Summary of the impact of digital technology on the world of culture and the media

A continuous movement of dematerialisation and re-materialisation of the objects that surround us

Dematerialisation is the process of rewriting physical objects as digital components that can be manipulated by a computer, a process known as digitisation[1]. Re-materialisation involves reintegrating these digital components into an object whose *design* is better adapted than that of a computer and which is intended for a specific use[2]. This alternating movement of digitisation and re-materialisation of our everyday objects, which has been continuous in recent decades[3], has been the cause of significant changes in the way we access culture.

New services that change the way we access culture

The reinvention of the objects that we use to access culture has been matched by the creation of new services that change our behaviours. The majority of these services are invented and experienced via the Internet, but they have now spread to all parts of our daily lives, as computers are now small enough to fit in our pockets and can connect to the Internet through wireless broadband networks. It's no longer enough just to listen to music when you can instantly research artists and explore their music, listen to tracks for free[4], buy tracks or albums, sort them into lists, comment on them, recommend them, and more.

Behavioural changes lead to economic changes

In 2009, more than a quarter of the global music industry's revenue came from the sale of digital music[5]; eBook sales began accounting for more than 1% of publishing revenue in Japan and the US, the two market leaders in digital publishing. This is becoming a common trend across the sector, but culture is not the only sector affected: in terms of its overall size, the global e-commerce market now accounts for slightly more than 1% of global GDP, with average annual growth rates of nearly 20% over the last 5 years[6].

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[1] Paper books can now be dematerialised in the form of a digital file and a piece of software that enables the file to be read on a computer (eReader software). This technology has been around for a few years but has not yet changed consumer habits. However, the invention of electronic objects specially designed for reading could change our habits, if the usage value of these objects becomes close to or higher than that of paper books.

[2] The Kindle, launched by Amazon in 2007 is specially designed for reading digital books and has a better usage value than an ordinary computer for the reading of eBooks.

[3] This movement has been underway for over fifty years now, since the invention of the first microprocessors.

[4] Listening is sometimes free on services that rely on advertising revenue, and it is also possible to listen to extracts on on-line sales platforms.

[5] Source: IFPI, 2010

[6] Source: JP Morgan – *Nothing but Net* – 2009

The perpetual reinvention of objects that provide access to culture is an engrained trend for all media, though not all are affected at the same rate.
For certain media, the rate of digitisation is approaching, or has already reached, ratios of 50% or more; for others, it's only the beginning. Between 2000 and 2010:

- The number of households wired for **digital television** has increased from 55 million to 600 million[7] worldwide. These households represent almost 45% of households with a television.
- The number of **digital radios** worldwide has increased from approximately 1 million to 20 million[8]. And that's just the start. These new objects are spreading rapidly and their numbers should increase yet more in the next few years, with the profusion of innovations due to technology and design[9].
- The number of **cinema screens with digital projectors** has increased from approximately 30 to more than 22,000, or nearly 15% of the global stock. Approximately 50% of these are 3D projection systems[10].
- The number of **eBook reading systems** has risen from a few tens of thousand to more than 7 million[11].

The replacement of our everyday objects by digital objects has gradually accustomed the general public to the use of the Internet[12], and the adoption of mobile telephone services has extended these uses to every part of our daily lives.
- Over the past decade, the number of Internet users has risen from 7% to 30%[13] of the world's population.
- The number of people with a mobile telephone has increased from 10% to 73%[14].
- In 2010, the number of mobile multimedia digital objects in circulation should reach around three billion units[15], for a world population of 6.8 billion.

