

“How and Where the R&D Takes Place in Creative Industries? Digital Investment Strategies of the Book Publishing Sector”

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Abstract: The innovative and strategic models of creative industries (CIs) in the digital economy are capturing an ever increasing interest in recent years. Notwithstanding, most of the literature is dealing with creation and talent and very few with technological and innovation perspectives. Innovation is in general considered from a single viewpoint: a means to develop new creative contents. Thus, this paper investigates a very important issue surprisingly neglected both in the scientific literature and the professional and public reports as well: the topic of R&D and technological innovations in CIs. The present paper characterizes how and where R&D takes place in a specific creative industry: the book publishing sector. A systematic identification of R&D developments concerning e-book technology has been achieved using an original methodology set up by the authors to feature the technological strategic evolutions. The results provide a reliable cartography of the value chain through an adaptation of the OSI layers model. This framework helps to understand the new digital ecosystem of the book publishing sector and the strategies carried out by editorial houses regarding R&D and new technological innovations.

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

This paper is a revised and expanded version of a paper presented at the XII International Conference on Arts&Cultural Management (AIMAC), 26-29 June 2013, Universidad de los Andes, Bogotá (Colombia) and at the XI International Conference TripleHelix, 8-10 July 2013, Birkbeck and UCL, London.

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INTRODUCTION

Creative industries (CIs) trigger an ever increasing interest in recent years (UNCTAD, 2010). Starting from the initiatives taking place in the UK (DCMS, 1998), many studies considered their unique contribution to economic growth and organizational design. The literature originally focused on the role of the creative class and the management of talents (Scott, 2006; Florida, 2002; Caves, 2000). The interest is nowadays focused on the establishment of creative atmosphere (Bertacchini, Santagata, 2012), networks, CIs clusters and creative cities (Lazzeretti, 2013; UNCTAD, 2010; Foord, 2008; Crossick, 2006) seen as regional development strategies. Among the potentialities of the CIs, opportunities of economic wealth, growth and jobs creation at local level are identified as main key factors (Florida, 2002; Piergiovanni *et al.*, 2012; EC, 2012; Henry, de Bruin, 2011; Green Paper, 2010). Lastly, research focused specifically on the strategic and innovative dimensions of CIs and their business models (Benghozi, Lyubareva, 2014; Parkman *et al.*, 2012; Tian *et al.*, 2008; Benghozi, Paris 2007; Throsby, 2001; Howkins, 2001).

The scientific literature in this field is therefore growing and both qualitative and quantitative studies are emerging¹ as well as special issues of scientific journals². Additionally, several local governments are calling for reports in order to consider and support future policy strategy guidelines³.

¹ e.g. for the qualitative ones: Cunningham, 2009; Flew, Cunningham, 2010; Harper, 2011; Hotho, Champion, 2011; Jaw *et al.*, 2012; Benhamou, 2014; for the quantitative ones: Muller *et al.*, 2009; Lazzeretti *et al.*, 2010; Chaston, Sadler-Smith, 2012; Piergiovanni *et al.*, 2012, Abecassis-Moedas, Benghozi 2012; Parkman *et al.*, 2012.

² 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; *Technological Forecasting and Social Change*, special section: Digital Technology and the Creative Industries: Disassembly and Reassembly, 2014; *International Journal of Arts Management*, special issue: Financing Creativity: New Issues and New Approaches, 2014.

³ e.g. Foundation for Research, Science and Technology, 2003; QUT CIRAC Cutler & Company, 2003; KEA, 2006; Santagata 2009; UNCTAD 2010; Unesco, 2013; SGS, 2013; Müller, 2013; OTIS, 2014; CBI, 2014.

Likewise, the focus on CIs has been largely renewed thanks to the Internet and information and communication technologies (ICTs). Actually, the use and worth of cultural contents support in large part the development of the digital economy and the emergence of dominant economic actors like Amazon, Google or Facebook. Generally speaking, ICTs are pervasive support of any kind of economic or social activity and are at the base of deep transformations in individual life as well as in the society. The Internet development contributed to the expansion of a knowledge and innovative economy that gives all its importance to “creative” process and information systems (Cohendet, Simon, 2007). In this evolution, the CIs are a pioneer and turn to be an ever-increasing inspiration for traditional industries (Lampel *et al.*, 2000): the economic model and the particular organisation of the sector, the intangible and cognitive creative components, the growing importance in the digital market, the new business models and value chain structuring.

Notwithstanding this interest and inflation of contributions in both the scientific and the grey literature, the related contents are in most of the cases very wide-ranging. More specifically, R&D, technology and innovation are neglected words. The papers dealing with such issue are all thinking about innovation as a means to develop new creative contents. Attention is particularly paid to CIs employment issues with implications for innovation policy, innovation processes by the point of view of innovation performance comparisons, innovation contribution of CIs businesses to companies in the wider economy, CIs innovation trajectories, ICTs and open innovation in CIs, services provided by CIs seen as enablers of innovation and so forth: cf. in particular the special issue “Innovation Policy in the Creative Industries” (Innovation: Management, Policy and Practice, 2009) aiming to analyze “*the empirical veracity, theoretical consistency and institutional reality of this alleged connection between creative industries and innovation policy*” (Potts, 2009, p. 140) by an analytic and policy hypothesis. Since then, despite numerous other editorial activities dedicated to CIs (see *supra* note 2), no other specific investigations have been focused on addressing the specific question of “technological innovation in CIs”. The very important issue about the characteristic and the management of R&D in CIs, especially in the cultural sector (Brandellero, Kloosterman, 2010; Green *et al.*, 2007) persists being, surprisingly neglected. This is surprising because the investment in R&D is almost unanimously regarded by economists as the main source of growth and performance in competitive and highly changing environments (cf. Freeman, 1974; Lundvall, 1992, Aghion *et al.*, 2009). Thus, addressing this

challenge is important from a social point of view (i.e. R&D and innovation in key industries like CIs cannot be neglected in the contemporary Internet economy) but also and most of all from a technology management perspective: as recently highlighted by Barge-Gil et al. (2011), firms can survive only if they continuously “upgrade their technologies”, especially in the digital age. Accordingly, this paper aims to fill this gap by positioning the locus and originators of R&D in CIs and identifying the publishers’ strategy vis-à-vis technological investments and innovations. To this end, it makes use of an original methodology, meaning the reconstruction of the different phases of the value chain through an adaptation of the classical OSI model (Zimmermann, 1980).

