and 2005. Since the 2005 CWS, the BLS has repeatedly requested that the CWS be reinstated but until recently has not been unsuccessful in doing so.[294] After a 10-year hiatus, the BLS will now resume the CWS. In the FY2016 Budget, out of a total BLS budget of $637.4 million, the BLS was granted $1.6 million and 3 full-time equivalent personnel to conduct a CWS every two years.[295]

Even though the CWS budget is only ¼ of 1% of the overall BLS budget, Jobenomics contends that resumption of the CWS will be a vitally important first step to laying a framework in understanding the contingent workforce's size, character and impact on the U.S. labor force and economy. However, Jobenomics is concerned that the BLS has historically been constrained by key worker protection laws that focus surveys on employees of standard companies as opposed to non-core contingent workers who are not classified as employees. Without a complete analysis of the entire contingent workforce spectrum (core and non-core, standard and nonstandard, or contingent and alternative work arrangements), it will be impossible for policy-makers to assess the degree of influence that the contingent workforce is having on the labor force.

The following chart was derived from the GAO's GAO Contingent Workforce Report that compared historical surveys (CWS, CES Establishment, CPS Household, CPS Disability, CPS Annual Social and Economic Supplement, NORC General Social [GSS], Survey of Income and Program Participation).[296] Jobenomics 2016 and 2030 estimates are also included.

U.S. Core & Non-Core Contingent Workforce Size Estimates

[293] U.S. Census Bureau, Supplemental Surveys, http://www.census.gov/programs-surveys/cps/about/supplemental-surveys.html and http://www.census.gov/programs-surveys/cps/about.html

[294] U.S. Government Accountability Office, GAO-15-168R, Contingent Workforce: Size, Characteristics, Earning and Benefits, 20 April 2015, Background, page 3, http://www.gao.gov/assets/670/669766.pdf

[295] FY 2016 Congressional Budget Justification Bureau Of Labor Statistics, Labor Force Statistics, CWS, pages BLS-1 and BLS-11, http://www.dol.gov/sites/default/files/documents/general/budget/2016/CBJ-2016-V3-01.pdf

[296] GAO, Contingent Workforce Report (GAO-15-168R), Tables 3 & 4, 20 April 2015, http://www.gao.gov/assets/670/669766.pdf

	BLS/GAO 1995 CWS	BLS/GAO 1999 CWS	BLS/GAO 2005 CWS	GSS 2006	GSS 2010	Jobenomics 2016 Est.	Jobenomics 2030 Est.
Employed	123,208,000	131,494,000	138,952,000	143,150,000	138,438,000	149,703,000	160,000,000
Contingent Workforce	39,549,768	39,448,200	42,519,312	50,531,950	55,790,514	59,881,200	80,000,000
	32.1%	30.0%	30.6%	35.3%	40.3%	40.0%	50.0%

Source: GAO Contingent Workforce Report (GAO-15-168R), Tables 3 & 4, 20 April 2015   *Source: Jobenomics*

Agency & direct-hire temps, On-call workers & day laborers, Contract company workers

Core Contingent	7,269,272	7,495,158	7,781,312	10,163,650	10,936,602	11,976,240	19,200,000
	5.9%	5.7%	5.6%	7.1%	7.9%	8.0%	12.0%

Independent contractors, Self-employed workers, Standard part-time workers

Non-Core Contingent	32,280,496	31,953,042	34,738,000	40,368,300	44,853,912	47,904,960	60,800,000
	26.2%	24.3%	25.0%	28.2%	32.4%	32.0%	38.0%

