"INVESTMENT STRATEGIES IN THE VALUE CHAIN OF THE PUBLISHING SECTOR: HOW AND WHERE THE R&D SOMEWAY MATTER?"

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ABSTRACT:

Creative industries are deserving an ever increasing interest in recent years. The scientific literature on this field is growing and several local governments are demanding reports and discussion papers for investigating future policy strategy guidelines. Notwithstanding, very few studies are dealing with a new and emerging topic like innovation in the creative industries. Innovation is in general considered from a single viewpoint: a means to develop new creative contents. However, one very important issue is surprisingly neglected both in the scientific literature and in the committed reports: this is the technological innovations and, therefore, the characteristic and the management of R&D in the creative industries. Within this context, the present paper aims at understanding where R&D takes place in the cultural sector, which economic actors are taking charge of it, where they are located in the value chain, how they are articulated with content producers. The research focuses on the publishing sector. A systematic analysis of the R&D developments of the e-book technology has been achieved and supplemented with face-to-face interviews in selected case-studies. The methods provides an original cartography of the value chain. This framework helps to understand the new digital ecosystem of the publishing sector and the investment strategies carried out by editorial houses regarding R&D partnerships and new technological innovations.

Keywords: creative industries; publishing industries; R&D; value chain; e-book

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INTRODUCTION

Creative industries are deserving an ever increasing interest in recent years. Starting from the initiatives taking place in the UK in the year 2001 (Department of Culture, Media and Sport, 2001), the concept gave rise to numerous developments. A large part of them has been dedicated, in particular local perspectives, to the creative class and the management of talents Caves (2000), Florida (2002) or Scott (2006). The literature is nowadays focusing on the establishment of networks, creative atmosphere (Santagata, Bertacchini, 2011; Bertacchini, Santagata, 2012), creative industries clusters and creative cities (Lazzeretti et al., 2012; Foord, 2008; United Nations-UNCTAD, 2008; Crossick, 2006) seen as regional development strategies. Among the potentialities of the creative sectors, opportunities of economic wealth, growth and jobs creation at local level are identified as main key factors (Henry, de Bruin, 2011; Piergiovanni et al., 2012). Lastly, research has been developed more specifically on the strategic and economic dimensions of creative industries and their business models (Throsby 2001; Howkins 2001; Benghozi, Paris 2007; Lyubareva, Benghozi, Fidele, 2013).
The scientific literature on this field is therefore growing (Lazzeretti, 2012) and both qualitative and quantitative studies are emerging (e.g. for the qualitative ones: Cunningham, 2009; Flew, Cunningham, 2010; Harper, 2011; Hotho, Champion, 2011; Jaw *et al*., 2012; for the quantitative ones: Muller et al., 2009; Lazzeretti et al., 2010; Chaston, Sadler-Smith, 2012; Piergiovanni et al., 2012, Abecassis-Moedas, Benghozi, 2012) as well as special issues of several scientific reviews specialized in this field[1]. Furthermore, several local governments are demanding reports and discussion papers for investigating future policy strategy guidelines (e.g. Foundation for Research, Science and Technology, 2003; QUT CIRAC Cutler & Company, 2003; Santagata 2009; United Nations-UNCTAD, 2008).

Notwithstanding this interest and inflation of studies in both the scientific and the grey literature, the related contents are in most of the cases very general. Innovation in creative industries is a new and emerging topic and very few studies are dealing with innovation in the cultural industries (Brandellero, Kloosterman, 2010; Green *et al*., 2007). Yet the several papers dealing with such issue are all considering innovation as a means to develop new creative contents. However, one very important issue is surprisingly neglected both in the scientific literature and in the committed reports: this is the characteristic and the management of R&D in the creative industries, especially in the cultural sector. Even the few studies that aim at investigating the potential of R&D to support the creative industries (e.g. Foundation for Research, Science and Technology, 2003; Cunningham *et al*., 2004) do not provide any analysis of the processes and/or technologies adopted. Investments in basic

1 cf. Industry & Innovation, 2008, special issue: managing situated creativity in cultural industries; International Journal of Cultural Policy, 2009, special issue: after the creative industries; Innovation: Management, Policy and Practice, 2009, special issue: innovation policy in the creative industries; Organization Studies, 2012, special issue: misfits, mavericks and mainstreams: drivers of innovation in creative industries.

and applied research are seen as crucial for creative sectors competitive advantage. To this aim the main suggestion is simply to build creative industries consortia (Foundation for Research, Science and Technology, 2003) but without previously investigating all the phases of the value chain as well as understanding what the R&D really means for these companies and consequently how and where the R&D is undertaken. Actually, disruptive technological innovations come from outside and creative firms are not really able to control their evolution.

Our main research assumptions are, consequently, that the general absence of investigations on R&D activities in the creative industries are due to a biased vision of the real relevance of these assets for creative companies. In other words, while the main reason for poor investments in R&D are usually linked to the small size of these companies and to the propensity not to give importance to R&D activities, another possible explanation could be linked to a misunderstanding of what the concept "R&D" really means for creative firms. This is perfectly illustrated by the famous saying made in the 60s by the writer and French ministry of culture A. Malraux who characterized movie industry as a prototype industry. It demonstrates that creative firms conceive the new product development as the development of innovative content and never consider them as technological R&D activities. Consequently, the main disruptive innovations in the creative industries have always taken place outside these industries: this was the case for sound movie, for instance, invented by General Electric in the early XXth, for the innovative devices in music (K7, Walkman or CD), created in the 70s and 80s by Philips or Sony, and more recently, for the MP3 and Appstore in music.

Within this context, our research perspective aims at understanding where R&D actually takes place in creative industries, how the articulation is made with content and development projects, which economic actors are taking charge of it, where they are located in the value chain, how they are articulated with content producers. From this viewpoint, the situation is, of course, different according to cultural sectors and creative fields: one could think, for instance, of the contrasting situations of movies and videogames. As a consequence, one of our objectives in this limited paper, is to reconstruct and map all the main phases of the R&D value chain in a specific sector. In such perspective, we have decided to focus on the book publishing sector, one of the most prominent creative industry sectors. In recent years it has experienced many innovations due to the diffusion of the Internet and the ICT technologies (Guiry *et al*., 2012; Ronte, 2001). Traditional books are confronted with the emerging e-books (e.g. Chrystal, 2010). The literature on the comparison between traditional books and e-books is flourishing both in terms of scientific or technical articles and in terms of books (cf. Howard, 2009; Dacos, Mounier, 2010; Greco, 2011). Actual policies and/or R&D strategies in this sector call for new analysis since editorial houses conceive their editorial strategy in order to adapt their content to the new digital demand and available devices rather than investing in the technological development and the design of the technology architecture (standards, devices, softwares...). Moreover, the transformation process of a traditional editorial house in a digital one has not still been investigated in terms of evolution and changes in the production chain and the editorial tools as well as the investment strategies adopted in the R&D.
Hence, the objective of the paper is to characterize the technological R&D ecosystem of this creative sector and to identify the investments and partnership strategies of creative firms.
The paper will be structured as follows. The introduction is followed by the theoretical framework: literature and conceptual perspective on R&D and new technologies in the creative industries in general and in the book publishing sector in particular will be analyzed. The empirical background will then provide an overview on the history of the book publishing industry, followed by a focus on the value chain phases and its recent evolution. Afterwards, the methodology will be described and the main results of the cartography of the main layers in the e-book publishing value chain and the case-studies analysis will be highlighted. Discussion and some concluding remarks will be presented at the end.

1. THEORETICAL FRAMEWORK

The general lack of wide investments in R&D of creative companies gives an echo to the absence of specific studies on the management of R&D in the cultural sector (Green et al., 2007). One of the reasons explaining the poor investments in R&D may of course be linked to the general size of these companies. Most of the firms in the creative industry sectors are SMEs (Bouquillion, Le Corf,
2010) with related difficulties in financing R&D activities. Notwithstanding, other motivations may explain this deficiency, because also large creative companies are known for under investing in R&D projects (Foundation for Research, Science and Technology, 2003). Therefore, the main motivation seems to be that companies in the creative industry sectors are considering that they take already so much commercial and aesthetic risk

by creating new content that they cannot take in charge additional technical risks and therefore prefer to appropriate the R&D results coming from other industrial sectors instead of investing directly in R&D projects. This is a direct consequence of the fact that each creative project turns out to be an innovative and prototype project in these industries. Therefore, they merely consider "R&D" as something related more to investments in projects and contents rather than directly referring to the design and innovation on processes, infrastructure and devices.

1.1 R&D and new technologies in the creative industries

This confused context is someway confirmed by the literature: on the one hand, Jaw *et al.*(2012) argued that innovation within creative industries is a subject dealt by very few studies and the theory on how creative firms develop innovation activities is limited. On the other hand, Potts (2009, p. 139) affirmed that "*there are many studies on innovation processes within the creative industries*" and "*R&D is central to innovation policy because it is the critical investment in the origination phase of the innovation process, which thus provides the central justification for public investment (the end product of public policy development) on innovation grounds.(...) Yet R&D has a very different meaning in the creative industries...in effect constituting a normal business model, not an exceptional (i.e. un-incentivised) activity*"(Potts, 2009, pp. 140-141).Besides, both perspectives turn very close since Potts (2009, p. 141) argued that for the creative industries "*R&D phases will often be routinely carried out over an extended value-chain in large media organizations, for example, both in-house and for-profit*". Innovation is seen as a normal aspect of business operations and strategy. And Jisun (2010) underlined the singularity of innovation patterns in creative industries: innovative creative products are mostly reliant on non-technological "soft" innovation (Stoneman, 2007) linked to the creation of new ideas or the recombination of existing ones. In this context, in recent years new particular forms of cooperation are emerging: partnerships and consortia in the form of business ecosystems have been created for applying open innovation among several companies working together in order to advance on new innovation axes (Mussinelli, 2010, 2011).