We assume that the general absence of investigations on R&D activities in the CIs in general is due to a “*biased*” vision of the real relevance of these assets for creative companies. The main reason for poor investments in R&D is usually linked to size specificities, skills and capitalization (Green *et al.*, 2007). But another additional enlightenment has to be put forward: what does the concept “R&D” really means for creative firms? Actually, innovations can occur in firms that do not perform formal R&D or they are not counted as the result of formal R&D (Barge-Gil et al., 2011; Nelson, 2000). This is even true in the specific case of CIs, because, as a matter of fact, creative firms conceive new products as the development of innovative contents and never consider them as the output of technological R&D activities. This is perfectly illustrated by the famous line in the 60s from the French ministry of culture André Malraux who characterized film industry as a prototype industry, considering esthetical originality as the main source of inventiveness. Accordingly, the main disruptive technological innovations in the CIs 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 (Walkman or CD), created in the 70s and 80s by Philips or Sony before they entered into the media industry, and more recently, for the MP3 and Appstore in music. Moreover, when R&D activities are carried out by creative companies (e.g. throughout project development) they are hardly defined formally as effective R&D activities. As a consequence, CIs are generally associated with various forms of “hidden innovation”, difficult to measure with traditional indicators (Cunningham, 2013; Barge-Gil et al., 2011; Brandellero, Kloosterman, 2010; Miles, Green, 2008; Green *et al.*, 2007).

Within this context, our research perspective aims at understanding where R&D actually takes place in CIs, 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, and how they are articulated with content producers. In a word, to what extent observable innovations reveal the technological strategies of actors in the book sector. From this viewpoint, the situation is different in the various cultural sectors and creative fields according to their technological background.

In order to detect and situate the actual role of technology and R&D in industries such as CIs, it is essential to identify at which steps technical innovations take place, through depicting and mapping all the main phases of the R&D value chain in a specific sector. This is the objective of the paper that focuses, furthermore, on the book publishing sector: this well-established and stable industry had been involved in limited technological revolutions. The sector relies, therefore, on a traditional separation. On the one hand, the printing industries were based on sunk costs related to heavy investment in technological infrastructure. On the other hand, the publishers fit into a process of editorial project that required only low technical investments and low technical barriers to entry. The emergence of digital technology and the e-book revolution have transfigured such market structure, changing the overall industry context and value chain structuring⁴. In 2008, Tian et al. underlined, in the Australian context, the absence of studies on the digitization of book publishing and its implications for business models; besides, they highlighted the summary nature of the information available, most of all under the form of consultancy reports or compilations. The situation did not change since then and the actual context of value chain technological innovations and innovative business models in the book sector is still poorly known. However, new comers like Amazon and Google with their disruptive innovations are destabilising more and more the book publishing industry. One may wonder whether or not these actors are becoming the winning leaders of the business ecosystems in this field (Gueguen, 2009; 2010) and to what extent they are designing and influencing a new value chain and a new business model for the book sector.

It calls for research investigations for understanding in which extent these creative firms are mastering their future environment by backing technological development, and how they can support autonomous strategy in their production of contents facing technological innovative developments coming from outside.

⁴ This makes this sector a more suitable case-study compared to other high-tech CIs calling for heavier investments like cinema or video-games.

In recent years the book publishing industry has experienced many innovations due to the diffusion of the Internet and ICTs (Mangematin *et al.*, 2014; Guiry *et al.*, 2012; Ronte, 2001). Tian *et al.* (2008) reminded that the book sector is different from other media: the book reading experience is unique and it implies different interactions according to digital or printed formats. These authors also argued that ICTs and electronic commerce could offer limitless opportunities to publishers in terms of new value propositions and business models, but under the condition of being able to take advantage of developments in digital technology. After the emergence of on line distant sales in digital bookstores, traditional books are now confronted with the emergence of e-books (cf. Benhamou, 2014; Greco, 2011; Dacos, Mounier, 2010; Howard, 2009). Consequently, publishers 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. Notwithstanding, the digitisation of book publishing has been scarcely investigated till now (Oiestad, Bugge, 2014). Most papers deal with the economics of e-book market and the transition of editorial houses from paper to digital distribution. Yet, the transformation process of a traditional publishing house into a digital one has still not been investigated in terms of evolution and changes in the value chain, nor of the investment and R&D strategies adopted in order to look ahead for changes and evolve their whole ecosystem. Hence, the objective of this paper is to reconstruct the ongoing innovation paths and to characterize the technological R&D ecosystem of this creative sector. This is an important issue to investigate in order to understand in which extent a specific industrial sector – namely the book publishing CI – can implement pivotal strategies to support endogenous technological innovativeness or should develop very early deep interactions and industrial partnerships with outsiders, defining therefore new boundaries to the related industry. In order to support our arguments, the paper will be structured as follows. The theoretical framework will present the literature perspective on R&D and new technologies in the book publishing sector. This part enables to understand at which level of the value chain the innovations are identifiable and who is taking charge of them. The empirical background will then focus on the value chain phases and its recent evolution. The methodology will be described: it allows identifying the positions described in the theoretical framework by a technical point of view through an adaptation of the classical OSI model (Zimmermann, 1980). The main results of the cartography of the layers in the e-book publishing value chain will be then highlighted.

Additional insights from face-to-face interviews will complement this description. Critical discussion of the findings will be presented at the end.