In 2010, an industrial vision seems to be emerging around the world for the developing of new means of accessing culture. The implementation of this vision is based on the use of *high-tech* objects and Internet service platforms, which <u>together</u> deliver a usage value in line with new consumer habits. The success of uses that were designed more than 15 years ago on the Internet has made them the <u>de facto</u> standards for accessing culture[16]. In 2003, the iPod + iTunes Store combination did for a specific medium (i.e. music) what the computer + web services combination did in the mid 1990s for all types of media (hypertext, video, music, radio, TV, multimedia). Since the beginning of this decade, Apple's success seems to have set the tone for the entire industry in terms of the new path to take. In addition, in 2010, the "object of desire + services with high utility value" combination has become the benchmark model for developing new ways of accessing culture, in line with consumer preferences. Google, Nokia, Microsoft and RIM have already adopted this approach and are using it on a massive scale. Together, they represent a range of more than 300,000 applications, a large number of which provide access to cultural content and services[17]. Their mobile platforms are beginning to extend the use of the Internet to an increasing number of everyday situations. Amazon, Barnes & Noble, Sony and Sharp are following the same path for developing access to books. Collectively, they offer nearly 2 million

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[7] iDate forecast for 2010 (www.idate.org)

[8] According to ABI Research (www.abiresearch.com)

[9] Some radios now have tactile screens, for example.

[10] According to Screen Digest (www/screendigest.com)

[11] At least 3.3 million for the Kindle, 3 million for iPad and over a million for other readers (according to Amazon, Apple, Barnes & Noble and Sony)

[12] In particular, the uses of participative web, i.e. Internet applications that enable users to produce their own content: blogs or micro blogs such as Twitter (105 million accounts opened as of April 2010), online music or video sites such as MySpace or YouTube, social media sites such as Facebook (over 500 million active users globally as of July 2010, of which 150 million access the services from a mobile phone).

[13] According to *Internet World Stats*, June 2010 (www.internetworldstats.com)

[14] According to statistics published by Ericsson in July 2010. According to Ericsson, the number of mobile Internet connections is set to reach 3.4 billion in 2015

[15] According to *World Digital FactBook 10th Edition, 2008-2009*. It is set to increase by another billion in 2011.

[16] Some of the most popular uses of the Internet are using search engines and portals to find information, testing or comparing products on line, sharing information and recommendations by email, on blogs and social networks and, increasingly, the interaction between internet users and institutions (museums and live event venues, music sites, video sites etc.)

[17] On Apples's *App Store*, which listed 250,000 applications in October 2010, over 85,000 applications were listed under the categories Books, Teaching, Music and Photos. There are almost as many applications in the Books category as in the general entertainment category. There are more book applications than video or music applications. Book applications are outnumbered only by games.

titles[18]. Other, less visible actors are following suit[19]: platforms for selling and reading digital books are multiplying, and their catalogues are likely to fill out in the years to come. At the same time, Yahoo, Samsung, Intel, Google, Apple etc. are beginning to roll out service platforms for distributing and selling television programmes, in partnership with TV industry leaders[20]. And Nintendo, Sony and Microsoft have already implemented this model with game platforms that are beginning to resemble media in their own right[21]. Together, these players in the digital industry are introducing new standards for accessing culture based on a generic model: high-tech objects combined with online service platforms.

In ten years' time, the media industry will have largely fallen into step with the new model based on "objects of desire" combined with online service platforms and, in 2020, the share of digitally accessed content will have become the majority for most major media, at least in the most industrialised countries. But this will not be the case for all media, nor for all countries. According to a study by PWC[22], digital could represent 65% of media growth in 2014. In 2015, the migration of media value towards digital could account for more than 25%[23], and more than 75% of media time could be spent on on-demand content. However, in emerging countries, analogue television, radio and print media are still experiencing growth[24]. Not all media will have reached 50% digital distribution in ten years time, despite the likelihood that in many industrialised countries television and radio will only be broadcast in digital format.

The development of mobile services on broadband-connected smartphones is likely to expand "disruptive" uses of the Internet in all situations relating to access to culture (via digital media or on site). The multiplication of experiments by museums over the last several years aimed at helping their audiences to organise their virtual and on-site visits is leading to the establishment of these types of services as an expected standard, which should in itself contribute to the institutionalisation of these new patterns of access[25]. Some trends, such as personalised tours provided via *smartphone*, are already seen as indispensable services for the most important of these museums[26]. Other, similar services are likely to rapidly become indispensable, such as making contributory, participatory and collaborative applications available to the public, as well as services that allow visitors to make recommendations to each other: applications that promote interactivity between the public, websites and locations that provide access to culture. With respect to books, these new disruptive scenarios are already a reality, although they are not yet adequately measured (weak signals)[27]. These scenarios should experience massive growth in the next ten years. To these new types of situations, we can also add all of the possibilities offered by social networking services, through which large flows of information, recommendations, and, to an extent, advertising are now largely provided by the public and by networks of people rather than by the brands and the institutions themselves[28].