Nonetheless, the absence of practical and implementable solutions emerges and this is reflected in the findings and the general conclusions of some latest studies on R&D and innovation in the cultural industries specifically focused on extra-EU as well as EU countries.
At the extra-EU level, Australia and New Zealand provided attention on this subject. According to the Australian report QUT CIRAC Cutler & Company (2003, p. 6), produced as part of the Australian Government's Creative Industries Cluster Study, "*the nature of R&D and innovation within the creative and content industries generally has not been closely examined*". Cunningham *et al*. (2004) focused on the issues of this report. They wondered "where is the R&D?". Creative industries appear to be marginal also within university-based research. Besides, Cunningham *et al*. (2004, p. 4) and QUT CIRAC Cutler & Company (2003, p. 29)stated that "*the many different research fields involved with creative industries do not relate to each other well and the potential linkages are seldom articulated into an R&D strategy involving the linkages between ICT, creative content, and educational and services industry content*", but without suggesting a solution to this gap. Again with a focus on Australia, Eltham (2009, p. 235) underlined that "*in the sphere of innovation policy, Australia has long suffered from an inability to conceptualise the creative industries as worthy of research and development funding*". R&D requirements of creative industries in New Zealand were analysed in a report undertaken by the Foundation for Research, Science and Technology (2003): creative industries are seen as one of the three focus areas of the Growth and Innovation Framework (GIF). This report was a first attempt at addressing the question "what is the potential of R&D to support the creative industries?": "*R&D was more often seen as a means of reducing costs, rather than a means of improving products in order to enter new markets (...)Establishing a creative industries consortium (a formal public-private partnership) would therefore be the most effective means to consolidate focused research effort over the long term*" (Foundation for Research, Science and Technology, 2003, p. 12 and 22).

At the EU level, some insights come from studies focused on the UK, France, the Netherlands and Austria. Green *et al*. (2007), focused on the good deal of "hidden innovation" in the creative sectors by examining product design and video games development sectors in the UK. More specifically, they explored the different types of innovation in the creative industries and they examined how innovation is unnoticed or under-reported in official R&D and innovation statistics. The aim was to better understand the forms, management and contexts of innovation in the creative industry sectors. They found that "*many dynamic innovations in the creative industries are not captured through technological innovation alone, nor is there a clear distinction between product and process innovation*" (Green *et al*., 2007, p. 2). The video games development sector analysis revealed that innovation was focused on the resolution of current problems on projects rather than developing new commercial

opportunities in their own right. Therefore, it was content, design, process or artistic innovation and it was hidden innovation because it was seen as part of the normal process of video game development. The authors specified that "*of the companies interviewed during this research none had a rigorous method for measuring R&D expenditure – or estimating the return from this activity. Even studios that did have a dedicated R&D team with an associated budget felt that R&D could not practically be separated from the inventive and innovation processes which was part of the routine practice of problem-led development and creativity*"(Green *et al*., 2007, p. 44). In other words, measuring R&D was not considered a pivotal activity for most firms. The existence of R&D Tax Credit opportunities was well aware, but the authors noticed a general confusion about how it was administered and the potential benefits achievable.
In the analysis of the French video games sector, PIPAME (2012, p. 72) argued that "*most part of videogame companies have their own game engine, that is the technical block that enables to develop contents. These engines generally come from R&D programmes and they are constantly updated, according the technological evolutions, requirements and platforms. Very few companies purchase these technologies on the market because of prohibitive costs (excepted, in our study, Ubisoft and Cyanide, that get their own proprietary engines). Thus, technological assets are the strongest item, from accounting viewpoint. Some enterprises like Quantic Dream have R&D units that go beyond the only technological dimension and focus on game play, interactivity and also emotion. To be noted that jobs of R&D coordinator are rarely created and that developped technologies are rarely documented* [authors' own translation]".

Stam *et al*. (2008, pp. 125-126) focused on creative industries in the Netherlands: they argued that "*it seems that, in media and publishing, innovation is an implicit part of daily operations and less often regarded as something that requires explicit actions*".
Finally, Muller *et al*. (2009; 2008, p. 2) focused on creative enterprises from Austria: they argued that "*creative industries are intensive users of technology and often demand adaptations and new developments of technology, providing innovation impulses to technology producers*". They showed that creative industries have a strong performance in technological innovation. Creative industries support innovation in several other sectors through downstream creative inputs in the form of ideas for new products (innovation content), supplementary products and services like software, or marketing support for product innovations. These inputs can also be upstream: creative industries are key users of new technology and they demand most of all information and communication technologies as innovative inputs from their suppliers like technology producers.
From all these considerations it seems that both public institutions and creative industries deserve little attention to R&D and innovation. As demonstrated more deeply into details in the following section, the situation turns to be exactly the same in the specific book publishing sector.

1.2 R&D, new technologies and the specific case of the book publishing sector

"*Book publishing has traditionally been regarded by European governments and industry actors not simply as an industry, but as an essential element of the backbone of national (or regional) cultural identity*" (European Commission, 2005, p. 120). As a consequence, the government cultural and political agenda has always developed specific policies for the book publishing sector, ranging from public subsidies to structural regulations aimed at protecting diversity. In fact, a key characteristic of the book publishing industry is its diversity: this sector includes very large international companies, which account for most sales, as well as very small specialist companies with niche markets. This diversity is nowadays confronted with the emerging revolution due to the Internet and the ICT technologies: new actors are appearing on the scene and the diffusion of the e-book, tablets, e-readers and personal digital assistants (PDAs) are demanding new strategies as well as updated business models.
According to Simon and de Prato (2012), in the media and entertainment markets the book publishing market is the only one where European companies are leaders. In particular, Germany is the largest European publishing market, while in France the book publishing sector is considered by the Ministry of Culture as the most important cultural industry because of its revenues and of the employment of one fifth of the workforce of the cultural sector (Gaymard, 2009). Notwithstanding, the US dominates the electronic book market because of the highlighted rapid response to technological innovation. Greco (2005) analyzed the main US publishing industry characteristics: the US book industry is mainly considered a prestigious keystone of the entire mass communications industry,

mostly for the content generated. In the European Union the e-book market is still negligible and it is fragmented, expanding fast in the UK and lagging behind in other EU countries(Simon, de Prato, 2012). The US concurrence calls for a rapid and effective response of the EU market.

According to the European Commission report (2005, p. 94), innovation in the publishing industry tends to be incremental, like low-cost high-quality colour printing for books, rather than radical, like the audio-book that created an entire new market. "*Many innovations that have affected publishing are supplier-led, as publishing still relies heavily on external suppliers for much of its operations. Printers and suppliers of printing equipment have enabled publishers to achieve new cost- savings or improved quality that has helped to enable new products or improved profits*". A symbiotic relationship happens in most cases: suppliers act in response to market demand from publishers and to their own innovation processes. The Internet and ICT technologies have prompted publishers to develop and launch online products and services and this incitement is more and more intensified as ICT technologies are constantly evolving. New initiatives like online platforms are fostering the publishing industries to integrate into their offerings new content applications in the form of communication technologies and not only information or content technologies (European Commission, 2005). However, according to the European Commission report (2005, p. 95), "*there is no strong evidence to suggest that highly innovative publishing firms with a history of radical innovation fare better generally in the market than others that follow the route of consistent incremental innovation*".
From the more distinctive technological perspective, the book publishing industry has gone, in recent years, through various developments (Simon, de Prato, 2012). According to Hsieh *et al*. (2011, p. 206), the main e-book technology milestones can be identified as follows: Content (information), Composer (software necessary to create an e-book), Container (the distribution medium and/or file format), Storage, and Access (the technology and software used to provide access to the content).
Formats and printing, in particular, have been characterized by several technological revolutions in rapid succession (Cercone, 2009). The relationship between print and publishing houses have historically been very strong: publishers have become progressively autonomous in relation to printing and bookshop industries (Rouet, 2007). At the beginning, some publishing houses were also print houses or bookshops, with a narrow relationship between publisher and printer for books creation. This link is no longer so close. Since the end of the 1950s, the separation between publishers and printers was already in progress. Publisher industry needs immaterial investments, flexibility and customization, while technical equipments of graphic industries are always under the challenge of concurrence and modernisation and the need to work at full capacity. Publishers and printers are linked through a relationship of specialisation in terms of collections, formats, kind of paper, and with the aim of reaching an optimum result of quality-costs-delays (Rouet, 2007; Gaymard, 2009).