Using composite data from multiple sources, the GAO estimates core and non-core contingent workers between 5.7% to 7.9% and 24.3% to 32.4% respectively, for a total of approximately 30% to 40% of the employed labor force. As of January 2016, the total number of U.S. employed is 149,703,000 million people.[297] Using the 30% and 40% figures, a total of 45 to 60 million Americans would be considered contingent workers. By 2030, at 50% of all employed workers, the United States would have a total of 80 million contingency workers and 80 million standard full-time workers.
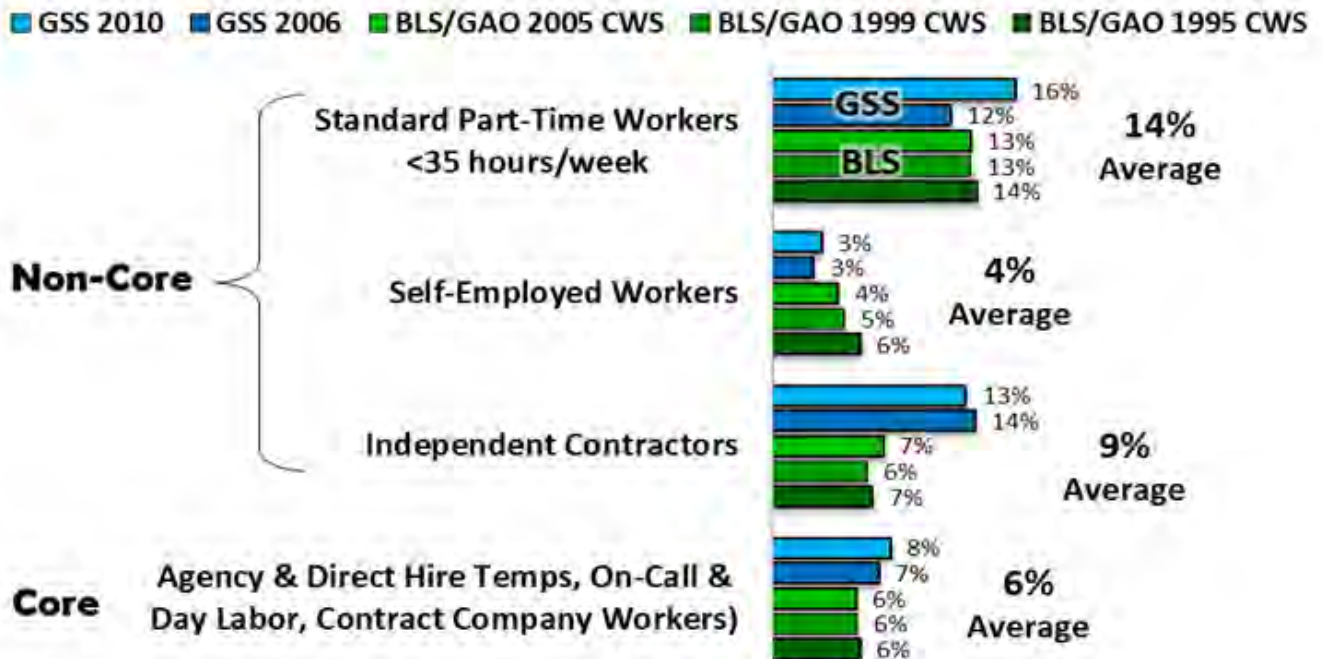
Contingent Workforce By Type Worker

The recent growth in 1099 workers (IRS Form 1099-MISC used by independent contractors, aka contingent workers) suggests a massive transition from full-time to contingent work this decade. In 2010, 82 million 1099s were sent to the IRS. By 2014, the number grew to 91 million for a total of 9

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[297] BLS, Table A-1. Employment status of the civilian population, http://www.bls.gov/news.release/empsit.t01.htm
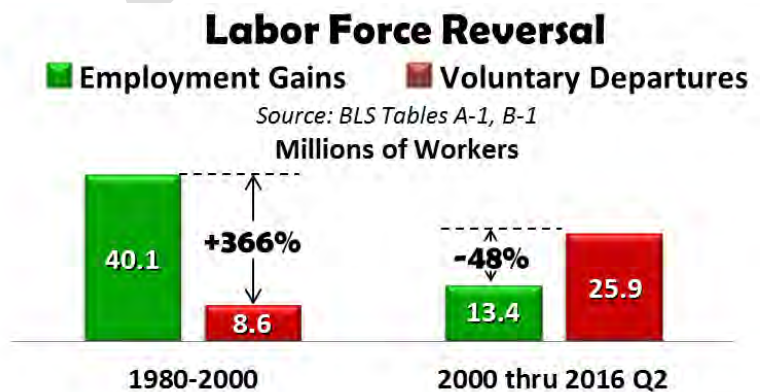
million for the four-year period or roughly 22 million if extrapolated for the entire decade. It should be noted that 1099s are only filed for wages over $600. Many contingent workers, like app developers, are working for zero wages with the hope of a large future payoff or jobs with leading network-centric corporations.

Within the contingent workforce, standard part-time workers are the largest group, at 14%, of all employed workers, followed by independent contractors at 9%, self-employed workers at 4% and core group workers at 6%. It appears that only the incorporated self-employed number were included (5.8 million today), not including the unincorporated self-employed (9.4 million today), which is consistent with the Jobenomics premise that government surveys are focused on incorporated businesses in existing nonfarm industries. It is also important to note that the number of incorporated self-employed businesses has grown by 35% since year 2000, giving credence to the notion that non-core contingent businesses are an important faction of the U.S. labor force and overall economy—a faction that is neither well reported nor understood.

Jobenomics Contingent Workforce 50%+ Forecast (Seven Major Factors). By 2030, or sooner, Jobenomics forecasts that contingency workers will be the dominant (over 50%) component of the U.S. workforce. This forecast is based on seven factors: (1) increasing labor force losses versus labor force gains, (2) adverse corporate hiring and employment practices, (3) revolution in energy and network technologies, (4) automation of manual and cognitive jobs, (5) impact of the emerging digital economy, (6) shift from full-time, to part-time and task-oriented labor, and (7) cultural differences of new labor force entrants.

- **Increasing labor force losses versus labor force gains.** The U.S. labor force took an ominous reversal at the beginning of the 21st Century when able-bodied adult workforce departures dramatically outpaced the number of people entering the labor force.

