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THE INFLUENCE OF ICT MEGATRENDS ON GLOBAL MEGATRENDS

UTJECAJ INFORMATIČKIH MEGATRENDOVA NA GLOBALNE MEGA-TRENDOVE

Zvezdan Vukanović

College of Arts and Sciences, Abu Dhabi University, United Arab Emirates
Fakultet za umjetnost i znanost, Sveučilište Abu Dhabi, Ujedinjeni Arapski Emirati

Abstract

In this paper, the author analyses the significant influence of IT on global megatrends. Of the five leading global megatrends, two are in the field of ICT, digital media and new technologies. The main reasons for the impact of IT megatrends are twofold: (1) the digital convergence of the media, ICT and telecommunications industries, (2)the exponential increase in information, computing power and internet transfer data. Digital convergence will significantly contribute to changing business models. In an applicative sense, the author considers the concepts of Industry 4.0 - The Fourth Industrial Revolution (4IR), to be the most significant as it marks the paradigmatic change of information, the conceptual and processual transformation of data and services ecosystems in the domains of robotics, the Internet of Things (IoT), Internet of Services, Automated Intelligence, Collaborative Robots (Cobots), Industrial Robots, Augmented Reality, and Virtual Reality. In business and strategic terms, digital media business models will transition, under the influence of digital convergence, to a multi-platform, complementary, interoperable and networked media and ICT ecosystem with a specific focus on the production and distribution of media products, services and applications within the user interface, hypermedia, immersion, mass customization, personalized, augmented and ambient media business space and environment.

Sažetak

Autor u ovom radu analizira značajan utjecaj informatičkih na globalne megatrendove. Od pet vodećih globalnih megatrendova, dva se nalaze u području ICT, digitalnih medija i novih tehnologija. Glavni razlozi utjecaja informatičkih megatrendova su dvojaki: (1) Digitalna konvergencija medija, ICT-a i telekomunikacijske industrije, (2) Eksponencijalni porast informacija, kompjutacijske moći i brzine prijenosa podataka. Digitalna konvergencija će značajno doprinijeti promjeni poslovnih modela. U aplikativnom smislu, autor smatra posebno značajnim koncepte Industry 4.0 - The Fourth Industrial Revolution (4IR) koja čini paradigmatsku promjenu informacijske, konceptualne i procesualne transformacije ekosistema podataka i usluga u domenu**:** robotike, the Internet of Things (IoT), Internet of Services, autonomous vehicles, 3D printing, Smart Cloud, quantum computing, nanotechnology, Big Data (Analytics), cloud computing, edge and fog computing, artificial intelligence, collaborative robots (cobots), industrial robots, augmented reality i virtual reality. U poslovnom i strateškom smislu, poslovni modeli digitalnih medija će se, pod utjecajem digitalne konvergencije, kretati prema multi-platformskom, komplementarnom, interoperabilnom i umreženom medijskom i ICT ekosistemu, sa posebnim fokusom na proizvodnju i distribuciju medijskih proizvoda, usluga i aplikacija u okviru korisničkog interfejsa, hipermedijalnosti, imerzivnosti, masovne kastomizacije/personalizacije, augmentacije i ambijentalizacije medijskog poslovnog prostora i okruženja.

1.INTRODUCTION TO THE CONCEPTUAL DEFINITION OF MEGATRENDS

The beginnings of the analytical and systemic consideration of the impact of global megatrends were heralded by John Naisbitt's Megatrends books /**1**/, RAND Corporation and Deutsche Bank. They began to realize the importance of projecting future megatrends related to global currents in society, economy, energy and, accordingly, identifying the creation of new, possible products in the

future, as well as the impact on the consumer, the organizational level and the planning process.

Megatrends are the global and sustainable macro-economic forces of the synergistic ecosystem of development, which have an impact on information technology, business, economy, society, culture and individuals, defining the future development of the world and its accelerated rhythm of change. They represent imminent and inevitable socio-economic evolution.