The book industry has responded to retail chains challenges through some product and marketing innovation as well as increased efficiency, but "*it has not in general responded through technological innovation: e-books have not yet developed as a force in European publishing, although print-on-demand is growing, especially in academic publishing. The e-books market is developing rapidly in the US...The difference may in part be accounted for by the greater willingness of US consumers to take up new technology*" (European Commission, 2005, p. 103). But the overall influence of the Internet as a sales channel is not yet well understood in terms of changes to the retail channel dependence (European Commission, 2005).
According to Simon and de Prato (2012, p. 68), "*digital technologies were introduced in the publishing value chain upstream, but not used for the final product. The players appeared to have been reluctant to opt for this direction. However, historically, the 80s went through some kind of "cd- rom fever" which never delivered its promises and increased the caution toward digital technologies*".
The survey undertaken by Guiry *et al*. (2012, p. 12) - focused on the South West in England - highlighted that "*the key reticence which publishers had around digital investments was chiefly amongst smaller publishers, who felt they were unable to invest their own resources into digital research and development since they did not feel the market was able to provide the relatively quick turn-around to profit that their organisations need to survive*". Smaller publishers are inclined to think that larger publishing houses should bear R&D costs for leading the way to new products.
From all these considerations we can assume that the main factor for the evolution of the graphic chain and the relationships between publishers, printers and booksellers is linked to the computer age and the impact of computerization of the graphic chain and the computer-aided publication. Digital printing and printing on demand accelerated this process with cost reduction and rapidity of delay (Rouet, 2007).

2. THE ECONOMICS OF THE BOOK INDUSTRY

The technological and digital revolution we just presented is impacting deeply the economics of a particular sector like the book publishing one. The secular model of the printed book is now confronted with the emerging e-book diffusion. The impact is so strong that an effective business model for the e-book market is still missing. In order to understand the characteristics of the book publishing sector and its recent evolution, the following sections provide some insights on the history of the book industry and the value chain phases that have historically characterised this sector. These sections will be useful for introducing the subsequent empirical analysis methodology and results.

2.1 A brief overview on the historical context of the book publishing industry

The book publishing industry is the oldest subsector of the media and content industries. It can be dated back to the introduction of the codex, the format used for modern books, around the 1st century. This new format can be considered as the most important technological change before the invention of printing machines at the beginning of the 19th century (Simon, de Prato, 2012).
It is widely recognized that Michael Hart, the founder of Project Gutenberg[2], created the very first e-book and digital library in 1971 (Lebert, 2009). Since then, the mainstream dimension of book evolution has been digitalization, that is, evolution of paper book to e-book (Park *et al*., 2010; Dacos, Mounier, 2010; OECD, 2012). Several studies are analysing varied aspects of the e-book history (cf. Hsieh et al., 2011). In recent years many contributions are also investigating the transformations in the publishing industry due to the emergent e-book model. Other authors focused in general on the life story of the book (Howard, 2009) or the history of e-books (Lebert, 2009), while others focused more specifically on a given country like France (Dacos, Mounier, 2010; Rouet, 2007) or the US (Greco, 2005, 2011).

The digital revolution has had a later and less severe impact on the digital publishing sector compared to the music and cinema industries, where several changes happened in a brief time (Patino, 2008; Gaymard, 2009). Publishing has usually been a low growth business (Ronte, 2001), but in recent years something has changed radically this industry (OECD, 2012). According to Ronte (2001, p. 12) "*technology is changing the rules of the game. A low-growth market implies that technology creates incremental value for publishers only by redistributing the value in the system*". In recent years, technology has had an unusual disruptive impact on publishing (Carreiro, 2010). The main drivers of change can be identified in the Internet and ICT technologies, printing-on-demand and the rapidly evolving e-book readers (Ronte, 2001). But all these changes are happening under a slow revolution. Print books have been in existence for over 500 years; yet e-books came along just forty years ago (Chrystal, 2010). Advances were made in book materials and printing processes, but "*the basic bound format remained essentially unchanged since antiquity*" (OECD, 2012, p. 10). The first attempts at introducing e-books failed because of their weight and cost: heavy and low technology advanced materials as well as a very high price did not attract the interest of readers. As a consequence, between 2001 and 2004 first e-reader projects like Cybook, Gemstar e-book and Librié failed (Patino, 2008). The main change happened when new materials were tested and implemented in new e-readers. Several companies started to create specific reading software for different formats and various reading terminals. Print books have never been influenced by new technologies that rendered previous books obsolete and unreadable, while e-books are constantly evolving in terms of formats and types. This technology evolution provides changes and it is a challenge for old and new e-books (OECD, 2012).

2 "*Project Gutenberg is a volunteer effort to digitise and archive cultural works, to « encourage the creation and distribution of e-books »...it was the world's first digital library. Most of the items in its collection are the full texts of public domain books*", (OECD, 2012, p. 38).

The digital revolution supports, therefore, disruptive economic change in the publishing sector: it changes the traditional business model of printing, it lowers entry barrier to incomers such as technological suppliers, it gives a key role to new distribution channels such as aggregation platforms. At the end of the day, this is, consequently, the very new and prominent role of R&D and innovation which is at stake and might call for an alternative strategy from editorial houses. This is clearly demonstrated by the recent evolution in the book value chain.

2.2 The traditional book value chain and its recent evolution

The printed book is an astonishing model: mobility, the presence of an index as a search engine, a semi-open system (it is possible to write on it and turn pages), a perfect autonomy (no source of energy is necessary), possibility of usage everywhere, instant and definitive ownership from the time of purchase (Patino, 2008). An e-book, instead, is an emerging and still not well defined model, that requires new technical skills and know-how, specialized software expertise, management of new commercial relationships, new methods of digital marketing and distribution, new negotiations and networks (OECD, 2012; Guiry *et al*., 2012).

Simon and de Prato (2012) considered the redistribution of the components of the book chain as well as the shifting role of the new and existing industry players following the e-book introduction.
The revolutionary aspects brought by the Internet and ICT technologies are impacting all the phases of the publishing value chain (Ronte, 2001). Publication, distribution, sale and reading are changing. The passage from physical to digital distribution, the zero marginal cost of producing an additional book, the emergence of new intermediaries, the many competitors entering this industry thank to the digital technologies, the problems linked to electronic security, are only some of the characteristics of this revolution.

According to Lebert (2009), following the many changes underwent by traditional publishing since the 1970s, digital publishing became mainstream in 1997. New photocomposition machines, desktop publishing and graphic art studios disrupted the traditional printing mechanism. Digital "on demand" printing and digitization also accelerated the publication process, because editors, designers and others could all work at the same time on the same book. Digital and traditional publishing became complementary.

In this context, publishers tend to take the role of content brokers and aggregators who cooperate with other actors (Jha *et al*., 2010). According to Dacos and Mounier (2010), the practices of collaborative elaboration of contents changed the very notion of book chain. The book is now an object resulting from the joint work of several actors with different professional specialisations, but the different actors work in networking with new cooperation models instead of coordinating the work on a unidirectional production chain. This is possible because of the technological peculiarities of digital text, meaning the infinitely rewritable characteristic of electronic texts. Practices of sharing and collaborative creation of contents emerged in a context now known as Web 2.0.

The traditional value chain for printed books has been described by the OECD (2012, p. 25) report as *"the wholesale model. It is based on the book's progression from raw created content, through manufacture and wholesale/distribution to retail, and finally to the consumer. At every stage in the chain there are assumed to be costs, and profits, and these are embedded in the price as the item moves up the chain*". Simon and de Prato (2012) underline the supplier position of the author and the core position of publishers. Their functions include the aggregation, presentation, pricing and marketing of books and dealing with the other actors of the value chain, like technical intermediaries and specialised workforce. With the emerging development of e-books and online distribution, printers, retailers and traditional distributors are in a weaker position. New aggregators and distributors are appearing. The United Nations-UNCTAD report (2008) focuses on changes in the distribution channel because of the introduction of new product delivery formats. In general, the present trend is towards greater concentration for facing the increased competition. Vertical integration in distribution and retail channels are also included in this trend. And about the competencies necessary to deal with the consequences of the Internet and ICT revolution in the creative sector in general, "*the so-called creative workforce nowadays has a high level of education and good knowledge and skills to make use of new ICT tools and the emergence of new business models. In this changing environment, the role of the intermediaries is gradually disappearing or being replaced by that of the infomediaries, and creators are increasingly recognizing the importance of developing creative entrepreneurial skills with a view to combining art, creations and business*"(United Nations-UNCTAD report, 2008, p. 208).

3. METHODOLOGY AND RESULTS

Our research is supported by a multidimensional methodology. A mapping of the R&D ecosystem of the book publishing industry has been elaborated through a methodical codification of the various investments made by creative firms, of the partnerships created and the technological developments adopted. First of all, an exploration of technical documents has been used: it aimed at identifying the category of innovation being developed, the specific setting in the value chain for R&D development and the economic actors supporting it (internal or external to the traditional boundaries of the publishing sector). Furthermore, case studies of some of these actors (publishing houses, electronic platforms, technology suppliers) and face-to-face interviews with experts in publishing technologies have complemented the mapping perspective, identifying precise strategies and industrial policies implemented in the e-book publishing ecosystem.
The following sections describe in details the methodology adopted and the results coming from the reconstruction of the e-book publishing value chain as well as the interview results.

3.1 The empirical analysis: methodological insights

A cartography of the value chain in the e-book publishing sector has been built starting from an analytical coding of the main characteristics of all the versions of the most diffused e-readers and tablets. In particular, the different versions of Kindle, Kobo and Nook e-readers have been explored. Starting from a deep analysis of all the main features of the different e-reader versions, all the specific technologies that influenced the characteristics of these e-readers have been investigated in details and catalogued in various groupings. The exploration of technical documents and Internet websites enabled to study in depth the specificities of these technologies. The main technology groups identified revealed that several specific technologies have been introduced for ink and display characteristics development, for light and quality image improvements, for sound property ameliorations and for aspects of augmented e-books. Furthermore, the second step of the analysis has been to undertake face-to-face interviews for having a confirmation of the key findings of the cartography in progress and for understanding the main editorial response facing the e-book revolution.
A sample of publishing houses and technology professionals were selected from the list of the most important ones in the French market and/or the most active in the digital technologies adoption. The aim was to understand the actual strategy of publishing houses about the e-book and the adoption of e-book technologies. This approach enabled us to reconstruct the content of the different phases of the value chain. In particular, the interview findings enabled to build the final layers of the cartography of the e-book value chain. This last one has been built in a chart divided in several levels. The cartography building and the content of each level will be deeply described in the following sections.