1. THEORETICAL FRAMEWORK

Over the years, the concept of innovation has changed profoundly in economics and strategic management. Innovation has usually been conceived as the result of an essentially technological process, originating in basic research and then declining in applied research, development and commercial novelty (cf. Abernathy, Utterback, 1978; Thompson, 1967); it calls therefore to mind what Freeman (1974) defined a 'coupling process' between the market and the technology sectors. Yet, subsequent studies have shown that innovation is also a continuous and cross-cutting approach (Brown, Eisenhardt, 1998; Nonaka, Takeuchi, 1995). As a consequence, it does not summarize a technological invention, but it is based instead on the ability to rethink the overall design of a product/service including its dimension, use, design, service or business model (cf. Von Hippel, 2007, for instance). The current developments of the digital economy have further complicated the context by giving to disruptive technologies of various types (e.g. telecom networks, Internet, tablets, Appstores, e-readers...) a decisive weight in innovation ecosystems (cf. Yoo *et al.*, 2012). The introduction of new technologies has a disruptive effect on existing industries and may replace prevailing business models (Oiestad, Bugge, 2014; Tian *et al.*, 2008).

Taking into consideration the relevance of R&D - considering internal and non-internal R&D activities (Narula, 2001) and their strategic success factors (Brockhoff, 2003) -, innovation and technology in firms' organization stimulated therefore a large range of literature. Among many others, one may think to the seminal works of Lundvall (1992), Christensen (1997), Chesbrough (2006), Antonelli *et al.* (2006), Jacobides, Winter (2007), Aghion *et al.* (2009) and Steinmueller (2010). In the specific context of CIs, various points are worth to be noted. A first interesting issue is the general lack of significant investments in R&D of creative companies. It 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 these poor investments in R&D may be linked to the general small size, skills and capitalization of CIs (Bhatiasevi, Dutot, 2014; Bouquillion, Le Corf, 2010) with related difficulties in financing R&D activities. Such perspectives therefore consider technological innovation with a view altogether traditional, where innovation results in the ability to invest

upstream in strategic R&D resources. Notwithstanding, other motivations may explain this deficiency, because also large creative companies are known for under investments in R&D projects (Foundation for RST, 2003).

Accordingly, another argument has to be raised: CIs companies are considering that they take already so much commercial and aesthetic risks by creating new content that they cannot take in charge additional technical risks. As a consequence, they are used to appropriate the R&D results coming from other industrial sectors instead of investing directly in R&D projects. This can explain why disruptive technological innovations generally come from outside and creative firms are not really able to control their evolution: this process may originate an involuntary dependence on innovations (David, 1985; Oiestad, Bugge, 2014) that determine the real sector evolution. Another line of reasoning argues that CIs are peculiar sectors, because it is difficult to separate the investments in projects from the ones in technologies. Creative firms perceive R&D as something related more to investments in projects and contents rather than directly to technologies, design and innovation on processes, infrastructure and devices. In a completely different perspective, Potts (2009, p. 141) affirmed that “*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*”. Innovation is seen as a normal aspect of business operations and strategy.

These paradoxical findings explain the particular state of the literature on innovation in CIs. Even the studies that aim at investigating the potential of R&D to support the CIs (e.g. Cunningham *et al.*, 2004; Foundation for RST, 2003) do not provide any analysis of the processes and/or technologies adopted. Investments in basic and applied research are seen as crucial for creative sectors competitive advantage but the main suggestion is simply to build consortia (Mussinelli, 2011) in the form of business ecosystems.

These approaches can also be interpreted in terms quite close to the sociology of innovation (Akrich *et al.*, 1988) and to interactionist approaches (Becker, 1982). Far from being simply considered in technical terms, it is, in this perspective, to understand the development of innovation as the ability to structure and design a network of actors and stakeholders cooperating together on new projects.

As a consequence, it bears neither investigating the various phases of the value chain nor understanding what the R&D really means for these companies, how R&D is effectively carried out, in which layer of the value chain and where it is located in the ecosystem. An

absence of practical and implementable solutions emerges. This is reflected in the findings and the general conclusions of some of the latest studies specifically focused on extra-EU as well as EU countries. As demonstrated with more details in the following section, this situation is exactly reflected in the book publishing sector.

2. METHODOLOGY AND RESULTS

In order to provide an answer to the questions discussed above, we have defined an original methodological framework to accurately trace the evolutionary paths of technological innovations in the book publishing industry: characterization and historicizing of technical advances, economic actors and associated industrial partners. The main purpose was both to identify disruptive innovations and successive developments which they give rise, to detect the basis of partnership and technological rivalry between major players in the sector, to locate modalities of R&D where publishers primarily invest.

Our research is supported by a multidimensional and special methodology specifically designed/contrived by the authors with both a formal and an interpretative approach. First of all, the extensive mapping of the R&D ecosystem of the book publishing industry has been elaborated through a methodical codification of the various technological developments that are detectable in the recent history of the industry. To that end, we tracked all the existing technical documents and implemented their methodical exploration: it gave space to a codification process that aimed at identifying the categories of innovation being developed, their specific nature and setting in the value chain for R&D development, the economic actors supporting it (internal or external to the traditional boundaries of the sector).

We began to build the cartography starting from an analytical coding of the main characteristics of all the versions of some among the most diffused e-readers and tablets: we stripped all the technical documentation concerned with the technological trajectories and public reports about technologies and industrial policies and we explored the different versions of the most successful devices (Kindle, Kobo and Nook, cf. Miller, 2013) cross-checked with Internet websites of the companies. Secondly, face-to-face interviews with CEOs and managers of French publishing houses, founders of electronic platforms and experts in publishing technologies have complemented the mapping perspective by identifying precise strategies implemented in the e-book publishing ecosystem. Table 1a resumes the various components of the research material supporting the paper.