There are three key dimensions of a megatrend:

1. That there is a long-term duration and impact (this implies at least 15 years),
2. That it influences the global business context, and
3. That it transforms socio-economic strategies.

The five major global megatrends in the 21st century are:

1. The change of the dominant global economic power from West to East,
2. The increase in urbanization, population aging and immigration,
3. Sustainable development,
4. Health care, and
5. Technological and Information Technology megatrends.

Of the five listed global megatrends, two have a special significance for the media, telecommunications and ICT, as they are dominantly generated and encouraged by their development. These are the Health care and Technological and Information Technology megatrends. Hence, they will be analysed in greater detail here.

1.2. Health care

There are three key tasks facing the global healthcare system: reducing rising costs, improving quality and results, and expanding access. Within the framework of health care, the pharmaceutical industry will be one of the most profitable sectors, given its efficient technological development, as well as the ageing tendency of the world's population – principally of those over 60 years of age. Thus, the population older than 60 years of age will increase from 11% to 22% in the period from 2000 to 2060. In less than 40 years, one fifth of the population will be at least 60 years of age /**2**/. The global population will drastically increase in age between 2010 and 2050, as demonstrated by the fact that the number of those older than 65 in 2050 will be 1.5 billion, while it was 531 million in 2010. Japan and South Korea will find themselves in this category (where the average age of the population will be 53 years), Germany (51 years) and China (46 years). Intercontinental demographic changes in the population will cause four-fifths of the world's population to live in Africa or Asia in 2050, while the population of Europe and North America will be only one-fifth, which is a reduction of 20% compared to 2010. Between 2010 and 2050, Germany will lose 13% of its population, Russia 16% and Japan 15%, respectively, while the Nigerian population will increase by 176% and Kenyan by 138%, respectively.

The trend of an ageing population will result in increased healthcare allocations by countries; so, in the United States of America, health care allocations will amount to 23% of GDP in 2023, while in 2012 they constituted 17% of GDP. In the future, healthcare will be personalized and involve the use of wearable sensors transmitting a large amount of patient data via mobile devices and computers and storing them in cloud-based computerized software systems, within the framework of health organizations that can subsequently use them. In the future of global health care, significant megatrends will be focused on analytical understanding and big data collection (extensive and content data systems), as part of advanced methods of predictive analytics to extract value from data with the assistance of sophisticated software algorithms that are conceptually distinctive by switching from a relational to a non-relational database. Data searches can be performed extremely efficiently, e.g. a Google search yields results in milliseconds. More specifically, between 2015 and 2020, the global healthcare analytics market has grown on average by 23.7% per year; social media channels generated 50 petabytes of data on healthcare in 2012, rising to 25,000 petabytes of data in 2017; meanwhile, the sensory market for global healthcare and fitness on mobile phones is expected to grow by 40% annually from 2013 to 2018. Currently, 20,000 smartphone applications are available to users.

1.3. Mainstream/dominant/primary technology-ICT-digital media megatrends

Analysing the dominant digital media and ICT tends, it is evident that ICT and digital media are integrated with the biotechnology, nanotechnology, energy, and also the microelectronic and microelectromechanical research areas.

The twelve basic technological global megatrends include:

- High performance computers
- Artificial cells, tissues and organs
- Micro and nanotechnology
- Intelligent materials & surface engineering
- Biotechnology in agriculture
- Biotechnology in medicine
- Energy technologies
- Mixed reality
- Optical devices
- Artificial intelligence
- Wireless technologies and,
- MEMs (microelectronic and microelectromechanical systems) /**3**/.

Moreover, it should be considered that scientific research in the following ICT fields will be increasingly developing in the future: computer-generated images, immersive and virtual reality, ultra-high definition TVs, augmented reality, 5G wireless communications, ambient technology, IOT, WOT, holography, Li-Fi, quantum computing, genetic engineering, molecular nanotechnology, nanomedicine, nanorobotics, AI Art, drone journalism, online universities, geo targeting, 3D printing, smart cloud, USSD - Unstructured Supplementary Service Data, predictive analytics, wearable technologies with biometric sensors, big data analytics, quantum algorithm, cognitive computing, quantum computing, cloud computing, biointerface & gestural interfaces, quantifying emotion – the use of computer cameras to analyse human emotions, digital & intelligent billboards, collaborative software and e-commerce on social networks.