3.2 Results

This section presents the main results coming from the empirical analysis undertaken both through the methodical exploration of technical documents and through the face-to-face interviews. The key factors resulting from this multidimensional methodology will be underlined in the various layers identified in the reconstruction of the actual e-book publishing value chain.

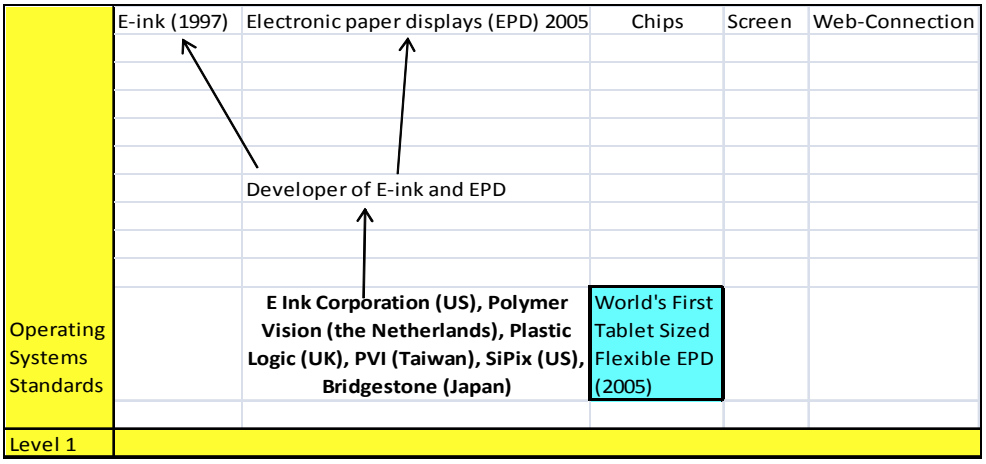
3.2.1 *Cartography of the main layers in the e-book publishing value chain*

The methodical exploration of the main actors in the e-book market and of the specific characteristics of the different versions of Kindle, Kobo and Nook e-readers appeared since their introduction on the market, enabled to structure a first draft of the e-book value chain cartography.
In order to build a cartography of the value chain of the e-book publishing sector, we adopted a model structure inspired by the robust and traditional perspective usually used in the digital sectors. Actually, we considered six main structural and technical layers adapted from the classical Open Systems Interconnection (OSI) seven layers reference model, used in telecommunication and Internet economy (Zimmermann, 1980). This model portrays the architecture of the industry assuming a hierarchical vertical division of the technical layers. Each consistent layer is considered to be ruled by technological specificities characterizing technological concerns, investments, skills, industrial companies, economic models and clients' perspective. Consequently the various layers help to understand the technological structuration, the articulation and interrelations between the various levels of the value chain, as well as the distinctive partnerships, investments and strategies implemented by the numerous actors.

Level 1 focuses on the *operating systems standards*: the starting point is the introduction of e- ink technology and electronic paper displays (EPD) between the end of the '90s and the beginning of the 2000s. These technologies are linked to Level 2 that is focused on the *hardware and technology of terminals*: e-ink technology influenced digital printing and the emergence of the first tablets, e-book readers and personal digital assistants (PDAs). Several formats succeeded one to the other till the prominence at international level of e-pub and pdf formats. Recent improvements are identifiable in the attempt at creating augmented books with additional properties like optical reader-embedded pen and audio-books. Level 3 is focused on *standards and software*: blogs and social networks like Facebook and Twitter, and the diffusion of editors' platforms, consortia and partnerships are impacting and influencing the infrastructures and networks linked to the connection to consumers (*Architecture of infrastructures and networks*, Level 4). Print on demand (POD), digital aggregators, digital libraries, distribution platforms, are some key examples. In this context, Level 5 (*Middleware*) is focused on the tools structuring economic relations and exploitation rights. It includes, in particular, those against piracy like digital rights management (DRM) and digital object identifiers (DOI). Finally, Level 6, dedicated to *users interfaces*, identifies the main work in progress like 3D e-books and environmental consequences of toxic substances for e-reader production.
The specific content of all these layers is deeply described in the following section and it is completed with the interview results.

3.2.2 *Focus on these layers and the interview results*

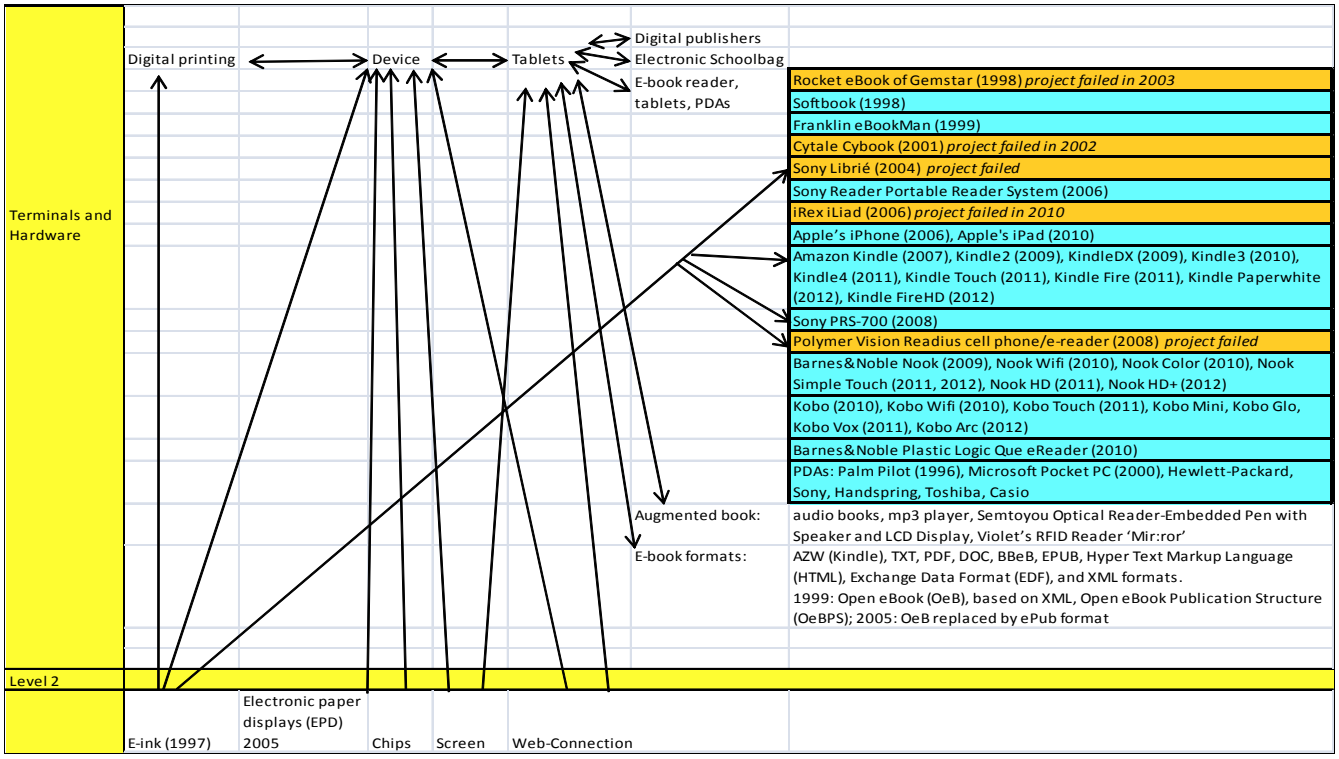
LEVEL 1: OPERATING SYSTEMS STANDARDS: THE KEY ROLE OF E-INK AND EPD TECHNOLOGIES



The first commercial application of e-ink (also referred to as e-paper) was launched in Japan in 2004 (Simon, de Prato, 2012). The leading developer of electronic ink (e-ink) and electronic paper displays (EPD) is E-ink Corporation. In 2005 it introduced the "World's First Tablet Sized Flexible Electronic Paper Display" that is considered its first flexible tablet-sized EPD. This was later utilized in the Sony Reader Portable Reader System in 2006 (Leal, 2009).One of the main benefits of this new display has been the elimination of the backlit display. Light is reflected in the same way as real paper does, eyes are not strained and reading is easier also outdoors and in direct sunlight. Other benefits are identifiable in the lack of glare, a less consumption of battery life, a lighter weight, a thinner size, and a more durable display compared to glass (Leal, 2009). E-paper products are focused on electrophoretic technologies and e-ink is a major supplier for the technology and basic materials. Other key players include the Dutch Polymer Vision and the English Plastic Logic (Simon, de Prato, 2012). In the publishing sector, Plastic Logic has been one of the main players in the commercial application of e-ink (Simon, de Prato, 2012). Plastic Logic is a spin-out of Cambridge university and it develops plastic electronics technology. The company builds on over ten years of fundamental academic research and it exploits intellectual property based on inkjet printing of active electronic circuits through the use of advanced plastic materials (Druilhe, Garnsey, 2004, pp. 276-277). E-paper was therefore created by labs affiliated with several corporations. Xerox Corporation is one of these. According to Howard (2009, p. 154), "*the Xerox Corporation uses*

what they call "Gyricon" technology (from the Greek word gyro meaning "rotate" and icon, meaning "image"), while the E- Ink Corporation (founded in 1997) has developed "RadioPaper". The names are different but what these e-papers have in common is a thin, high-resolution display that allows images or text to appear, be erased, and change based on electronic input".