During the 1980s and 1990s, employment gains were 366% more than voluntary departures (40.1 million versus 8.6 million). From the beginning of year 2000 through Q2 2016, employment gains were 48% less than voluntary departures (13.4 million versus 25.9 million). From a Jobenomics standpoint, this labor force reversal is largely due to poor economic conditions, conservative hiring practices, limited livable income opportunities, the demise of the American middle-class, and attractiveness of government welfare and mean-adjusted assistance programs.

Labor Force Reversal
Employment Gains — Voluntary Departures
Source: BLS Tables A-1, B-1
Millions of Workers
40.1 +366% 8.6 | 13.4 -48% 25.9
1980-2000 | 2000 thru 2016 Q2

Without significant jobs growth in conjunction with a meaningful reduction of voluntary departures, the U.S. economy is not sustainable, middle-class wages will continue to erode, consumption (70% of U.S. GDP) is likely to falter, and another recession is probable. Consequently, it is imperative that policy-makers, decision-leaders and business executives

aggressively create employment opportunities that will motivate citizens towards workfare over welfare and self-sufficiency over public/familial dependence.

The best way to motivate these individuals to emphasize the plethora of employment opportunities afforded by the 6.1 million open U.S. jobs[298], the fastest-growing service industries that are generating 81% of all new jobs, and by the millions of new opportunities that are available via the ongoing energy technology and network technology revolutions.

Contingent work and new non-core contingency businesses are an important component of fulfilling these opportunities—a component that has not been aggressively supported in the United States. Today, there are 60,000,000 American contingent workers. Prior to the end of the next decade, this number is likely to grow to 80,000,000 Americans. Now is the time to plan and create meaningful employment and income opportunities for the contingency workforce.

- **Adverse corporate hiring and employment practices**. From 2010 to 2016, big businesses with over 500 employees provided only 3,014,000 net new jobs, whereas small businesses with less 500 employees produced 10,511,000 net new jobs.[299] Today, corporate America makes more money on money than on people-made goods or people-provided services. If not for small business, the U.S. labor force would be much smaller than it currently is.

Since the end of the Great Recession in 2009, big business received numerous government incentives and low interest loans compared to small businesses. Rather than using these incentives and financial largess to recapitalize, most corporations understandably used the money to buy back stock, merge, acquire and invest in the secondary market. The net result of these actions was stronger corporations and a weaker labor force.
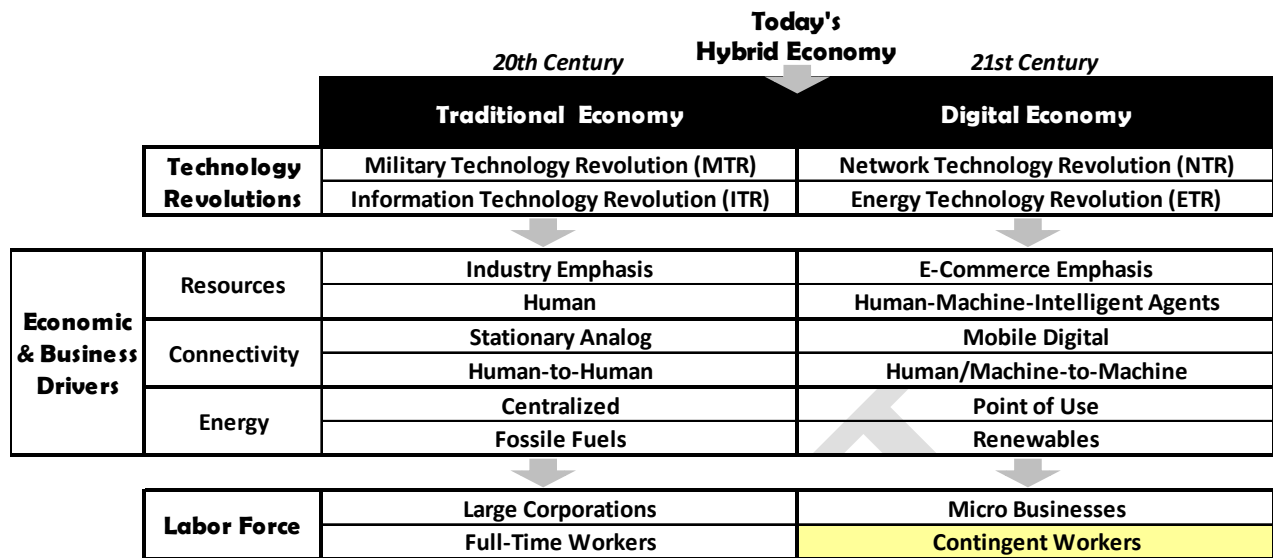
While it is essential that the United State maintain strong corporations, it is equally essential to develop a strong labor force. Major corporations must play a larger role in developing skills, jobs and startup businesses to fill the 6.1 million open private sector jobs.