The contextual integration of the technological and business concept of these advanced technologies results in Industry 4.0, an advanced digitized and networked industry, whose value will be approximately one trillion dollars annually.

1. MAIN REASONS FOR THE IMPACT OF IT MEGATRENDS

The main reasons for the impact of IT megatrends are twofold:

- The digital convergence of the media, ICT and telecommunications industry, and
- The exponential increase in information, computing power and data transfer rates.

In particular, the price of broadband internet information transfer has been reduced by a factor of 40 over the last 10 years, while the cost of processing information has decreased by a factor of 60 over the same period.

1.1. Digital convergence

Digital convergence includes the networking of business strategies and aspects of the formerly separate media, ICT and telecommunications industries that have now converged through mega-mergers, buyouts, partnerships and strategic alliances and new technologies, such as social networks, cloud computing, immersive media, augmented media, wearable technologies, IOT, and WOT. In other words, digital media convergence is not only a technological change, or an opportunity provided by corporate branding, but a reconfiguration of the paradigmatic media transition and the establishment of new media aesthetics and economy, as well as of the relationship changes within existing technologies, industries, markets, revenue, distribution, media content and audiences.

The rapid changes in software, computer and telecommunication technologies has resulted in a significant reduction in the cost of media content production and distribution, as well as in the expansion of User Generated Content (UCG). All three levels of the media industry (distribution, software, and content) are under the influence of digital convergence, and this affects relationship changes in the value network, infrastructure, distribution, marketing and relationships with users and consumers in the media industry and business.

1.2. The conceptual definition and typology of digital convergence

Jenkins /**4**/ classifies digital convergence into five areas:

1. Technological
2. Economic
3. Social or organic
4. Cultural
5. Global convergence

The focus of technological convergence is on media content digitalization; economic convergence deals with the integration of the entertainment industry; social or organic convergence deals with consumers; cultural conference creates new forms of creativity at the crossroads of various media technologies, industries and consumers; while global convergence represents a cultural hybridity

that arises from the international exchange of media content.

Lawson-Borders /**5**/ identifies seven interconnected convergence criteria, all of which begin with the letter C:

1. Communication,
2. Commitment,
3. Cooperation,
4. Compensation,
5. Culture,
6. Competition, and
7. Customer.

Lee /**6**/ defines four categories and eight levels of digital convergence:

1. Data convergence (Media convergence and Domain convergence)
2. Structural convergence (Architecture convergence and Infrastructure convergence)
3. Application convergence (Platform convergence and Device convergence)
4. Industrial convergence (Intra-industry convergence and Inter-industry convergence)

Pavlik and McIntosh /**7**/ state that convergence affects four areas, as follows:

1. The content of communication
2. The relationships between media organizations and their public
3. The structure of communication organizations
4. How communication professionals do their work.

1.3. The most dominant impacts on the functioning of digital media convergence

The most dominant influences on digital media convergence include:

- technological innovation, including the evolution of the Internet, and the digital revolution that followed
- the deregulation and market liberalization that followed, especially after the adoption of the 1996 Telecommunications Act in the United States, boosting the privatization of Telecoms in the European Union
- increased standards of living for consumers and changes to their consumer preferences
- technological standardization
- increased global competition in the field of media and telecommunications
- the re-purposing of media content from the old media (print, radio) to digital ones (internet, digital cable and satellite television) /**8**/.

1.4. Paradigmatic changes in media consumption business models after digital convergence

Media convergence has contributed to a more modular and networked way of creating and distributing media content. Instead of one dominating platform, now the media can be digitally distributed over several social networks simultaneously, within one medium - for example, content can be uploaded via a computer or laptop computer to You Tube, LinkedIn, Facebook, Twitter, Instagram and other platforms.