E-ink and e-paper, on which text is displayed, are innovations specifically developed for displaying text on the electronic screen of an e-reader. The aim was to have a result as much as possible similar to the look of physical print on paper (OECD, 2012). Initially, e-ink/e-paper technology was designed to display text in black and white: in recent years, colour e-readers, with image capabilities and with early stage technology, have been released (OECD, 2012). To sum up, the advantages of e-ink can be summarised as follows: "*first, only a very small amount of energy is required to create a sharp image with e-ink, and once the image is formed no additional energy is required to maintain it. This makes the technology highly efficient and-in the end-affordable. Second, e-ink is lightweight and can therefore be applied to an array of surfaces, from plastics to paper to metal. Finally, e-ink is highly flexible, so that when applied to a plastic, it can be bent around very small objects, such as a pencil*" (Howard, 2009, p. 155).



LEVEL 2: TERMINALS AND HARDWARE: THE COMPETITION BETWEEN E-BOOK TABLETS, READERS AND PDAS

According to Lebert (2009), the Palm Pilot was the first PDA, launched in March 1996: 23 million Palm Pilots were sold between 1996 and 2002. Microsoft in April 2000 launched the Pocket PC, while Hewlett-Packard, Sony, Handspring, Toshiba and Casio also entered the market with their PDAs. In the meantime, at the beginning of the 2000s the first smartphones by Nokia and Sony Ericsson were created. The early e-readers were also introduced in the market: they were large and heavy, much like early computers and laptops. As a consequence, the first e-books did not initially do well. The first handheld e-book reader devices were introduced in 1998, the Rocket e-book[3] of Gemstar and Softbook[4], released by NuVoMedia and Softbook Press, respectively (OECD, 2012;

Leal, 2009). Lebert (2009) cites also the EveryBook[5], created by EveryBook, and the Millennium eBook[6], created by Librius.com. Other first e-books were introduced at the beginning of the 2000s: Cybook of the French company Cytale, that failed in 2002 (Rouet, 2007; Patino, 2008). Rocket e-book of Gemstar exited the market in 2003 (Simon, de Prato, 2012).
The high price was also a major barrier in the diffusion of the adoption of the first e-readers

(Gaymard, 2009).
From 2006 to 2010 several new e-reader devices entered the market, most of them using the new e-ink technology. In particular, the attention towards e-books and digital reading increased conspicuously when Sony released its reader Librié[7] in 2006 in the US market and Amazon launched Kindle e-book reader with its online sales mechanism in 2007, followed by Barnes and Noble with Nook reader in 2009. More specifically, the first version of Kindle was released in the United States in November 2007. The successor, Kindle 2, was introduced in February 2009, and the expanded version, Kindle DX, was brought to market in June 2009 (Loebbecke *et al*., 2010).Then, in 2010 Kobo e-reader was released and Apple launched the multi-purpose device with e-reader capability, known as the iPad (Simon, de Prato, 2012).

3 *"The Rocket eBook was launched by NuvoMedia, in Palo Alto, California, as the first dedicated reading device. Founded in 1997, NuvoMedia wanted to become "the electronic book distribution solution, by providing a networking infrastructure for publishers, retailers and end users to publish, distribute, purchase and read electronic content securely and efficiently on the internet." Investors of NuvoMedia were Barnes & Noble and Bertelsmann. The connection between the Rocket eBook and the computer (PC or Macintosh) was made through the Rocket eBook Cradle, which provided power through a wall transformer, and connected to the computer with a serial cable"* (Lebert, 2009, p. 76).
"*The Gemstar eBook was launched in October 2000 by Gemstar-TV Guide International, a company providing digital products and services for the media. Gemstar first bought Nuvomedia (Rocket eBook) and SoftBook Press (SoftBook) in January 2000, as well as the French 00h00.com, a producer of digital books, in September 2000. Two Gemstar eBook were available for sale in the U.S. in November 2000, with a later attempt in Germany to test the European market. The REB 1100 had a black and white screen, like the Rocket eBook. The REB 1200 had a color screen, like the SoftBook Reader. Both were produced by RCA (Thomson Multimedia). New and cheaper models were then launched as GEB 1150 and 2150, produced by Gemstar instead of RCA. But the sales were still far below expectations. The company stopped selling reading devices in June 2003, and digital books the following month*"(Lebert, 2009, p. 77).

4 *"SoftBook Press created the SoftBook along with the SoftBook Network, an internet-based content delivery service. With the SoftBook, people could "easily, quickly and securely download a wide selection of books and periodicals using its built-in internet connection" using a machine that, "unlike a computer, was ergonomically designed for the reading of long documents and books." The investors of Softbook Press were Random House and Simon&Schuster*"(Lebert, 2009, p. 76).

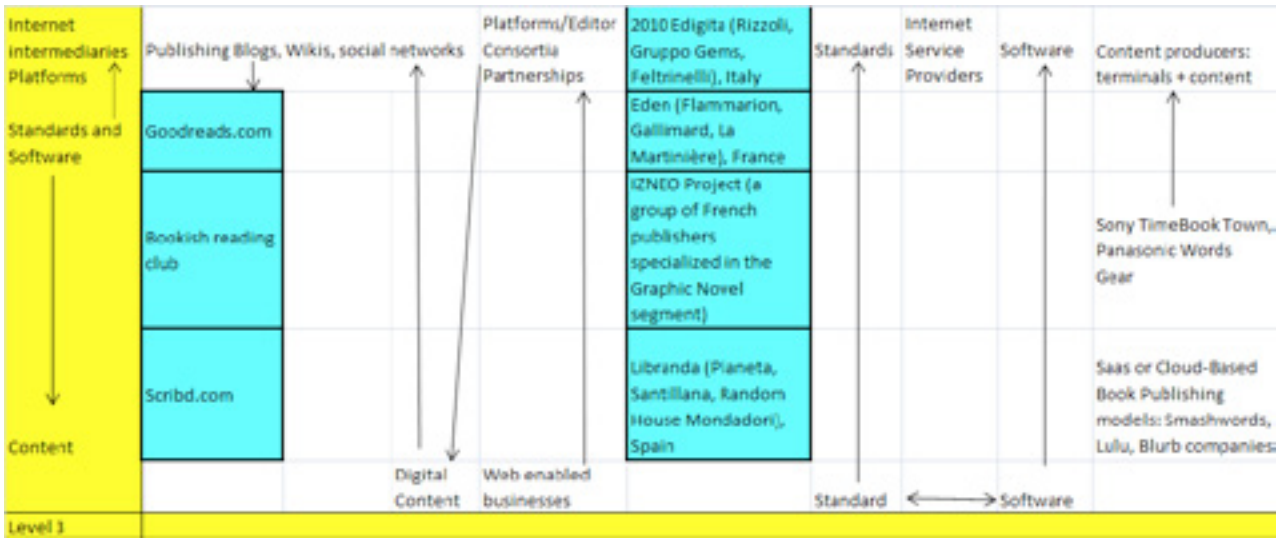
5 *"EveryBook (EB) was "a living library in a single book". The EveryBook's electronic storage could hold 100 textbooks or 500 novels. The EveryBook used a "hidden" modem to dial into the EveryBook Store, for people to browse, purchase and receive full text books, magazines and sheet music*"(Lebert, 2009, p. 76).

6 *"Librius was a "full-service e-commerce company" that launched a small "low-cost" reading device called the Millennium eBook. The website offered a World Bookstore that delivered "digital copies of thousands of books via the internet""*(Lebert, 2009, p. 76).

7 *"Sony launched its first reading device, Librié 1000-EP, in Japan in April 2004, in partnership with Philips and E Ink. Librié was the first reading device to use the E Ink technology, with a 6-inch screen, a 10 M memory, and a 500-ebook capacity*"(Lebert, 2009, p. 79).

Recent improvements in memory size, number of supported formats, and clarity of reading are characterizing the new e-readers (Mussinelli, 2010, 2011). Former e-books started as downloadable documents to a computer. Early formats were PDF and ASCII text (Leal, 2009). ASCII became Extended ASCII and then Unicode. In 2009 the most diffused formats for digital texts were PDF, Mobipocket, ePub and HTML (Dacos, Mounier, 2010). The actual official open standard of the International Digital Publishing Forum (IDPF) is the electronic publication format e-pub (OECD,
2012) and PDF and e-pub formats are currently the standard of the market (Mussinelli, 2010, 2011). Kindle is the only mainstream e-reader on the market with a proprietary format and resistance to embrace the e-pub format (OECD, 2012).
Other improvements are observable also in sound quality. Yet in the late '80s, audio books started to be developed and distributed (Simon, de Prato, 2012), but it is specifically in recent years that new technological developments are improving the quality of sound. The development of voice recognition systems and synthesis technologies for facilitating the automation of book recording processes are going to increase the efficiency and effectiveness of audio book creation (Simon, de Prato, 2012).
We are also assisting to the evolution of paper books to augmented and enhanced books (Park *et al*., 2010) with not only audio-books but also book-apps even more popular. Furthermore, sharing e- books was not possible with the first e-book devices: electronic files could only be downloaded to the e-reader device and other devices synced with it, but the owner's account was necessary for each
recipient application (Leal, 2009). The latest innovations are changing also this aspect.