U.S. Is Transitioning To a Hybrid Economy

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[298] U.S. Bureau of Labor Statistics,, Job Openings and Labor Turnover, Table 7, retrieved 23 January 2016, http://www.bls.gov/news.release/jolts.t07.htm
[299] ADP, National Employment Report, December 2016, http://www.adpemploymentreport.com/

		20th Century	21st Century
		Traditional Economy	**Digital Economy**
Technology Revolutions		Military Technology Revolution (MTR)	Network Technology Revolution (NTR)
		Information Technology Revolution (ITR)	Energy Technology Revolution (ETR)
Economic & Business Drivers	**Resources**	Industry Emphasis	E-Commerce Emphasis
		Human	Human-Machine-Intelligent Agents
	Connectivity	Stationary Analog	Mobile Digital
		Human-to-Human	Human/Machine-to-Machine
	Energy	Centralized	Point of Use
		Fossil Fuels	Renewables
Labor Force		Large Corporations	Micro Businesses
		Full-Time Workers	Contingent Workers

Today's Hybrid Economy

The U.S. economy is transitioning from a traditional W-2 economy with standard employees to a digital 1099 economy with non-employee contingent workers. From a corporate standpoint, non-employees (contingent workers) make a lot of sense. Outsourcing work to a task-oriented and temporary workforce can provide corporate managers more flexibility and higher profitability than maintaining higher-priced, full-time employees. Contingent workers are also a solution to corporations that are struggling to attract talented workers. Critical skillsets can often be obtained by independent contractors, flex-workers, freelancers and on-demand labor.

According to Ardent Partners, a U.S. research consultancy, "95% of organizations today perceive their contingent workforce as important and vital today not only to day-to-day operations, but also to ultimate enterprise success and growth." In 2015, Ardent calculates that 54% of corporate top talent is concentrated on traditional workers, 20% on contingent workers, and the remaining balance (26%) a combination of traditional and contingent workers. By 2017, this concentration is expected to be 41% traditional, 25% contingent and 34% combined.[300]

Unfortunately, corporate America does not have a common contingent workforce management framework. The same is true with government agencies at both the federal and state level. In order to build a stronger U.S. labor force, leading corporate executives and government officials need to develop a strategic contingent workforce plan that will minimize exploitive hiring and contracting practices of non-employees as well as giving rise to contingency-oriented businesses that provide livable incomes to their constituencies.

The Network Technology Revolution (NTR)

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[300] Ardent Partners, The State of Contingent Workforce Management 2015-2016, http://ardentpartners.com/CWM15/ArdentPartners-TheStateofCWM2015.pdf

> **The NTR Is A Perfect Storm of Network Technologies, Processes and Systems Including:**
> Big Data, Cloud Computing, Semantic Webs, Augmented and Virtual Reality, Mobile Computing, Ubiquitous Computing, Quantum Computing, Near-Field Communications, Inductive Charging, 5G Broadband, Spatial Sensing, Geo-Location, Computer Vision and Pattern Recognition, Natural Language Processing, Speech Recognition, Machine Learning, Transfer Learning, Deep Learning, Memetics, Biometrics, Telepresence, Blockchains, Multifactor Credentialing, Emotive Surveillance, Identity Management, Anonymity Networks, Robotics, Mechatronics, Nanobotics, Ambient Intelligence, Artificial Intelligence, Intelligent Agents and Super Intelligent Agents.

> **The NTR Will Revolutionize Labor Forces, Economies And Nations Via The:**
> Digital Economy (aka Internet, Web or New economies), e-Business, e-Commerce (aka business-to-business, business-to-consumer, business-to-government, consumer-to-consumer e-commerce as well as e-retailing, mobile commerce and mobile-Health), On Demand/Sharing Economy (aka Uber and Airbnb economies), Apps Economy, Gig Economy, Third Industrial Revolution (Manufacturing), and the Internet of Things (IoT).

> **The NTR Will Be Brilliantly Innovative And Creatively Disruptive:**
> **Creating** tens of millions of net new U.S. jobs and businesses, and/or
> **Replacing** tens of millions of existing U.S. jobs and businesses.

> **The NTR Will Ultimately Transform Society By The Collective Resolve Of Humans Working Alongside Sophisticated Algorithms, Smart Machines, Robots And Intelligent Agents:**
> **Revamping** existing institutions and governments,
> **Instituting** new and different ideas, beliefs, behaviors and cultures, and
> **Changing** the nature of labor from relationship-oriented to task-oriented work, and full-time standard workforces to part-time contingent workers.