Table 1a: Sources for data collection

Material and documents	Types	Content (main keywords)
69	Scientific and technical papers	Innovation in CIs; business models in CIs; digital publishing; book evolution; electronic book; technology in publishing; R&D; digital media transformation.
10	UE reports	Publishing sector; e-books; the EU economy of culture; creative economy; promoting the potential of CIs.
6	French reports	Business models of CIs; advertising in cultural industries; CIs in EU reports; the book context; the e-book; management of intangible assets in CIs.
12	Other countries (not French) reports and working papers	UK CIs; CIs R&D in New Zealand; CIs R&D in Australia; soft innovation.
29	Specialist books	The economy of CIs; the Internet economy; entrepreneurship and CIs; history of book technologies; CIs and innovation; technology and publishing; history of e-books; the book publishing industry; economics of (open) innovation and technology policy.
20	Face to face interviews	French editorial houses, e-book, business model, value chain, technological investment strategies, digital innovations

In the coding process, we read the relevant material and documents with the goal to spot systematically all the reported technical and innovative events. Subsequently, these events have been coded on the basis of: technical identification of the innovation, date, related economic actors, corresponding technical layer, value chain level, industrial partnerships, associated standards. These events and their successive steps have been then represented graphically according to an original layout (cf. section 2.2) structured in successive technical layers. It displays: generic technologies, relationship graphs, actors embedded in the various phases, representative examples. The selected and codified technical documents that report the technological history have been completed by twenty face-to-face interviews conducted in Paris between January and December 2013 (Table 1b). A sample of publishing houses and technology professionals were selected from the directory of the most important in the French market and identified among the most active in digital technologies adoption. The aim was to understand the actual strategy of publishing houses *vis à vis* digital markets and the adoption of e-book technologies. This approach enabled us to complement the technological mapping and to flesh the final layers of the cartography.

Table 1b: Sources for data collection

Interviews	Role of interviewee
7	French publishers
4	Technology professionals
4	Representative actors (i.e. syndicate, associations)
5	Distributors, diffusors, digital libraries

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

The technological events identified during the methodical exploration of technical documents, the detection of the activities of the main actors in the e-book market and the

cross analysis of the specific characteristics of the different versions of Kindle, Kobo and Nook e-readers are represented in the charts of section 2.2. Every chart corresponds to a particular technical level and presents four different constituents: 1) the events and/or the actors involved (in bold), 2) the generic technologies (in italics), 4) some representative examples (in sky-blue) and 4) relationship graphs resuming the various interactions (application, implementation or reciprocal relations).

The model structure we adopted has been inspired by the robust and traditional perspective usually used in the digital sectors: we considered the seven structural and technical layers adapted from the classical Open Systems Interconnection (OSI) reference model, applied 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 helped to understand the technological structuration, the articulation and interrelations between the various levels of the value chains as well as the distinctive partnerships, investments and strategies implemented by the numerous actors.

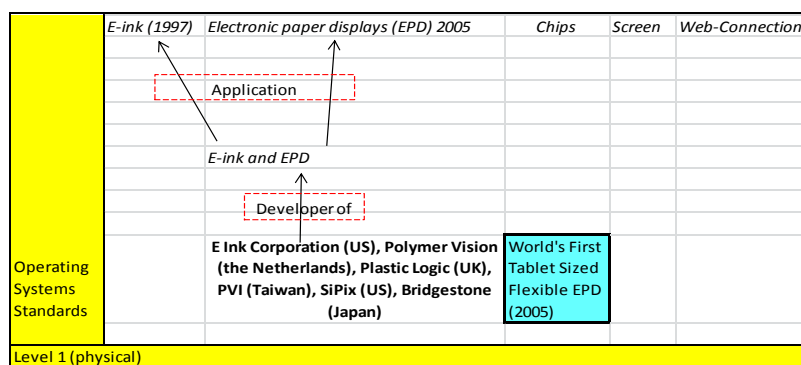
In the OSI model, Level 1 focuses on the *operating systems standards*. One of the corresponding starting points in the book publishing sector has been, for instance, the introduction of e-ink technology and electronic paper displays (EPD). These technologies are related to Levels 2 and 3 that are focused on the *hardware and technology of terminals*: e-ink technology influenced digital printing and the innovative display supporting the emergence of the first tablets, e-book readers and personal digital assistants (PDAs). Level 4 is focused on *standards and software*: blogs and social networks like Facebook and Twitter, and the diffusion of publishers' platforms, consortia and partnerships that are impacting and influencing the infrastructures and networks linked to the connection to consumers (*Architecture of infrastructures and networks*, Level 5). Print on demand (POD), digital aggregators, digital libraries, distribution platforms, are some key examples. In this context, Level 6 (*Middleware*) is focused on the tools structuring economic relations and exploitation rights. In particular, it includes those against piracy like digital rights management (DRM) and digital object identifiers (DOI). Finally, Level 7, dedicated to *user interfaces*, identifies

the main ongoing developments like 3D e-books and green IT (environmental consequences of toxic substances for e-reader production).