LEVEL 3: STANDARDS AND SOFTWARE: THE INTERMEDIARY ROLE OF BLOGS, SOCIAL NETWORKS, PLATFORMS, CONSORTIA AND PARTNERSHIPS AMONG EDITORS



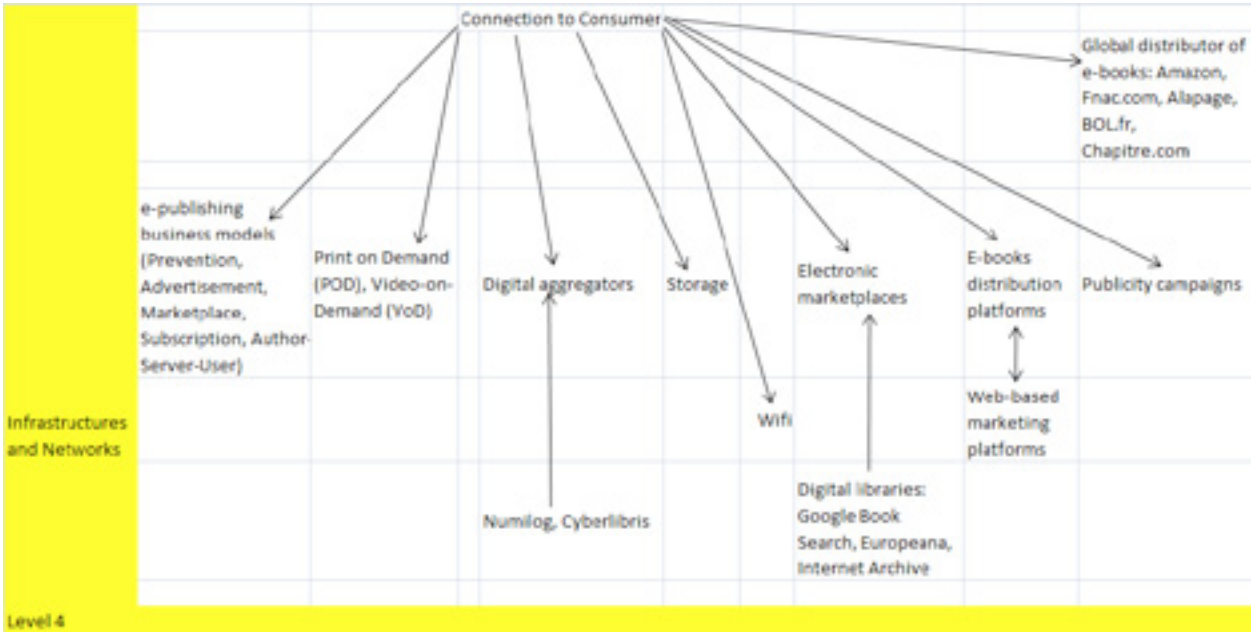
Some publishing houses, like the ones working in the tourist guides sector, are establishing narrow links with readers. To this aim, interactive, animation and evolutive technologies are necessary. Lonely-Planet.com, for example, created a website with several functionalities and specifically a link with readers through voyager forums, blogs, Twitter, awards and competitions. Nonetheless, alliances seem necessary with other platforms: an autonomous strategy has weak complementarities. The main challenge is the creation of trust between readers, editors and authors, that can complete the quality of published texts (Dacos, Mounier, 2010). Collaborations with Facebook and game developers to create content that combines the strengths and appeal of the various formats are on the way: the social media interest in the book publishing sector is exemplified by the Facebook's purchase of book app developer Push Pop Press and the partnership with Kobo and Net Flix (Guiry *et al*., 2012). As a consequence, the latest e-readers and tablets are offering links with social networks such as Facebook and Twitter.

Partnerships among editors and other actors are also emerging: an example is given by BooksOn.de created by the partnership between Ciando.de, one of the most important German online bookstores, and Deutsche Telekom (Mussinelli, 2010).Other major digital platforms were launched in 2010: examples are given by the Italian Edigita (RCS, Mauri Spagnol and Feltrinelli), the French Eden (Flammarion, Gallimard, LaMartinière), the Spanish Libranda

(Planeta, Santillana and Random House Mondadori), (Simon, de Prato, 2012). In France Virgin Megastore has a partnership with Amazon and Booken for selling Kindle and Cybook, while Fnac has a partnership with Kobo for selling the e- reader with access to its own e-bookshop (OECD, 2012).In Korea Samsung has created a partnership with Google for having access to Google e-books, while in China publishing houses are mostly developing their own e-readers with access to their own e-books (OECD, 2012).

The French publishing sector has been used to have a market structure dominated by two leading firms (Hachette-Lagardère and Vivendi Universal Publishing-VUP), four family-owned firms (Albin-Michel, Flammarion, Gallimard, Le Seuil) and several small publishers. In recent years, this structure has changed dramatically. Flammarion was sold to the owner of the Italian publisher Rizzoli in 2000 (RCS Mediagroup), in 2004 Le Seuil was sold to La Martinière while VUP sold its publishing assets to Hachette and the private investor Wendel (Simon, de Prato, 2012).

LEVEL 4: INFRASTRUCTURES AND NETWORKS: THE ROLE PLAYED BY CONNECTION TO CONSUMERS



Digital text has changed the manner in which texts are not only created, but also distributed and read. Since the end of the 1990s, many traditional libraries have created a website for their collection (Lebert, 2009). In the 2000s publishers started to sell digital versions of their books on-line on their website or on Amazon.com or Barnes&Noble.com. Furthermore, in the year 2000 new on-line bookstores were created for selling only e-books: Palm Digital Media, renamed Palm eBook Store, Mobipocket[8], specializing in readers (software), e-books for PDAs, cellphones and smartphones and
bought in 2005 by Amazon, or Numilog[9] (Lebert, 2009; Patino, 2008).

8"*Mobipocket was founded in March 2000 in Paris, France, by Thierry Brethes and Nathalie Ting, as a company specializing in ebooks for PDAs. The Mobipocket format (PRC, based on the OeB format) and the Mobipocket Reader were "universal" and could be used on any PDA - and also on any computer from April 2002. They quickly became global standards for ebooks on mobile devices. In October 2001, the Mobipocket Reader received the eBook Technology Award from the International Book Fair in Frankfurt. Mobipocket partnered with Franklin for the Mobipocket Reader to be available on the eBookMan, Franklin's personal assistant, instead of the initially planned Microsoft Reader"*(Lebert, 2009, p. 68).

9"*In March 2000, Numilog was founded by Denis Zwirn near Paris, France, as a company specializing in the* distribution of digital books. Numilog launched in September 2000 an online bookstore that became the main French-speaking aggregator of digital books over the years. Numilog has sold books and audiobooks in partnership with a number of publishers, including Gallimard, POL, Le Dilettante, Le Rocher, La Découverte,

Publicity investments in the book sector promotion are an important link to consumers and they have been recently analyzed in France by Beuscart and Mellet (2012). They highlight the weakness of investments in publicity in the French publishing industry, as yet highlighted by Rouet (2007). Publicity campaigns are expensive, but necessary because of high concurrence. Promotion and marketing initiatives in the French publishing value chain are focused mostly on relationships with the press and the direct work of agents in libraries for fostering the so-called "*Point on Sale advertising*". Publicity expenses are usually made in the written press with a tradition of "*advertising posters*", because book readers are expected to read also journals and magazines. After the importance of written press, the radio is the second publicity media utilized by the publishing industry (see also Rouet, 2007) and billposting is the third one. Since 2006 the Internet has a place in the publicity strategy, but its position is still weak.
According to Gaymard (2009) and to Lebert (2009), French Internet sales of books in recent years have been leaded by five main operators: Amazon, Fnac.com[10], Alapage[11], BOL.fr[12] and Chapitre.com[13]. Amazon.com was created in 1995 (Greco, 2005; Lebert, 2009), it can be considered the first mover in the e-book market, because it first introduced the business model, and it secured its time advantage by making a good part of its business model proprietary. Then, in 1997
Barnes&Noble, a leading US bookseller, entered the world of e-commerce, it launched its America

OnLine website and began a fierce price war with Amazon.com for the best book discounts (Lebert,

2009). Well established distribution channels, in-house knowledge concerning storefront and the related processes, and an international scope provided benefits and complemented Amazon's strategy (Loebbecke *et al*., 2010). "*It has had one of the fastest growths in the Internet's history, even as compared to eBay and Google. Amazon has since become an e-commerce platform for others, thanks to its pioneering retail e-commerce/e-shopping business in many product categories, not just books*" (Simon, de Prato, 2012, p. 13). Since 1998, Amazon created a new way of buying books and distributing books with its website Amazon.com. Amazon makes every activity related to human readers online. They buy the device Kindle from Amazon.com and buy e-books from Amazon through
Kindle or computers, and read the books on Kindle. The ordered e-books are delivered to Kindle

De Vive Voix, Eyrolles or Pearson Education France. Numilog was bought in May 2008 by Hachette Livre, a leading publishing group" (Lebert, 2009, p. 66).