The NTR is characterized by a "perfect storm" of highly advanced technologies, processes and systems including **big data** (datasets that are too large to efficiently handle), **cloud computing** (practice of using a network of remote servers hosted in data centers to store, manage, and process big data), **semantic webs** (thinking websites), **synthetic reality** (blending of the artificial and natural worlds), **mobile computing** (proliferation of smart mobile devices and micro-devices), **ubiquitous computing** (embedding microprocessors in everyday objects to communicate without human interaction), **5G broadband networks** (50-fold speed increases and 1000-fold data volume improvements), **spatial sensing** (real-time detection, measuring, mapping and analysis of objects in relationship to the environment), **robotics** (automated machines capable of movement), **mechatronics** (combination of mechanical engineering, computing, and electronics to create nanobots), **nanobotics** (also called nanomachines, nanoids, nanites and nanomites are microscopic self-propelled machines with a degree of autonomy and reproductive capability at the molecular level), **telepresence** (operating machines remotely to create an effect or control), **geo-location** (the process of determining the location of an entity by means of digital information processed via the internet), **near-field communications** (short-range wireless technology that connects devices), **machine learning** (systems that can learn and teach each other), **deep learning** (an artificial intelligence technique allowing machines to extract patterns from big data in the same manner that the human brain does), **memetics** (machines that can create memes to mimic cultural traits and ideas), **biometrics** (agents that can identify and track biological traits), **blockchains** (distributed digital economy public ledgers), **multifactor credentialing** (automated authentication and identification of crowds, individuals and intelligent agents), **emotive surveillance** (systems that analyze and manage emotions), **identity management** (controlling user access and restoring damaged online identities), **anonymity networks** (networks that enable

users to block tracking or tracing data and identities), **ambient intelligence** (when formerly dumb or mute objects are given the ability to communicate), **artificial intelligence** (or AI, intelligent algorithms and agents that will augment human interactions), and **intelligence agents** (AI agents that replace the need for human intervention and actions).

The NTR will transform economies, labor forces and society via including the **Internet of Things** (an environment where vastly more devices are connected to networks than people), the **digital economy** (also known as e-commerce, mobile-commerce, e-business and gig economies which are in their infancies compared to the traditional standard economy), the **sharing economy** (also known as the on-demand economy that individuals to rent or borrow goods rather than buy and own them) and the growing non-standard **contingent workforce**.

From an NTR perspective, Jobenomics sees three major trends occurring in U.S. labor force that will have a dramatic effect on the economy and employment, (1) more than any other labor force trend, the NTR will create significantly more employment opportunities (ala the emerging digital, gig, internet, Uber or e-commerce economy) for the contingent workforce than the standard workforce, (2) new labor force entrants (Generations Y & Z, often described as "digital natives") will be much more NTR-savvy than previous generations and have a substantial different view regarding the way business is currently conducted and their roles in business, and (3) those who cannot adapt will likely depart the U.S. labor force to the growing netherworld of perpetual familial and government assistance and join the rolls of those officially categorized as "Not in Labor Force".

America is blessed to be the home of network and information technology giants like Apple, HP, Facebook, Google, CISCO, Amazon, Microsoft, eBay and dozens of other NTR companies. While U.S. NTR giants are making great technical advancements in communication, media and entertainment, foreign countries in Asia and Europe are using U.S. technology to develop their labor forces and economies to a much greater degree than in the United States.

As corporate citizens, U.S. NTR companies need to assume a much greater role in developing their domestic workforce that is capable of competing and prospering in the emerging global digital economy. From a Jobenomics perspective, NTR CEOs should take the lead (i.e., the responsibility) for creating a minimum of 10 million net new U.S. jobs within the next decade via the creation of network-centric small, micro and self-employed American businesses.

The Apps industry serves an excellent example of only one subset in a myriad of NTR technologies listed earlier in the NTR inventory of emerging technologies. The Apps industry has grown in less than a decade from zero in 2008 to 4 billion apps in an $87 billion marketplace in 2015 that is expected to double by 2018. According to a recent Apple press release, as a result of the Apple's App Store's success, Apple is now responsible for creating and supporting 1.9 million jobs in the U.S. alone.[301] If the collective NTR CEO community wanted to create 10 million net U.S. jobs, with livable wages, they could easily do so without government intervention.

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[301] Apple, https://www.apple.com/pr/library/2016/01/06Record-Breaking-Holiday-Season-for-the-App-Store.html

If Tim Cook turned Apple's creative energy to creating NTR-optimized e-business devices, tens of millions of more Americans (and billions of people around the world) could be given the opportunity to build a business. If Mark Zuckerberg used Facebook to monetize social networks, tens of millions of new careers could be created. If CISCO's Chuck Robbins will spend a small portion of time and effort developing the Internet of Business as compared to the Internet of Things, millions of new businesses could be created. The same is true of Jeff Bezos and Amazon, Satya Nadella and Microsoft, Sundar Pichai and Google, Ginni Rometty and IBM, as well as the rest of the American NTR CEOs. Together, these companies could create untold numbers of new U.S. jobs and micro-businesses that would mitigate the erosion of the middle-class, provide new career paths for the digital generation, and create meaningful income opportunities and livelihoods for the evergrowing contingent workforce.