2.2 Focus on the layers

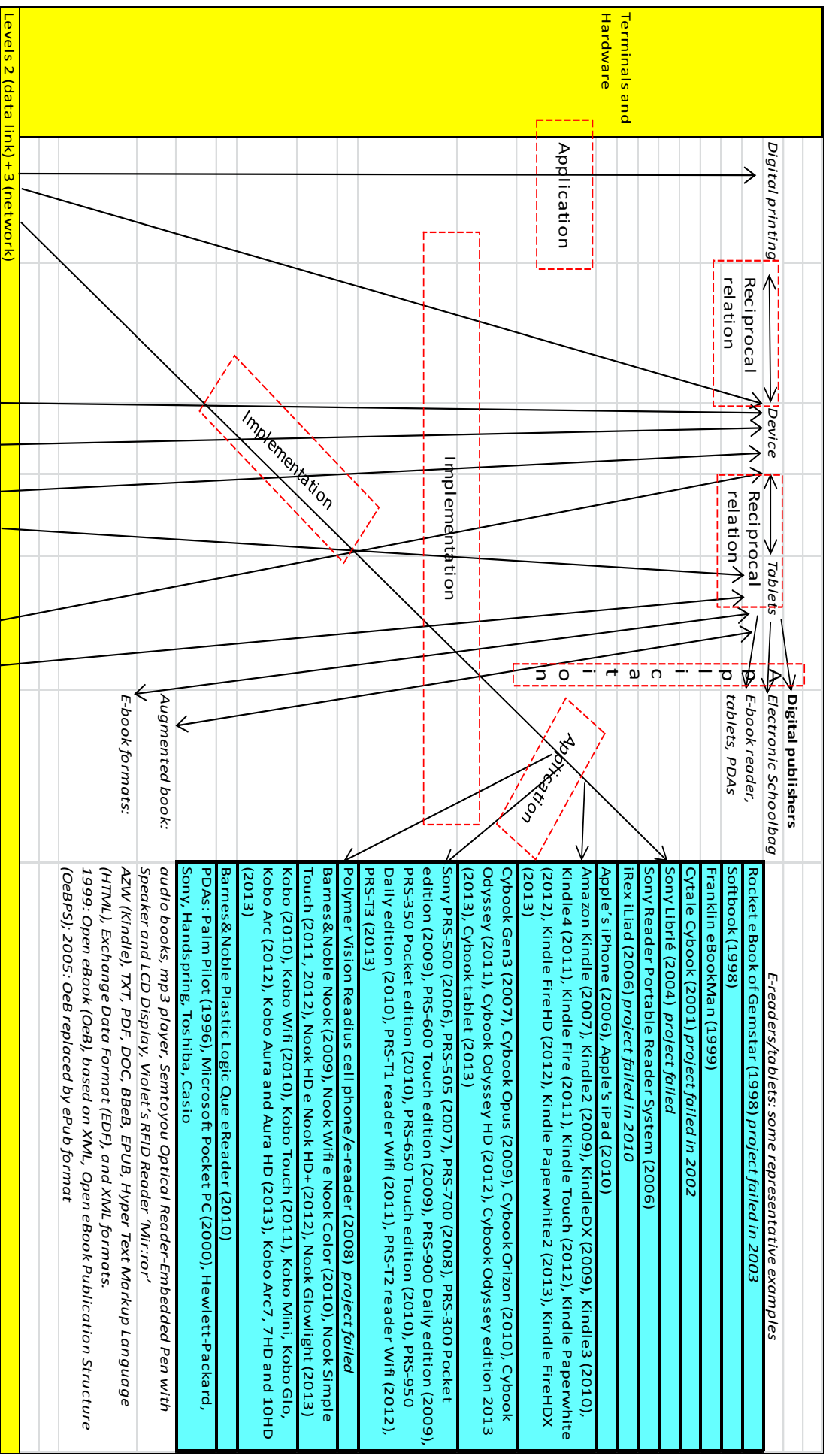
Level 1: Operating systems standards: the key role of e-ink and EPD technologies

Looking at the elements structuring the operational system of digital books, it is interesting to underscore that the initial technology supporting the e-book development was the electronic ink (e-ink) rather than the terminal itself or its processor. The first commercial application of e-ink (also referred to as e-paper) was developed at the MIT Media Lab in 1997 and it was launched in Japan in 2004 (Simon, de Prato, 2012). The leading developer of e-ink and electronic paper displays (EPD) is E-ink Corporation. In 2005 the company 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. 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, so eyes are not strained and reading is easier also outdoors and in direct sunlight. Other benefits are identifiable in the lack of glare, a reduced 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.



Legend:

- 1) Events and/or actors involved: **bold character**
- 2) Examples: **sky-blue setting**
- 3) Generic technologies: *italics*
- 4) Arrows: **boxes** describing the kind of relationship (application, development, reciprocal relation)

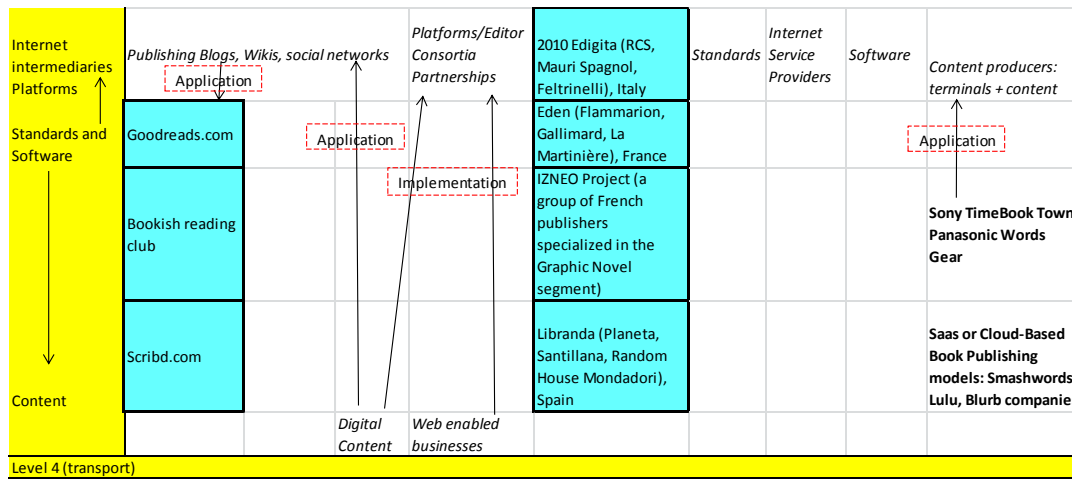


Levels 2 (data link) + 3 (network)

Levels 2 and 3: Terminals and hardware: the competition between e-book tablets, readers and PDAs

One of the significant dimensions of the technology rivalry is related to the competing - generic or allocated - devices used to read e-books. Palm Pilot, launched in March 1996, was the first PDA. Microsoft launched the Pocket PC in April 2000, while Hewlett-Packard, Sony, Handspring, Toshiba and Casio also entered the market with their PDAs in the same period. The early e-readers were also introduced in the market: heavy and low technology advanced materials and a very high price did not attract the interest of readers (Gaymard, 2009; Patino, 2008). The first handheld e-book reader devices were introduced in 1998, the Rocket e-book of Gemstar and Softbook, released by NuVoMedia and Softbook Press, respectively (OECD, 2012; Leal, 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 Librie in 2006 in the US market and Amazon launched the Kindle e-book reader with its online sales mechanism in 2007, followed by Barnes and Noble with its Nook reader in 2009. 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). Recent improvements in memory size, number of supported formats, and clarity of reading are characterizing the new e-readers (Mussinelli, 2011). Nonetheless, it is worth to underline that the technology is about the same for the different e-book readers: differences are observable in the design, but the software and the core technological characteristics are essentially the same. Other improvements may also be found in sound quality. 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).