10"*Fnac.com was the online branch of Fnac, a network of "traditional" bookstores spread throughout France and other European countries, and run by the group Pinault-Printemps-Redoute*" (Lebert, 2009, p. 25).
11"*Alapage was an online bookstore founded in 1996 by Patrice Magnard, before being bought by France* Telecom in September 1999. Alapage became a subsidiary of Wanadoo, the internet service provider of France *Telecom, in July 2000*" (Lebert, 2009, p. 25).
12"*BOL.fr was the French subsidiary of BOL.com (BOL: Bertelsmann On Line), launched in August 1999 by Bertelsmann, a German media giant, in partnership with Vivendi, a French multinational company*" (Lebert, 2009, p. 25).
13"*Chapitre.com was an independent online bookstore, created in 1997 by Juan Pirlot de Corbion*" (Lebert, 2009, p. 25).

through Amazon's integrated Whispernet mobile data connection (Park *et al*., 2010). Lab 126 was founded by Amazon as its subsidiary for conceptualizing, designing and building in-house Kindle device, while the manufacturing was outsourced to the Taiwanese firm Foxconn Technology Group, which has experience in producing high quality technical devices (Loebbecke*et al*., 2010).
The characteristic of Amazon Kindle is that users are forced to purchase e-books exclusively through the Kindle store. Amazon thus uses the e-book format AZW, which is only usable with the Kindle hard and software, in order to foster its vertically integrated, proprietary system (Loebbecke *et al*., 2010).
Other key actors in the e-book value chain are digital aggregators like Numilog and Cyberlibris, that play the role of diffusers and distributors (Patino, 2008). Numilog has been bought by Hachette (Dacos, Mounier, 2010).
Connection to consumer can nowadays benefit from the introduction of print-on-demand (POD), where books are printed only on demand from readers. POD and e-ink, developed at the MIT Media Lab in 1997, have recently become the two techniques at the forefront in the print evolution. Several publishers are using these new technologies not only to cut costs but also to broaden their audiences and to adapt to changed economic climate (Leal, 2009). From technological commodities books became micro-technological innovations, meaning the result of wholesale mechanization of printing (Howard, 2009).
POD was introduced in the early 1990s. It utilizes digital printing: production is quicker than offset printers and excess print materials do not need to be kept on hand, because POD enables to print only what is needed to meet current demand (Leal, 2009).
Connection to consumer is amplified also by the launching of digital library projects: Google

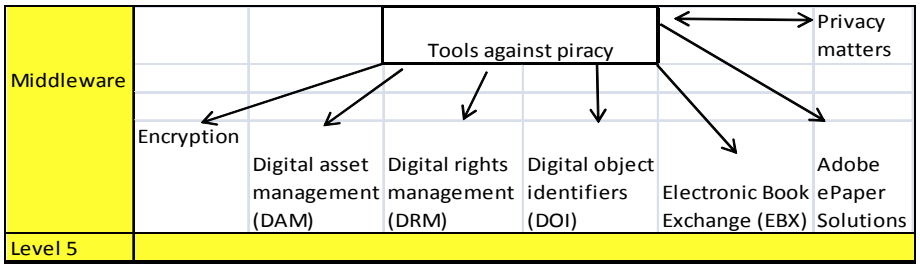
Print project, from 2006 known as Google Book Search, and the European digital library announced in

2006 are the main examples (Simon, de Prato, 2012; Dacos, Mounier, 2010; Patino, 2008). The first one was launched in 2004 as the attempt at digitalising as many books as possible of major public libraries. The second one is the reaction to the Google initiative: Europeana was launched in November 2008 (Dacos, Mounier, 2010; Lebert, 2009). Europeana is a portal for digital copies of art, music film and books held by the cultural institutions of EU countries. It is sponsored by the European Commission (OECD, 2012; Simon, de Prato, 2012).Partnership agreements are established with main libraries and editors in order to foster these projects: for instance, Microsoft Windows Live Book Search was established with a partnership with the British Library, but it was closed in a few years. FNAC in 2007 created a digital library in partnership with Cyberlibris, while Internet Archive and Yahoo launched the Open Content Alliance[14] project (Patino, 2008).In 1996 the Internet Archive was

14"*Conceived by the Internet Archive to offer a universal public digital library, the Open Content Alliance* (OCA) was launched in October 2005 as a group of cultural, technology, non profit and governmental *organizations willing to build a permanent archive of multilingual digitized text and multimedia content. The project took off in 2006, with the digitization of public domain books around the world. Unlike Google Books, the Open Content Alliance (OCA) has made them searchable through any web search engine, and has not scanned copyrighted books, except when the copyright holder has expressly given permission*"(Lebert, 2009, p. 74).

founded, that is a non-profit digital library that offers permanent storage and access to collections of digitized materials, including books. This initiative is linked to the Open Library project, a site that seeks to include a webpage database for every book ever published (OECD, 2012; Lebert, 2009).
Platforms are another key step: Gallica 2, launched in 2008, is a consultation platform that offers free content through the BNF collections, as well as paid content through partnerships with editors (Patino, 2008). Furthermore, e-book platforms such as the ones of Amazon and Apple offer the possibility to have a direct customer interface on their online stores to self-published authors (OECD, 2012).

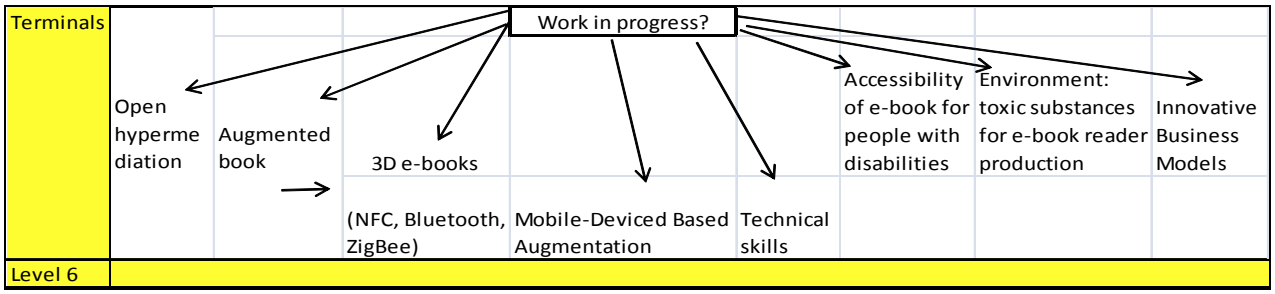
LEVEL 5: MIDDLEWARE: ECONOMIC STRUCTURING AND PIRACY CONCERNS



Piracy is one of the main problems faced by the digital revolution and currently there are few studies on digital book piracy(Simon, de Prato, 2012). Tools like encryption, digital asset management (DAM), digital rights management (DRM), and digital object identifiers (DOI)[15], are helping publishers to find a suitable solution (Carreiro, 2010; Dacos, Mounier, 2010). In particular, DOI is attributed by the agency Crossref: it consists in the creation of a sort of warehouse of single logins for identifying every text. This identification gives a strategic and monopolistic position to Crossref (Dacos, Mounier, 2010). Vulnerability to digital piracy is an important threat in the book sector: "*the industry has limited experience in dealing with digital piracy with no international forum for cross- industry agreement about protection policies and technologies (Italy and UK have such forums). Currently, the major source of piracy is the creation of digital versions by pirates from print originals through scanning and OCR for Internet distribution; this is also hard to combat*"(European Commission, 2005, p. 73).

15DOI is "*an identification system for intellectual property in the digital environment*" (Carreiro, 2010, p. 225).

LEVEL 6: TERMINALS AND USERS : TECHNICAL INTERFACE AND ERGONOMY



About the work in progress, an interesting aspect is e-book accessibility to people with print disabilities: features like the translation of the visual digital text of an e-book into voice-audio mode, increases the accessibility to persons with disabilities (OECD, 2012). Notwithstanding, the digital divide and technical competence gaps can still be an obstacle for individuals willing to access electronic books and in particular enhanced e-books with apps and richer features.
There are also aspects linked to technological improvements not still understood. An aspect not still investigated enough is linked to environmental consequences of these new technologies: e-ink does not require materials to be printed, but the environmental impact of the materials used in technological devices are not yet well understood (Leal, 2009). E-book readers are produced with toxic substances that are not-biodegradable (OECD, 2012). According to Howard (2009, p. 156), "*e- paper, assuming it has no negative environmental impacts, is an environmentally sound alternative*" to traditional paper.

Regarding the next future, Tian and Martin (2010) analyzed the Australian book publishing industry and they found that those technologies which emerged as likely to offer most in regard to the future of book publishing included production, content and communication technologies. Park *et al*. (2010) underlined that researches on the attempt to build 3D model of e-books for more natural and convenient reading are emerging (Chu et al. 2004; Hong, Chi & Card 2005; Almeida et al. 2006 [*all these 3 references are cited in Park et al., 2010*]), but there have been not yet 3D e-books appearing in industry.

4. DISCUSSION: THE ACTUAL EDITORS' STRATEGY

R&D is carried out by creative companies without corresponding formally to effective R&D activities: Green *et al*. (2007, p. 3) have recently argued that "*the nature of innovation in the creative sectors is not well understood, and that the true level of innovation activity in creative firms and organizations is frequently underestimated*" while Potts (2009, p. 141) stated that "*activity which might otherwise be classified as R&D is not so classified in these industries*". As highlighted by Brandellero and Kloosterman (2010) and Green *et al*. (2007), creative industries are generally associated with various forms of "hidden innovation", difficult to measure with traditional indicators.