- **Shift from full-time, to part-time and task-oriented labor**. Via the NTR and the emerging digital economy, many traditional full-time jobs will be dissected into discrete tasks, which in turn will be addressed by temporary collectives and virtual organizations. Today's software can divide complex jobs into smaller tasks, automate the routine work, and then recruit contingent workers through online network hubs to perform non-routine work. As automated NTR systems monitor human workers, over time these increasingly intelligent systems will learn and assimilate anthropomorphic traits in order to automate more and more complex non-routine cognitive tasks. Today, the NTR is facilitating the labor force shift to contingent labor. In the future, contingent workers will likely provide machines with the wherewithal to replace a substantial percentage of the human labor force with cheaper and more efficient mechanical forms of labor. A McKinsey Global Institute (MGI) report that showed the 44% of U.S. firms that reduced headcount during the Great Recession did so via automation.[302]

  Team collaborative and management tools will further create "contextual" work environments that rapidly form, perform, and then reform to address subsequent tasks. Micro jobs, micro labor and micro tasks are becoming more common, while brick and mortar edifices that house full-time employees are giving way to temporary offices, mobile computing and home-based operations—environments ideally suited for contingent workers.

  According to an annual four-year report and survey of 7,000 business executives in 130 countries, the Deloitte Global Human Capital Trends 2016 report states that 92% of the executives see a need to redesign their organizations from a hierarchical managerial model to "highly empowered teams, led by a breed of younger, more globally diverse leaders. To lead this shift toward the 'new organization', CEOs and HR leaders are focused on understanding and creating a shared culture, designing a work environment that engages people, and constructing a new model of leadership and career development." Over 80% half of surveyed executives, across a wide range of public and private industry sectors, stated that they are in the process of restructuring or have already completed the process.[303]

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[302] McKinsey Global Institute, An economy that works: Job creation and America's future, June 2011, file:///C:/Users/CHUCK/Downloads/MGI_US_job_creation_full_report.pdf

[303] Deloitte University Press, Global Human Capital Trends 2016, The New Organization: Difference by Design, http://www2.deloitte.com/us/en/pages/human-capital/articles/introduction-human-capital-trends.html

In the Jobenomics lexicon, as shown, tomorrow's organization will be a hybrid model that embraces both the traditional and digital business models. In a traditional business model, supervisors mandate goals to meet to achieve defined performance standards accomplished by hierarchically structured and stratified teams. While the contingent workforce is present, it usually is a subordinated and a small fraction of the overall workforce. In a digital business model, managers coordinate dispersed tasked-focused teams that play a much greater and influential workforce role. The formula for success for a hybrid labor force is to find the right balance between the models.
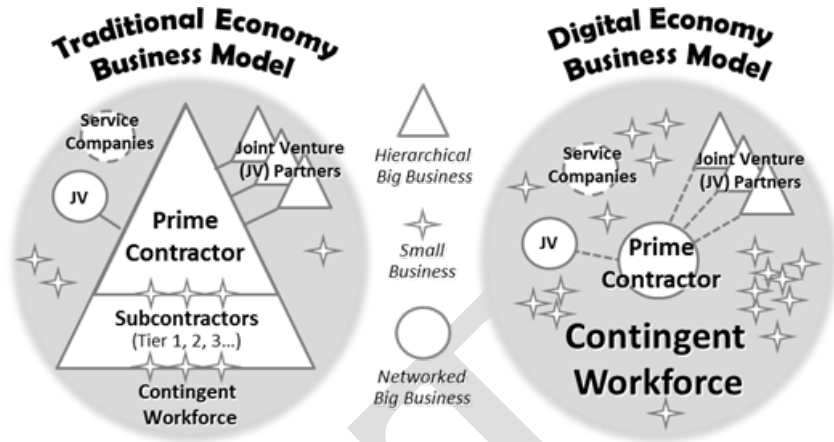
Task-oriented contingent work is likely to accelerate in proportion to digital economy and e-business growth. Contingent work will also be accelerated by the advent of online network hubs designed task-oriented workers.

Online network hubs (like Amazon's Mechanical Turk, Flexjobs, microWorkers, Fiverr, Elance and TaskRabbit) provide online labor pools usable by corporations, governments and individuals for tasks of any scale. These network hubs provide access to a highly-skilled, diverse, on-demand, scalable workforce, and correspondingly provides contingent workers a selection of millions of tasks for bid.

Similar hubs are available to contingent businesses. For example, Amazon started Amazon Launchpad[304] for startups to launch, market, and distribute their products to hundreds of millions of Amazon customers across the globe. The program offers a streamlined onboarding experience, custom product pages, a comprehensive marketing package, and access to Amazon's global fulfillment network.

Educational institutions are also experimenting with network technology and contingent workforces. Founded and run by a former Google engineer and using from the founder of Google and other philanthropic sources, AltSchool is a collaborative community of micro-schools that uses outstanding teachers (contingent workers), deep research, and innovative creative collaboration tools to offer a personalized, whole child learning experience for the Generation Z. The future of business and the labor force is certainly not anything like it used to be.

- **Cultural differences of new labor force entrants**. Ethnology involves a branch of study that analyzes cultures in regard to their development, differences and relationships between various demographic groups. The ethnology of new labor force entrants will be increasingly important as

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[304] Amazon Launchpad, http://www.amazon.com/gp/launchpad/signup

154 million NTR-savvy "Screenagers" (Generation Z, born 1996 to present, now 20 years old and younger) and "Millennials" (Generation Y, born 1980 to 1995, now ages 21 to 36) enter the workforce over the next decade, especially as it applies to the number of Screenagers and Millennials entering as contingent workers.