Eventually, we expect the digital game to establish itself as a new form of media, able to capture exclusive audience attention for a significant period of time[29]. This will pose a challenge with respect to developing

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[18] According to information from available from Amazon and Barnes & Noble

[19] Cf. Asus, Cybook, Dell, Hitachi etc.

[20] Cf. Yahoo Connected TV, Google TV, Intel Smart TV, Apple TV

[21] In June 2010, Nintendo announced cumulative sales of 73 million Wii consoles worldwide, which corresponds to a world market share in family consoles of around 50% (www.nintendo.com). The standard Wii menu includes themed channels and online services. The infrastructure is technically equipped to host advertising or social network services, etc.

[22] Cf. *Global Entertainment & Media Outlook - PWC - 2009*

[23] Cf. *Media NYC 2020* project

[24] To be re-examined after 2009 in the light of the world economic crisis, but generally many emerging countries will have difficulties developing fixed digital infrastructures on a national scale. They use less costly analogue hertzian infrastructure to develop television and radio in rural areas and use mobile technologies to develop their communications networks.

[25] Cf. the "*Mobileuseum*" project at the Tate Gallery in London, in collaboration with the *MoMA, MET, BritM, Tate, Smithsonian* and *Getti* museums...

[26] Cf. the *American Museum of Natural History* (New York) "*explorer*" application shared on Twitter and Facebook, games and recommendations between visitors to the *Brooklyn Museum*, geo-localisation of national heritage images by GPS at the Museum of London, the iPod or iPhone guide from the *Fowler Museum* (Los Angeles), as well as the mobile applications from the *Ashmolean Museum* (London) or the Prado (Madrid) etc.

[27] E.g. Accessing catalogues and on-line services while in a local book shop.

[28] A recent CNN study shows that 43% of personal news broadcast on the Internet is done via Twitter, Facebook, Youtube and Myspace.

[29] According to the NPD Group, in the United States "online gamers" spend an average of 8 hours per week playing on the Internet. This figure has increased for the last 3 years running. According to a Nielson report in June 2010, on average,

advertising over the next ten years, but it could also become a point of entry for access to culture in general. Technically, it could act as a distribution channel for all other media[30]. In Asia, particularly Japan, South Korea and especially in China, where the Internet and mobile services are used as <u>low-cost media</u>, online games are already being used as sales platforms for digital goods. The latter are also experimenting on a daily basis with mixed models by incorporating paid advertising into games (animated banners and rich media, product placement and integration, *advergaming* etc.) [31].

The connected television will bring Internet services into the heart of the home, and extend the most popular uses of the Internet to consumers who are still resistant to computers. The TV is no longer a terminal exclusively dedicated to television programs. Once connected to the Internet, it will become the main competitor (or supplement) to the personal computer and game console. All three will be used in future applications to access multimedia family applications, games, themed channels and, to an extent, telecommunications. In the years to come, television platforms will be structured around "on-demand" [32] services, making the "television + online services" combination one of the main points of entry for e-commerce.

The range of reading systems offered to the general public will multiply, and then proliferate; and online catalogues will gradually include the whole of the product offer, both digital and paper. The smartphone and the personal computer will be among the terminals used for digital playback. In the years to come, competition will probably concentrate less on exploiting all the possibilities offered by digital technologies for reinventing reading and writing[33] than on the ability of the market leaders to provide ergonomics comparable to those of paper books, and on the depth and variety of their catalogues. However, service innovation will play a key role in the search for business models and in attempting to limit the effect of "destructive creation" inherent in digitisation[34]. On-demand printing services and custom publishing, for example, could help the book industry to continue to derive value from products printed on paper, at the same time that the industry continues to develop the digital book. Combined "digital + paper" offers should help to avoid excessive cannibalization of the "paper" market by the digital market. Finally, services related to collaborative and community behaviour will be critical in acquiring and retaining readers. Interactivity and local services, for example, could allow local booksellers to remain competitive with online offers, in terms of both usage value and price. It will be necessary to modify on-site services to meet certain online access standards, particularly by providing methods for research, recommendations and choice that are at least as fast, efficient and fun as those offered on the Internet. It's therefore possible to imagine "win-win" partnerships between online distribution platforms and local bookstores.