The result of creating such a wide distribution domain is a change of business and the business models functioning in the sphere of media consumption and the rapid fragmentation of the public. Tables 1 and 2 show the specific change in media consumption business models after digital convergence, which explains the influence of the creation, migration and distribution of media content under the conditions of media convergence.

Table 1. Paradigmatic changes in media consumption business models after digital convergence

Before digital media convergence	**After digital media convergence**
Industrial media dominantly produced by large multinational corporations	Personal media primarily produced by internet users
Top-down content production & organizational structure	Bottom-up content production & organizational structure
A centralized framework for the organization, production, and dissemination of media One to many content distribution	Decentralized (network and on-demand) based media Many to many content distribution
Linear, One-way media communication	Interactive and immersive media communication

Reaching the audience	Connecting the audience
Passive users - Users as recipients	Active users - Users as participants
Static media	Mobile media
Economies of scale	Economies of scope (Long tail Economics)
Content is king	The user is king
One-sided platform distribution	More diversified multi-platform (hypermedia and multimedia) distribution, less hierarchical, and distinguished by multiple points of production and utility
Less available and accessible to the public, distribution costs and viewing is more expensive	Generally available and accessible to the public at little or no cost
The time lag between communications produced by industrial media can be long (days, weeks, or even months)	Capable of virtually instantaneous responses; only the participants determine any delay in response
Once content is created, it cannot be altered (once a magazine article is printed and distributed changes cannot be made to that same article)	Easily altered content by almost instantaneously editing and writing comments
Less creative content creation	More creative content creation
Storage capacity for media content is relatively low	Storage capacity for media content is very high Acts as an online database
Low levels of content categorization and sharing	High levels of content categorization, annotation and sharing: Widgets, collaborative tagging, social classification, social indexing, and social tagging, folksonomy

Table 2. Paradigmatic changes in media consumption business models after digital convergence

Before digital media convergence	**After digital media convergence**
Less peer-to-peer power Publisher-Centric	More peer-to-peer power User-Centric Model UGC – User generated content
Analogue	Digital media Digital convergence Mobile and wireless media Ambient media Augmented media Widget(ized) media

	Tagged media Folksonomy
Two-dimensional media	3D media
Traditional market targeting (B2C and B2B marketing)	Better and more efficient market and consumer marketing (B2C and C2C) Nicheization Social network and online communities
Web 1.0 and Web 2.0	Web 3.0 (semantic web) and Web 4.0 (symbiotic web)
Value chain	Value network-ecosystem
Collaborative consumption	Collaborative creation
Producer	Produser
Consumer	Prosumer
Consumerism	Prosumerism
Broadcasting	Narrowcasting to microcasting
An upstream supply chain	A downstream supply chain (customization, targetization, high margins)
Distribution - one to many	Distribution - many to many
Symmetric information	Asymmetric information flow
Media consumption is about demand	Media consumption is about mass personalized-customized demand and choice
Products and Services	Applications

1.5. The exponential growth of information and computing power

In a short time, the Internet has become the world's largest electronic market by changing the means, process and mechanisms of communication, opening the door to online trade and changing modern business by creating new paradigms for relationships in communication, art, and science. It took 46 years for electricity to be taken up by at least a quarter of the US population, 35 years for the telephone and 26 for the television, but only 6 years for broadband Internet. It took Facebook 2 years to reach the number of 50 million users, 3 for the iPod, 4 for the Internet, 13 for TV, and 38 years for the radio. Cisco Systems, Inc., the American technology conglomerate, has calculated that IP traffic, based on the monthly information flow between 1996 and 2001, increased by 100 times, while it increased by 10 times between 2005 and 2010. Between 1951 and 2013, the microprocessor speed of personal computers grew 10,000 times. In partnership with the NASA, Google is developing a quantum computer, D-Wave 2X, which will define algorithms 100 million times faster than a traditional, conventional processor-based computer. The 2016 PWC research on the technology and applicative expansion of the five most significant megatrends, with a particular focus on ICT, illustrates that the planet's inhabitants used a total of 25 billion ICT devices in 2015, and that by 2020 the figure will have increased to 50 billion (PWC, 2016). Concurrently, media consumption will grow at an annual rate of 7.2% in the period between 2015 and 2020. According to the research by the International Telecommunication Union (ITU), the number of