154 Million NTR-Savvy Gen Yers and Zers Will Transform The American Labor Force

Generation	Born	Oldest Age In 2016	U.S. Population Millions		Predominant Technology Culture	Predominant Business Asperations
Gen Z, Screenagers	Before - 1996	20	87	27%	NTR	Entrepreneurial
Gen Y, Millennials	1980-1995	36	67	21%	ITR/NTR	Aspiring-Entrepreneurial
			154	47%		
Gen X	1966-1979	50	62	19%	Analog/ITR	Intrapreneurial
Baby-Boomers	1946-1965	70	79	24%	Analog Systems	Quasi-Traditional
Great Gen	1912-1945	104	32	10%	Mechanical Systems	Traditional Employee
	Total Population		326	100%	Source: Jobenomics, U.S. Census Bureau, Ryan-Jenkins	

Screenagers and Millennials generally prefer contingent work over traditional full-time occupations. 61% of Millennials still at "regular" jobs want to quit within two years and be entirely independent. 72% of surveyed Screenagers want to start their own business[305]. While much of this is wishful thinking, the NTR will provide many of these Millennials and Screenagers with business and nonstandard employment opportunities that will make their wishes come true.

Properly structured, the digital economy can provide employment opportunities for those Millennials and Screenagers who exhibit "cultural dissimilarities" that make them a poor fit for the traditional workforce. Millennials are now firmly embedded into the U.S. labor force and are providing a multigenerational management challenge[306] compared to their Generation X (born 1966 to 1979) and Baby-Boomers (born 1946 to 1965) counterparts who have been integrated into the traditional workforce and corporate culture established by the baby-boom generation and their forefathers. Many Millennials, who have distinct ideas about what they expect from their jobs and the reliability of long-term corporate careers, are having a hard time conforming and integrating into traditional corporate culture.

The entrance of Screenagers, who spend an average of 7 hours a day of screen time (i.e., pads, tablets, smartphones and TV), will likely compound the workforce integration challenge since these newcomers have even greater cultural differences, expectations and timelines than the Millennials. Screenager ethnology is incompatible with today's traditional career paths. Many people think that this will change as Screenagers mature and the harsh realities of earning a living ameliorate their cultural dissimilarities. Jobenomics is not so sure.

Rather than trying to force-fit new labor force entrants into the baby boomer-oriented legacy labor pool, it is prudent to seek solutions that recognize the realities of changing workforce attitudes and help newcomers to productively pursue their self-interests and self-sufficiency. As

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[305] Ryan Jenkins Next Generation Catalyst, 7 Emerging Millennial and Generation Z Trends For 2015, http://ryan-jenkins.com/2015/02/05/7-emerging-millennial-and-generation-z-trends-for-2015/ , and Global Messaging, Beyond Facebook: How to Market to a New Generation, https://www.globalmessaging.co.uk/index.php/beyond-facebook-market-new-generation/

[306] Business News Daily, Despite Skeptics, Millennials Taking Control At Work, 4 September 2013, http://www.businessnewsdaily.com/5039-millennials-management-positions.html

advocated by Adam Smith, the forefather of today's classical free market economy, when individuals pursue their self-interest, they indirectly promote the greater good of society by producing vital goods, services and tax revenues for society. Accordingly, "digital natives" should be afforded the opportunity to be self-directed in the emerging digital economy.

Jobenomics contends that micro and self-employed business creation is a viable way to accommodate the expanding contingent workforce and deal with the issue of cultural dissimilarities with new labor force entrants. Screenagers and Millennials represent demographic groups with high motivation and great potential for micro and self-employed business growth. Surprisingly, Baby Boomers also have great potential.

Today, China is trying to replicate its economic success by promoting micro and self-employed businesses with the rural poor. According to recent government figures, the value of Chinese micro and small business loans were $3.5 trillion[307] compared to $0.6 trillion in the United States.[308] In addition to government-sponsored initiatives and financial incentive programs, Chinese companies are aggressively facilitating micro and small business creation.

Alibaba, a Chinese e-commerce company, was founded "to champion small businesses, in the belief that the internet (digital economy) would level the playing field by enabling small enterprises to leverage innovation and technology to grow and compete more effectively in the domestic and global economies".[309] Today, Alibaba underwrites approximately 250,000 micro-businesses per year. Other Chinese NTR companies (Jingdong, Tencent, Baidu, NetEase, Amazon China, et al) are doing the same.

If leading U.S. technology companies were inclined to help U.S. contingency workers create micro and small business in support of filling the 5 million job openings and seizing emerging ETR/NTR employment opportunities, America could put tens of millions of people to work as well as creating millions of small and self-employed business.

Given these seven trends, Jobenomics forecasts that the contingent workforce will continue to rise and eventually overtake today's standard workforce as early as 2030. More importantly, the nature and character of the U.S. labor force, business and the economy is evolving at an ever increasing rate. More attention needs to be given to maximizing productivity and income security for the contingent workforce.