Level 4: Standards and software: the intermediary role of blogs, social networks, platforms, consortia and partnerships among publishers



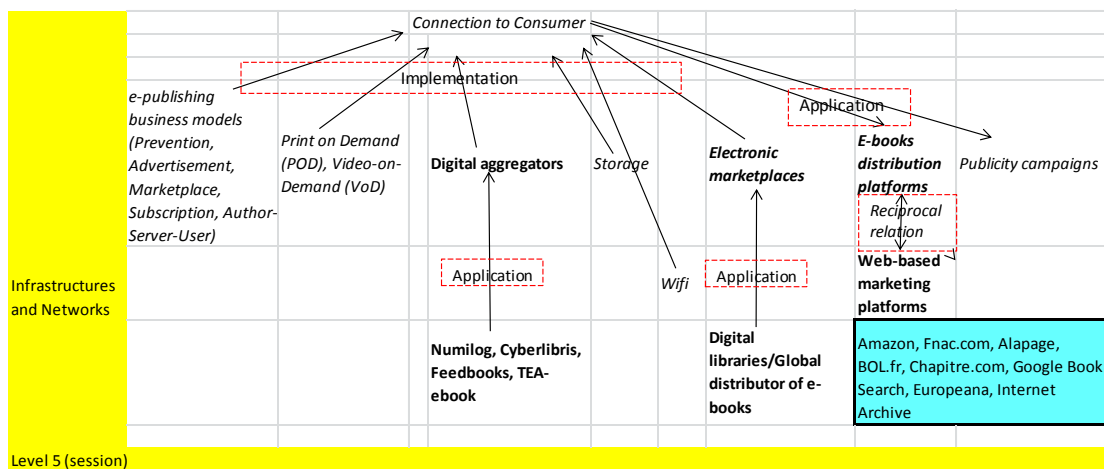
In the level 4, newcomers, who are often (large) ICT platforms like Amazon, are setting the scene and reinventing the traditional innovation and business models of cultural industries. As a consequence, the innovations resulted in a shift of power towards the downstream distribution activities through important process innovations: Amazon uses data-mining systems to enhance the quality of its suggestions, compile users' choices and recommendations to develop advertisement. This resulted in the actual domination of those ICT platforms playing an important role as tools in power distribution and the development of quasi monopolistic positions. Amazon monitors carefully the different dimensions of its own ecosystem and manages the relationships with the other players along various value chains, both horizontally and vertically within the more global Telecom Media Technology ecosystem. Competing with such powerful newcomers, publishers' strategy might consist in collective action to develop alternative solutions and standards. In this way, the French project MO3T⁵ has the goal to compete with the leading model of Amazon, but its roll out is still far to be completed. Additionally, some publishing houses are establishing narrow links with readers. To this aim, they look for interactive and upgradeable technologies. Nonetheless, alliances seem necessary with other platforms, because an autonomous strategy supports weak complementarities. The main challenge is the creation of trust among readers, publishers and authors that can enhance and complete the quality of published texts (Dacos, Mounier, 2010). Collaborations with Facebook and game developers to create content that

⁵ <http://www.mo3t.org/en/index.php>

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 NetFlix (Guiry *et al.*, 2012). As a consequence, the latest e-readers and tablets are offering links with all the main social networks.

Level 5: Infrastructures and networks: the role played by connection to consumers

In the 2000s publishers started to sell digital versions of their books on-line. Furthermore, in the year 2000 new on-line bookstores were created for selling only e-books: some representative examples are Mobipocket, or Numilog. The control of such technological distribution platforms turns to be a competitive resource in order to control the relations with customers but it also calls for heavy investments and distinctive skills. Accordingly, some publishers preferred, like Hachette did, to acquire existing companies (namely Numilog) rather than developing these investments and skills by themselves.

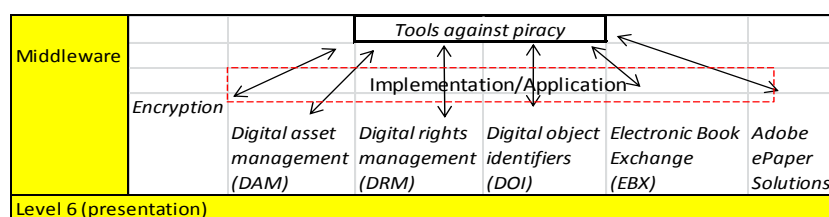


The success of Amazon demonstrated that the online retailers are best placed to draw the consequences of new forms of relationships between edited contents and consumers. Book publishers (in a broad sense) used to manage this kind of relationships especially when the firms were integrated vertical firms: digitization shifted the process. Amazon introduced his Kindle e-reader dealing directly with customers. Besides, Amazon, created in 1995, can be considered the first mover in the e-book market, because it first introduced the business model, and secured its time advantage by making a significant part of its business model proprietary. Later, in 1997, Barnes&Noble, the leading US bookseller, entered the world of e-commerce thanks to the launch of the website AmericaOnLine beginning a fierce price war

with Amazon (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). Amazon created a new way of buying books and distributing books. The ordered e-books are delivered to Kindle through Amazon's integrated Whisprnet mobile data connection (Park *et al.*, 2010). A feature 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 in order to foster its vertically integrated, proprietary system. This complex ecosystem, made of incumbents and newcomers, is similar in the illustrative case of France. Internet sales of books in recent years have been led by different key actors: firstly Amazon, then four additional main players coming from the publishing sector - one international and three national players - (Fnac.com, Alapage, BOL.fr and Chapitre.com), and lastly digital aggregators like Numilog, Cyberlibris, Feedbooks, TEA-ebook that play the role of distributors (Patino, 2008).