These forms of innovation include, among others, R&D of new prototypes and products, changes to business models and organisational set-ups, an original combination of technologies for new goals (Brandellero, Kloosterman, 2010; Green *et al*., 2007).
The reconstruction and map of all the specific phases of the R&D value chain in a specific creative sector like the book publishing one, enabled to understand where the technological innovation actually takes place, and whether creative companies have a perception of what really R&D means or not as well as to understand how and where the R&D activities someway matter. It seems that the e- book diffusion has fostered editors to an increased attention towards appropriateness of R&D and technological innovation: the revolution in printing, formats, e-readers, tablets and PDAs, are at the origin of several changes in the editors' strategy and new investments. The year 2003 was a turning point in this emerging market, because more and more books were published simultaneously in a print as well as in a digital version (Lebert, 2009). As a consequence, publishers are defining and implementing new commercial strategies but all these strategies are depending on the new technologies demand without a leading position of the editors. Digitization alters the legacy cost structure, because some costs disappear while new ones appear mostly on the software side of the equation, others remain

unaffected or are shifted, like the ones of promotion through blogs (Simon, de Prato, 2012). In this context editors are focusing on some particular aspects and, therefore, could not be able to adopt a global reactive strategy against competitors and incomers: global editorial projects as well as effective business models are still missing. Using the cartography layers described help to understand how editors are actually focusing on investments on some specific aspects. The e-ink's technology (*Level 1*) revolutionized the e-readers world. They became lighter, more compact, and easier to read with increased and/or more displayed screen sizes. They also improved the battery life and the capacity to hold more and more information with expandable memory (*Level 2*). But, according to Patino (2008), in recent years the e-readers have succeeded one another without the supremacy of one particular of them. Everything is open: actually, a reference and standard model of digital reading support does not exist, yet. Contrary to the music and film sectors, where supports have changed several times in the last decades, the book industry still cares for a secular reference model. And this aspect is underlined in France by the fact that the book price has been regulated by a specific law issued in 1981, because of the fact that "*the book was not a commodity like any other* [authors' own translation]" (Gaymard, 2009, p. 42). This specific aspect is at the origin of a general attitude at coherence with the traditional channels of the printed book value chain: the e-book revolution has not produced a process of unfair competition.

In this context, editors are investing mostly on competence development for adapting their strategy to the e-book market needs: specific courses for acquiring competences are attended by internal staff. Furthermore, several platforms (*Level 3*) appeared on the market: these platforms are established in the form of a consortium among several editors or they are managed by external actors playing the role of intermediaries.
What is still missing is a real editors' business model for the e-book: it seems that editorial houses are following the market needs without playing an effective role of leaders. In other words, the interview results highlighted that French editors are using the several platforms and enterprises appeared on the market in recent years for diffusing and distributing books through the Internet. They are also clients of societies that offer aid in building standard formats like e-pub (*Level 2*), they adopt tools like DRM or tatouage, but they are aware of the lack of strong support of tools structuring economic relations and exploitation rights and in particular those against piracy (*Level 5*),and they are not facing piracy through an effective solution. All this is happening through an imitation process among editors rather than through an emulation process (DiMaggio, Powell, 1983; Hannan, Freeman,

1984, 1989). This is also due to the heterogeneity of techniques and offer of e-readers, tablets and PDAs (*Level 2*): this heterogeneity is seen like a nightmare and editors do not know which way to go for not losing power on the market. Their main concern is about the need to be visible everywhere: they are looking for a connection with social networks (*Level 3*), an application with I-Phone and I- Pad, a presence on all the main diffusion platforms. But editors are not giving the same importance to the establishment of a lasting business model. The rapidity of evolution and the fast succession of novelties on the Internet, are not fostering the need for the emergence of a stable and durable business model. As a consequence, investments in R&D and innovation are not linked to the creation of a real business model, but mostly to visibility, that is the editors' main concern. This means that the actual editorial strategy is focused more on maintaining the secular place and role of the editors in the book value chain through an adaptation-imitation process rather than to update their role and functions to the new emerging, instable environment and cultural habits. This calls for wondering about the durability of this fragile system and about who is taking the leadership role. R&D and innovation are someway leading this evolutive process but editors are not really well aware of this aspect because they seem not to have the willing to build a model for using effectively and efficiently these innovations. This is proved by the fact that one of the key points resulting from the interviews was linked to the technological standards (*Level 2*): e-pub and pdf formats have not been a *choice*, but an *imposition* at the international level. To this aim, several companies specialised in digital editing are becoming the pivotal tools for developing these formats and many editors are depending on these societies while others have invested in staff training. Notwithstanding, French editors are willing to maintain the place of the publisher in the digital market: to this aim they are focusing on "trust" building in the relationship with distributors and diffusers (*Level 4*). These last ones are playing a key role for the visibility of the catalogue on all the main important digital bookshops. Several platforms specialised in technologies for digital publications are continuously appearing. This aspect is also linked to the growing importance of blogs and links with social networks like Facebook and Twitter

(*Level 3*).

The relationship between editors and Internet publicity of books (*Level 4*) is another key confirmation of our assumptions. Till now, according to Beuscart and Mellet (2012, p. 103), "*apart from exceptions, Internet is still a limited role in the promotion of books* [authors' own translation]". The relationships with libraries and the press are pivotal in the editors' promotion strategies. Editors are well aware of the importance of the Internet in terms of promotion activities and marketing, but they use this tool only for experimenting weak initiatives. As a consequence, in the words of the authors, French publishing seems a sector "*for the most part still rooted in the tradition, with little publicity, preferring the press, and converting very slowly to the Internet* [authors' own translation]" (Beuscart, Mellet, 2012, p. 122). The difficulties of the Internet diffusion in the French publishing sector are confirmed by Rouet (2007, p. 193) who argued that "*Sale in bookshops is the "normal" way to sell and reference books. This state of affairs lasted, while the bookshops maintain an irreplaceable channel for selling books; they are the balance of the whole chain, although its share in retail sales has declined significantly with the emergence of new players* [authors' own translation]". Notwithstanding, Internet is considered an effective tool for buying books. As a consequence, all the editors are forced to have an own Internet website for information and communication. The Internet website is a complement of the physical bookshop and services like the possibility to turn some pages of a book on-line is a method in competition with sales in bookshops (Rouet, 2007). Editors are in a phase of exploration of the Internet opportunities for publicity campaigns, like blogs and new visibility tools like social networks (Beuscart, Mellet, 2012). And the evolution towards collaboration with social networks like Facebook and Twitter is a means for knowing better readers' needs and habits. Younger generation habits are demanding ever more and more innovative reading experiences (OECD, 2012).Editors are looking for a better understanding of the consumers' needs for being able to provide an effective offer. The sectors related to the youth generation, like comics, are attracting most of the interest of many editors, because young generations are more used to read on tablet and e-reader screens than on printed paper.

One of the main problems of the emerging role of actors like Amazon and Fnac (*Level 4*) is that their window influences the readers' choice, because a great amount of information is available on the net, but one cannot have a real possibility of choice. The suggestions coming from the experience of a physical bookseller cannot be replaced by the promotion of books on the main window of a digital platform. According to Loebbecke *et al*. (2010, p. 55), Amazon introduced a radical innovation by changing the core design concept. For the first time in the book market, hardware sales were being combined with content delivery: this business model has been proven to be successful in other major content markets such as music and software. But there is also a general concern that publishers are losing control of their business to giants from outside the industry, like Amazon, Apple and Google (Guiry *et al*., 2012). While at the beginning editors refused to give book files to actors like Amazon, at the end they were obliged to provide these files losing the power and the full control of the diffusion channel. Notwithstanding, the editors' attitude towards these emerging giants is not reactive: a general lack of active initiatives and global programmes for counteracting these actors emerged.
Finally, there are some projects in progress focused on 3D e-books (*Level 6*), but they are so expensive and risky that it is difficult to find editors willing to take this challenge.
To sum up, digital libraries, publishing-related community blogs, social media and social networking sites are emerging as key tools for attracting new clients and fostering the diffusion of e- books (Carreiro, 2010; Tian, Martin, 2010). Collaborative e-book distribution platforms created by a consortium of major publishers and coproduction agreements among publishers and developers who specialized in the area of new technologies are other key tools (Mussinelli, 2010, 2011). But in this context the effective role played by editors is not emerging as a pivotal factor.

The European Commission report (2005, p. 70) highlighted that one of the main weaknesses of the EU book publishing market and industry is that this is a mature sector with no immediate driver for change. There is no evidence suggesting that the number of people buying books is growing. As a consequence, "*parts of the industry have focussed on cost reduction rather than on product innovations that might grow the overall size of the market...Innovation is limited; a large number of new products are created that are very similar to previous products. Major product innovations happen more rarely and this has conditioned the culture of the publishing industry*". Furthermore, "*the industry has been slow to respond to some of the threats and opportunities created by digital technology and the Internet in particular. There is a lack of technologically-informed staff able to lead strategy and execution at senior management level in some parts of the industry. IT investments have not yielded all the benefits anticipated by publishers and have not invariably shown positive return on investment, often because of over-investment in unnecessarily customised systems rather than industry standard solutions*"(European Commission, 2005, p. 71).

In conclusion, the actual main problem is linked to the absence of investments in technological development focused on an effective business model. Editors are adapting their editorial strategy to the succeeding new digital demand needs, but they are not leading this evolving process with a convincing strategy.

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