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[307] Reuters, China pushes for more small business lending despite bad loans rising, 8 May 2015, http://www.reuters.com/article/2015/05/08/us-china-economy-idUSKBN0NT0O320150508
[308] U.S. Small Business Association, Small Business Lending in the United States 2013 (Published December 2014), Table B. Value of Small Business Loans Outstanding by Loan Type and Size through June 2014, https://www.sba.gov/sites/default/files/2013-Small-Business-Lending-Study.pdf
[309] Kauffman Foundation, The Importance of Startups in Job Creation and Job Destruction, Last Paragraph, 9 Sep 2010, http://www.kauffman.org/what-we-do/research/firm-formation-and-growth-series/the-importance-of-startups-in-job-creation-and-job-destruction

As the NTR matures, low-skill jobs will increasingly be at risk due to robotics as well as other forms of automation of both manual and cognitive skillsets. In 2015, McKinsey estimates that advanced robots save up to 20% of equivalent human labor costs in the manufacturing sector.[310] By 2030, up to 47% of all existing American jobs could be automated as predicted by the 2013 and 2015 Oxford studies. smart manufacturing (SM) http://searchbusinessanalytics.techtarget.com/definition/smart-manufacturing-SM?utm_medium=EM&asrc=EM_ERU_55374680&utm_campaign=20160406_ERU%20Transmission%20for%2004/06/2016%20(UserUniverse:%202010939)_myka-reports@techtarget.com&utm_source=ERU&src=5497491
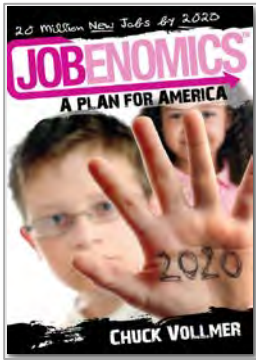
https://www.uschamberfoundation.org/data-driven-economy

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[310] Ibid 36, The Market for Industrial Robots, Page 40

About Jobenomics

Jobenomics deals with economics of business and job creation. Jobenomics National Grassroots Movement's goal is to facilitate an environment that will create 20 million new middle-class U.S. jobs within a decade. The Movement has a following of an estimated 10 million people. The Jobenomics website alone is averaging about 400,000 hits per month and doubling each year.
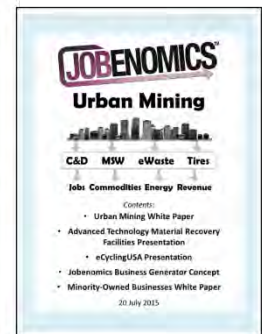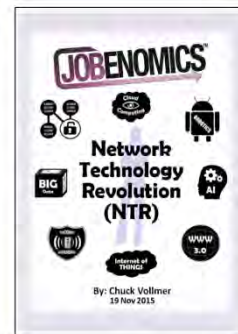
Research. Jobenomics produces a series of comprehensive reports including quarterly employment and unemployment reports that address U.S. labor force, business and economic conditions and issues. Jobenomics provides advice and timely data to policy-makers and decision-makers regarding business and job creation trends.

Key Focus Areas. While Jobenomics supports big business and government job creation efforts, its principal focus is on highly-scalable startup and self-employed businesses that employ almost 80% of all Americans and produced nearly 80% of all new jobs so far this decade. Jobenomics is working with numerous communities and national organizations regarding implementing Jobenomics Community-Based Business Generators to mass-produce small and self-employed businesses for women, minorities, new workforce entrants (Gen Y/Z), veterans and other socioeconomically challenged citizens.

National-Level Initiatives. Jobenomics is leading three national-level initiatives involving; the Energy Technology Revolution (ETR), the Network Technology Revolution (NTR) and Urban Mining. These initiatives could create tens of millions net new American jobs. The Jobenomics ETR plan addresses emerging technologies, systems and

services across the entire energy spectrum for electrical power generation, transportation, storage and energy-related services. The NTR is characterized by a "perfect storm" of advanced network and digital technologies that will transform economies, businesses and labor forces via the emerging Digital Economy. Jobenomics' Urban Mining initiative helps communities monetize high value waste streams in order to create jobs and fund local business generation efforts. As part of this program, Jobenomics established eCyclingUSA (www.eCyclingUSA.com) reclaim high value metals from electronic waste streams and use profits for business/job creation.

City and State Programs. Jobenomics is jointly engaged with Rev. Michel Faulkner, candidate for Mayor of New York City, on the Jobenomics New York City (NYC) initiative that is designed to produce 1 million net new jobs for the city within the next ten years. As a proof-of-principal project, the Jobenomics NYC team is implementing Jobenomics Harlem, one of the most financially distressed neighborhoods in NYC. Jobenomics Baltimore City and Jobenomics Delaware are similar initiatives for

creating 100,000 and 150,000 net new jobs respectively. Jobenomics North Carolina and Jobenomics Southern Maryland are in development.

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