Internet users worldwide increased eleven-fold between 2005 and 2010. In 2005, the Internet was used by only 16% of the world's population; in January 2018, the number of Internet users worldwide amounted to 3.82 billion, and in 2020 it will increase to 60% of the world's population (5 billion). In the period between 2013 and 2020, the number of worldwide users of devices connected to the Internet will increase by a factor of 4. A particular exponential increase in information was recorded in terms of mobile networks, which will increase three times in comparison with IPTV between 2014 and 2019. Nevertheless, the June 2017 document entitled *The Zettabyte Era-Trends and Analysis* produced by the Cisco® Visual Networking Index (VNI) indicates that the distribution of information within IPTV has increased five-fold over the last five years, and that it will triple again in the next five years. Visual media content on IPTV will experience a particular expansion. It is foreseen that in the year 2019, four-fifths of the information flow on IPTV will be visual content. The most significant increase in IP flow is predicted in the Middle East and Africa, followed by the Asia-Pacific region and Central and Eastern Europe. Based on the 2014 research by iPass Inc. and Maravedis and Rethink Study, there will be 341 million public Wi-Fi hotspots available globally in 2018, which is a seven-fold increase compared to 2014, when there were 48 million available. By 2018, Wi-Fi will be available on 60% of aircraft and 11% of trains, while in 2014 availability on planes was 16%, and on trains 3%, respectively.

2. The applicativity of the most significant technological-ICT megatrends

The most important technological and ICT megatrends might be applicative in the area of the Fourth Industrial Revolution (4IR), defined by Schwab /**9**/ as a paradigmatic change in information, and the conceptual and processual transformation of data and service ecosystems, which will bring about a quantum leap in productivity in the areas of: robotics, the Internet of Things (IoT), autonomous vehicles, 3D printing, quantum computing, nanotechnology, Big Data (Analytics), cloud computing, edge and fog computing, artificial intelligence, collaborative robots (cobots), industrial robots, augmented reality and virtual reality. The Fourth Industrial Revolution (4IR) is a new level of value network within the life cycle of products and services that strives for the mass personalization of services. The economic potential of the Fourth Industrial Revolution (4IR) is particularly significant if we take into account the fact that the profits generated in this area in Germany alone are estimated to reach €78 billion by 2025 /**10**/.

The term 'Industry 4.0' was publicly presented in 2011, with reference to the initiative of an association of businesses, politicians and representatives of the academic community named 'Industrie 4.0' which was used to promote this idea in order to boost the competitiveness of the German manufacturing industry /**11**/. The Federal Government of Germany supported this concept by integrating it into its 2020 High Tech Strategy technological innovation leadership initiative, the first recommendations of which were published in April 2013 /**12**/.

Based on the analysis of five databases (CiteSeerX, ACM, AISeL, EBSCOhost, Emerald Insight) and Google Scholar, Hermann, Pentek and Otto identified in their article *Design Principles for Industry 4.0 Scenarios: A Literature Review* (2015) the key terms of Industry 4.0 accepted by researchers and corporate practitioners, after investigating 200 scientific papers that included the term Industry 4.0 in their titles, abstracts or key words. Owing to their aggregate collection of the most significant terms describing the Industry 4.0 concept, these three scientists discovered that the following five terms are most commonly mentioned within the framework of Industry 4.0:

1. Cyber-Physical Systems, Cyber-Physikalische Systeme, CPS
2. Internet of Things, Internet der Dinge
3. Smart Factory, intelligente Fabrik
4. Internet of Services, Internet der Dienste
5. Smart Product, intelligentes Produkt.