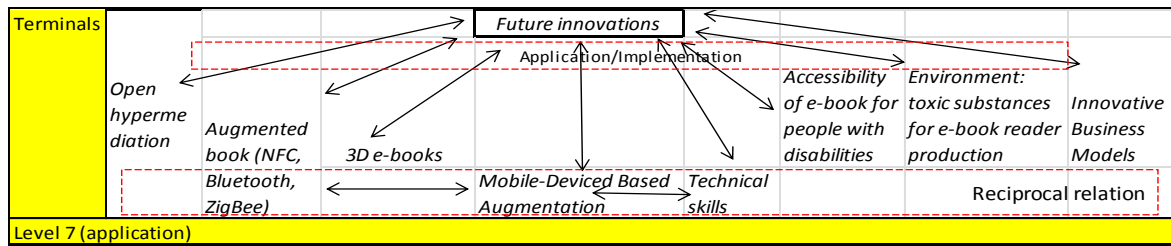
Furthermore, connection to consumers can nowadays benefit from the introduction of print-on-demand (POD), where books are printed only on demand from readers. From technological commodities, books became micro-technological innovations, meaning the result of wholesale mechanization of printing (Howard, 2009).

Level 6: Middleware: economic structuring and piracy concerns



Piracy is one of the main problems faced by the digital revolution (De Prato, Simon, 2014). Actually, it turns to be a key issue for the technological development supported in Level 6. Tools like encryption, digital asset management (DAM), digital rights management (DRM), and digital object identifiers (DOI), are helping publishers to find a suitable solution (Carreiro, 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).

Level 7: Terminals and users: technical interface and ergonomy



The seventh layer is mainly compelled to the structuring of various users' interface. As an illustration, an interesting activity in progress 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 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.

3. CRITICAL FINDINGS FROM THE SURVEY RESULTS AND DISCUSSION

The e-book development demonstrates the pervasiveness of ICTs in the publishing value chain and it portrays an undetermined model. E-books contribute to design a new digital ecosystem calling for huge - and unused - investments of publishing houses in order to support the appropriation of new technical skills, to outline support interoperability between various devices and standards, to build specialized software expertise in order to publish electronic books, and to learn new methods of digital marketing adapted to the new distribution channels. R&D and innovation are leading this evolutionary process but publishers are not well aware of this. The original cartography we outline demonstrates that each technical layer is supporting specific strategic perspectives. As a consequence, publishers have even more difficulty perceiving the evolution of their environment and their strategy is focused more on mimicking their traditional competitors and maintaining their secular place in the book value chain: they follow the market needs without playing an effective role of leaders. This section will critically discuss the findings of our analysis. A first part will debate on the results coming from the cartography: the content of the OSI layers and the results arising from the direct interviews will be critically discussed in the light of the positioning of R&D and innovation technologies in the book publishing industry value chain.

Afterwards, a second part will specifically deal on the actual publishers' strategy with some insights about future consequences.

3.1 Where R&D takes place in the book publishing sector? Some reflections arising from the cartography and the interview results

The reconstruction of the innovation paths of the publishing sector and the mapping of all the specific phases of the R&D according to the various technological layers enable to refine and complete these broad considerations underlining the following 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 (*Levels 2-3*). But, in recent years the e-readers have followed one another and the market is still open: actually, a reference and standard model of digital reading support does not exist. In this context, publishers are investing on skills development for adapting their strategy to the e-book market needs: the French publishers interviewed highlighted that specific courses for acquiring competences are attended by internal staff. Furthermore, several platforms (*Level 4*) appeared on the market (Benghozi, Salvador, 2014): these platforms are established in the form of a consortium among several publishers or they are managed by external actors playing the role of intermediaries: this was confirmed by the interviews of distributors and diffusors. What is still missing is a real publishers' 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 results arising from the interviews with publishers, technology professionals and representative actors in the book industry highlighted that French publishers are using the several platforms and enterprises appeared on the market in recent years for distributing books through the Internet. They are also clients of societies that offer assistance in building standard formats like e-pub (*Levels 2-3*), they adopt tools like DRM or electronic watermark, 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 6*). They are not facing piracy through an effective solution. All this is happening through an imitation process among publishers rather than through an emulation process (Hannan, Freeman, 1984, 1989; DiMaggio, Powell, 1983). This is also due to the heterogeneity of techniques and supply of e-readers, tablets and PDAs (*Levels 2-3*): a French publisher argued that this heterogeneity is