In ten years' time, the majority of newspapers will probably still be printed and distributed on paper at the global level. A decade is not long enough to invent a digital object that is capable of replacing the printed newspaper and to distribute it on a mass scale. But this time horizon is probably sufficient for a segment of the general public to become satisfied with electronic modes of reading – on tablets, for example – despite an experience that is still far removed from that provided by a printed newspaper. In the next ten years, we'll probably see the appearance of the first digital paper or flexible computer prototypes, and some of the objects built from these technologies may be sufficiently convincing to give a new direction to the printing industry. However, until these new objects are sufficiently developed to be adopted by the general public, the challenge of the press will be to find ways to enhance its content both online and on paper. Mixed offers, in terms of both materials and business models, will become the industry standard. New services, such as on-demand printing and customized printing jobs, could also help promote other paper media.

American Internet users spent 10% of their time on online games (23% on social networks or blogs and 8% on their online messaging service).

[30] The games *Rockband* and *Guitar Hero* are already off-line and on-line distribution platforms for recorded music.

[31] The Chinese on-line games market is set to reach 5 billion US dollars in 2010, with 338 million players, according to Zero2IPO (www.zero2ipo.com.cn/en). Niko Partners forecasts that this revenue will top 9 billion dollars in 2014 (www.nikopartners.com)

[32] Cf. iDate, TV 2010 – *Market Trends and Key Figures*

[33] The use of multimedia is only decisive for certain types of content (encyclopaedias, scientific books etc.) and less so for novels, for example.

[34] A phenomenon of the destructive creation of value can be observed in the music industry, whose revenue has been decreasing for the last ten years. All digital media are exposed to the problem. Although it is theoretically possible to reduce the period over which a market loses value, for example by finding growth outlets based on new services, it appears to be difficult to avoid the problem altogether.

The media industry is being transformed into a service industry. It must reinvent its ways of innovating in order to confront global competition that is exacerbated by technological innovation.
Each time that we digitise or re-materialise an object that gives us access to culture, we add new services. The usage value of these services is growing rapidly, and the standards of use currently offered by digital services has won solid support from the general public, to the detriment of standards invented prior to the democratization of the Internet. Faced with competition on a global scale, exacerbated by technological innovation and innovation in services, the media world has suffered, and will probably continue to suffer for at least another decade, from the phenomenon of the destructive creation of value. One of the sector's challenges for the 21st century will be to find new models of innovation in line with the creation of services based on the use of digital technologies. For example, it now seems to be essential to know how to use the Internet as a life-sized laboratory in order to innovate continuously with one's customer base. It also seems to be essential to incorporate a design approach as far upstream as possible in project development: not only the design of objects (access terminals), but also the design of services (online service platforms). Finally, it's crucial to know how to apply the best e-commerce techniques on a day-to-day basis, and to implement a consistent strategy that integrates all of the channels through which culture can now be accessed.

The trends observed over the past ten years will extend further over the next ten years. But the proliferation of digital systems on a global scale will pose new challenges for society. These challenges are primarily related to new forms of complexity generated by the proliferation of networks and by the economic competition exacerbated by them. The Internet is a network of computer networks that can connect cultural resources or human beings on a large scale. It can also be used to link real objects and virtual objects together in a network, something that has already been achieved, at least on an experimental basis. On the other hand, nanotechnology will enable the industrial-scale production of new materials that will have the ability to transmit and store digital information, and biotechnology may make it possible to create objects that inherit both living properties and computing capabilities[35]. In the next decade, the Internet of Things might begin to take shape on such a large scale that we may not be able to ensure its stability.