Table 3 shows a more specific and detailed overview of the terms that appear most frequently in the search databases with reference to Industry 4.0,

Table 3. The most commonly occurring terms in search databases with reference to Industry 4.0

Search term	The number of publications in which the search term appears

Cyber-Physical Systems, Cyber-Physikalische Systeme, CPS	46
Internet of Things, Internet der Dinge	36
Smart Factory, intelligente Fabrik	24
Internet of Services, Internet der Dienste	19
Smart Product, intelligentes Produkt	10

Other occurring terms are: M2M, Machine-to-Machine (8 times), Big Data (7), and Cloud (5).

Cyber-Physical Systems, based on a computer-based algorithm, control and monitor physical objects and processes and create a virtual copy of the physical world, decentralizing control and decision-making. Through the Internet of Things (IOT), Cyber-Physical Systems interactively communicate and cooperate with each other, as well as with people in real time through distinctive behavioural modalities, depending on the context structure. The CPS represent a higher level of coordination between physical and computing elements. Smart Grid is one of the most significant examples of the CPS /**13**/. In the industrial area, supported by Cloud technologies, CPS have contributed to the development of Industry 4.0 within the framework of the European Commission's IMC-AESOP projects, in cooperation with Scheider Electric, SAP, Honeywell, and Microsoft. Smartphone platforms are very functional for CPS applications, for a variety of reasons, including the following:

- they have significant computing and processual resources and capacities, as well as database storage
- they have a large number of sensors, such as touch screens, cameras, GPS chips, microphones, light sensors
- they have multiple communication mechanisms, such as WiFi, 3G, EDGE, and Bluetooth to connect to the Internet and other devices
- they have ready application distribution mechanisms, such as the Android Market and the Apple App Store.

Specific examples of mobile cyber-physical systems include those which are monitoring and analysing CO_2 emissions, detecting traffic accidents and measuring traffic, or monitoring the heart rhythm of patients /**14**/.

The Internet of Things (IOT) is a network of physical devices, home electronic appliances, mobile phones, software and sensors which enable objects to be connected and to exchange data. Each IOT item is specifically identifiable through an integrated computing system, and it is interoperable with the existing Internet infrastructure. In this way, the IOT represents an integration of hardware, software, data and services. In terms of its application, the IOT is particularly useful in smart grids, smart cities, intelligent transportation, Light-Fidelity (Li-Fi), QR codes and barcodes, Wi-Fi, LTE-Advanced and for wearable technologies, such as smart watches. In the area of business and IT applications, the IOT has very developed prospects. The International Telecommunication Union (ITU) predicts that the IOT will connect 30 billion objects in 2020, while its global market value is estimated at $7.1 trillion in 2020, and $12 trillion in 2030, respectively.

The Internet of Services, Internet der Dienste enables services through an open platform and interface architecture within the Service-Oriented-Architecture (SOA). In this way it appears as an intermediary between the participants in the network. Online services provide new channels of electronic commerce. Standardization will enable operationality between the business levels of different services. The main goal of the IOS is to create new value in the service sector by the systematic use of the Internet. The Internet of Services is expected to create Long Tail Economics in service networks, which will simultaneously lead to the atomization of services and their on demand offer to customers and consumers.

Smart Factories, intelligente Fabrike will have the ability to communicate with the environment and they will be an integral part of the ordering network of digital goods purchases. Each Smart Factory is not only automated but also an adaptable/optimized factory which can adapt to different cycles and consumer demands by expanding into new markets, developing new products and services, and incorporating new technologies. According to research conducted in 2017 by the Capgemini Digital Transformation Institute (DTI), Smart Factories will increase productivity seven-

fold by 2022. It has been estimated that the Smart Factory's market potential will reach between $500 billion and $1.5 trillion by 2022. By 2022, the quality of products manufactured in the Smart Factory will be up to twelve times greater than was the case in 1990 /**15**/.

Each **Smart Product, intelligentes Produkt** is a tangible entity, object, software element or service, designed and built in such a way that when independently embedded into a variety of smart environments, it can provide interaction between products and customers over its life cycle based on proactive communication with the environment, semantics, multimodal natural interfaces, AI planning and machine learning /**16**/. That is why smart products are seen as products that contain information technology in the form of micro-chips, software and multi-factor sensors (related to the eye, face, voice, touch or movement) that allow them to collect, process and produce information /**17**/. The technologies that enable the use of smart products are: GPS, barcodes, QR-codes, RFID, WLAN, and semantic technologies.

The most important features of smart products are:

- Their adaptation to the situation and the environment
- Their adaptation to individual participants in interaction with products
- Their adaptation to the particularities of business environments
- The personalization of products and user needs
- The ability to change products with regard to customer reactions
- The proactive anticipation of user plans and intentions and
- The possibility of networking products /**18**/.

In addition to their specific features, smart products should have the ability to support their work across their life cycle and to achieve multimodal interaction with users /**19**/.

In order to achieve a more comprehensive application of smart products, additional research needs to be carried out on the following topics:

1. The application of smart products in industrial production and business
2. The impact of smart products on price
3. The sale of smart products through new channels and
4. The application of the business model of selling the data collected by smart products to third parties.

3. Three information and communication technologies of the future

Three significant technologies that will contribute to the development of new business models in the ICT field are: 3D printing, Big Data and the Smart Cloud. It is important to underline that 3D printing will increase its global market potential from $1.1 billion in 2009 to $7.1 billion in 2020, while Big Data will grow at an annual rate of 40%. Therefore, the IT traffic exchange, which was 1.2 zettabytes in 2012, will reach the figure of 100.2 zettabytes in 2020. The smart cloud is a customized on-demand cloud that can address a particular business need for a specific time period and that can be integrated into the current IT infrastructure base – this primarily refers to infrastructure (IaaS), platforms (PaaS) and software applications (SaaS). This new segment of Cloud development will contribute to the development of new business models, as well as of new technological applications for software corporations.

4. Additional research in the field of digital media convergence

For the purpose of the better conceptual and applicative positioning and understanding of digital media convergence, additional research is needed to primarily address the impact of the convergence of digital media platforms on market competition, as well as on complementors, the structure of the media industry, mergers and acquisitions, strategic management, consumer needs, the cultural industry, web-digital-online journalism, and the telecommunications industry – most especially mobile telephony and IPTV.

5. Concluding considerations: The applicative implications of the development of information megatrends

Considering that two out of five primary/mainstream megatrends are in the ICT field, and that the media spectrum, the exponential information flow, and the data exchange rate have increased exponentially owing to the new paradigmatic changes in the field of media digitalization, IT megatrend analysis indicates that the most important technological and ICT megatrends that can be applied in the area of the Fourth Industrial Revolution (4IR) which consti-

tutes a paradigmatic change in the handling of information, conceptual and processual transformation of data and services ecosystems, are in the fields of: robotics, the Internet of Things (IOT), the Internet of Services, autonomous vehicles, 3D printing, the Smart Cloud, Quantum computing, nanotechnology, Big Data (Analytics), Cloud computing, edge and fog computing, artificial intelligence, collaborative robots (cobots), industrial robots, augmented reality and virtual reality. The contextual integration of the technological and business concept of these advanced technologies will generate the advanced digitized and networked Industry 4.0, whose annual value will amount to about one trillion dollars, while the International Telecommunication Union (ITU) foresees that the IOT will connect 30 billion objects in 2020, and its global market value is estimated at $7.1 trillion in 2020, and $12 trillion in 2030, respectively. In business and strategic terms, under the impact of digital convergence, digital media business models will move towards a multi-platform, complementary, interoperable and networked media and ICT ecosystem, with a particular focus on the production and distribution of media products, services and applications within the user interface, hypermediality, immersion, mass customization/personalization, and the augmentation and ambientalization of the media business space and environment.

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