Ensuring the evolution of our scientific and educational culture will be one of the main challenges we will have to face in order to adapt our organizations to the digital revolution. If the development of the Internet continues at its current pace[36], the networking of computers, cultural resources, humans, objects and parts of our natural environment will quickly lead to levels of complexity that we do not currently know how to manage. To support this development, it will be necessary to change our scientific and educational culture. This will involve both designing and inventing new approaches for understanding the complexity of the systems that we are putting in place, and developing our curriculum and our methods of organization to allow the greatest number of individuals, particularly the youngest ones, to use, and even invent, new opportunities that offer them the "intelligence" of networks. The basic questions about equipment are still far from settled in most advanced countries, but disruptive solutions that challenge our traditional approaches are already developing in emerging countries[37]. Apart from equipment issues, the challenges that the digital revolution poses for the world of education can be seen most clearly in our educational methods and content. How can we integrate the new world of complexity into our curriculum, when science doesn't yet understand it? Research into the ways in which a child constructs a mental model of the world, for example, involves defining the concept of digital geography[38] as the sum of the representations of the world developed through a child's experiences both in the real world and "in" the virtual world[39].

The sciences and the arts can help us to better understand complex and adaptive systems. They can also help the media to innovate differently. If technological innovation enables artists to revitalise their subjects and their modes of expression, it also tends to bring them closer to the practical and business world, to

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[35] Cf. « ProspecTIC – Nouvelles technologies, nouvelles pensées ? La convergence des NBIC » ("New technologies, new ways of thinking? The convergence of NBIC") by Jean-Michel Cornu
[36] The development of the Internet has reached a point of inflexion: the infrastructure needs to be renewed to rise to the challenges of real time, "*always on*" habits and the interconnection with the real environment (Internet of Things).
[37] For example, with an economic model based on sponsorship, the One Laptop Per Child project manages to provide children aged between 6 and 12 in poor areas with laptop computers connected to the Internet.
[38] cf. *digital geographies* (www.digitalcultureandeducation.com)
[39] In October 2010 there were over a billion users of the virtual world, of which 470 million were aged between 10 and 15, according to KZero (http://kzero.co.uk)

engineering, to industrial design, to service design and to education. More and more, the artist plays a role as a researcher, a supporter and a teacher, contributing, together with science and education, in providing tools that allow us to understand the new phenomena affecting society. This trend can be seen through projects for representing complex systems[40], as well as through numerous multidisciplinary research projects at the intersections of art, the life sciences and cognitive sciences[41]. Developing our children's artistic abilities and valuing artists' work could help us to better understand complex systems and should help our industries to create new objects that are at once appealing to the public and able to provide real use value to society.

Summary of avenues for exploration for the world of culture

- The association of high-tech objects with online service platforms is one of the new keys for accessing culture. This has been established as the new standard for the media industry.
- Its adoption by the public is determined by the use value of the "object + services" combination.
- The depth and availability of content is part of the use value of these services.
- Professions in the media industry and the cultural world are being transformed into service professions. They must meet at least two new challenges to face up to global competition exacerbated by technological innovation:
    o Find new models of innovation in order to invent objects and services with high added usage value (e.g. use the Internet as a laboratory for "life-sized" experiments, using "design thinking")
    o Apply best practices from e-commerce in a multichannel mode, because the rules of electronic commerce will increasingly apply to consumption patterns and access to culture in general.
- The sciences and education must meet the challenges of a world made increasingly complex by the proliferation of digital networks. To understand the complexity of the new world, we need to combine the talents of our artists with those of our scientists, and we need to develop our children's artistic abilities and creativity.
- Artists will be significant assets in helping the media industry to create future goods and services that provide access to culture.

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[40] For example ,by creating analogies between networks and planets, social networks on the Internet or newsfeed networks for financial markets (www.art-sciencefactory.com)

[41] cf. Visualisation of complex systems; *Artificial life*; *Sensitive painting*; *Audio-visual interactivity*; *Organic, genetic and Evolutionary Art*; *Swarm Art* etc.