seen like a “*nightmare*” and publishers 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 link with social networks (*Level 4*), an application with I-Phone and I-Pad, a presence on all the main diffusion platforms. But publishers are not giving the same importance to the establishment 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. This means that the actual editorial strategy is focused more on maintaining the secular place and role of the publishers in the book value chain through an adaptation-imitation process rather than updating their role and functions to the new emerging, instable environment and changing cultural habits. This raises questions about the durability of this fragile system and about who is taking the leadership role. R&D and innovation are somehow leading this evolutionary process but publishers are not really well aware of this aspect as they seem not to have the willingness to build a model for using effectively and efficiently these innovations. One of the key points resulting from the interviews with publishers and technology professionals was linked to technological standards (*Levels 2-3*): 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 publishers are depending on these societies while others have invested in staff training in order to be updated with the impact of new technologies. Electronic publishing has resulted in a proliferation of formats for e-books (PDF, ePUB, streaming... as well as the introduction of printing on demand (POD), (Cercione, 2009). In technology-based industries the use of technical standards from the perspective of differentiation strategies and competition is a well-known phenomenon. Unlike the areas where technologies are more rudimentary and less easily appropriated by an individual player, in the digital based sectors, technology does shape the strategies of economic actors and gives its full importance to standards. They are not depending from publishers but they have established themselves internationally, either through consortia or dominant firms (cf. EPUB2). Notwithstanding, the results of the interviews revealed that publishers are willing to maintain their secular place in the digital market: to this aim they are focusing on “*trust*” building in the relationship with distributors (*Level 5*). The latter 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 4*). It is interesting to highlight the emergence of a new strategy of building relationships with consumers-readers: the way of buying books is now personalised and readers are followed *after* having bought a book through their active involvement and interactions on the social networks. 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). The relationship between publishers and Internet advertising for books (*Level 5*) is another key confirmation of our assumptions. The face-to-face interviews confirmed that publishers 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. Notwithstanding, Internet is considered an effective tool for buying books. As a consequence, all the publishers are forced to have their own Internet website at least 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 are methods in competition with sales in bookshops. As highlighted by most of the French publishers interviewed, the evolution towards collaboration with social networks like Facebook and Twitter is a means for knowing better readers' needs and habits and providing innovative reading experiences. The sub-sectors related to the youth generation, like comics, are attracting most of the interest of many publishers, because young generations are more used to read on tablet and e-reader screens than on printed paper.

One of the main problems raised by the emerging role of dominant actors like Amazon and Fnac (*Level 5*) is that hardware sales are combined with content delivery. This business model has been proven to be successful in other major content markets such as music and software. Actually, such platform helps to cope with the flood of content actually available and thus influences the readers' choice. As argued by a French publisher during a direct interview, the suggestions coming from the experience of a physical bookseller cannot be replaced by the prescription of books on the main window of a digital platform. 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 (Miller, 2013; Guiry *et al.*, 2012). Consequently, at the beginning publishers refused to give book files to actors like Amazon; nonetheless, they were later obliged to provide these files losing the power and the full control of the distribution channel. Anyhow, as confirmed by the technology professionals

interviewed, the publishers' attitude towards these emerging giants is not proactive: a general lack of active initiatives and global programmes for counteracting these actors emerged. In this context the effective role played by publishers is not emerging as a pivotal influence.

3.2 The actual publishers' strategy

The printed book benefited from the stability of a secular model, while the e-book has not yet a reference and shared model. From a simple document, like a PDF file, downloadable on a computer and supported by a shared infrastructure, the evolution of the e-book led to a specific (proprietary) ecosystem. This autonomy acquisition has been determined by the technological evolution of software as well as of hardware. In particular, the evolution of e-readers towards lighter and more compact models determined the creation of autonomous systems. It is possible to observe an internal growth through an enlargement of functions and services offered by e-readers in a perspective of continuity, development and enrichment of reading functions: quality of images, animation, video, solutions for underlining and adding notes, are just some examples of the improvements and functionalities that are enabling to go beyond the capacities of a printed book. One may hypothesize that, given the unlimited possibilities of innovations in business models and organizations, the ICTs will prevent from having a reference and shared model. Furthermore, the book publishing industry is characterized by the willingness to retain a position of control regarding the rates of technological change, as recently highlighted by Oiestad and Bugge (2014) in an analysis of the Norwegian publishing industry. Ronte (2001) argues that the technology is changing the rules of the game: it is creating an incremental value through a redistribution chain and a new value sharing inside the system. Gueguen (2009; 2010) highlighted the importance of business ecosystems arising in the field of information technologies because of the key role of standards. As a consequence, given the aim of promoting technological standards and taking into account the diffusion of interoperability of standards, collective strategies, alliances, coevolution and cooperation arise. In the particular field of CIs, the impact of ICT may be defined as "hidden" (see *infra*): as highlighted by our survey results, innovation in the CIs depends more and more on technologies and standards that are "external" to these industries. As a consequence, the actors in the CIs' sectors need to be integrated into existing business ecosystems in order to survive and grow, but it is not possible to identify who has the leadership power within these ecosystems because of the hidden aspect. In other words, it

seems that the R&D skills are the way for some external actors to increase their market power over the traditional players of the CIs: these recent new comers have good chances of reaching soon a position of business ecosystem's leader. Nonetheless, given the recent emergence of this technology revolution in the book publishing sector, the debate about who will be the winning leader is still open.

R&D is carried out by creative companies without corresponding formally to effective R&D activities. The content, the design, the process and the artistic improvements are the key innovations - not officially defined as R&D - and they are considered more important than technological innovations. Elaborated by Green *et al.* (2007) and by Miles and Green (2008), the concept of hidden innovation (not-R&D-based innovations) clearly explains this perspective. It refers to the fact that a significant group of firms develop innovations spontaneously and with creativity, without performing formal R&D activities: for example, Barge-Gil *et al.* (2011) explored the role played by non-R&D activities that can, anyway, lead to innovation, meaning technology forecasting, design, use of advanced technologies and training. They found that non-R&D activities are critical factors in explaining a company's product and process innovations. Our analysis aimed at filling this gap in the book publishing sector. Our main result supports the same very idea that innovation in CIs is hidden but in a different sense of the word. While Miles and Green (2008), Green *et al.*, (2007), Brandellero and Kloosterman (2010), Barge-Gil *et al.* (2011) or Cunningham (2013), argue that innovation is hidden because it lies in creative contents, we may add that innovation is hidden, furthermore, because the technological developments in CIs are, in point of fact, concealed and covered. Insiders of the CIs like the book publishing never consider about investing in R&D to develop new technology, they rather think over adopting and adapting themselves to technological innovations developed elsewhere. Moreover, Riot (2013) advanced an additional perspective. While the book publishing sector has always been characterized by incremental innovations arising from large publishers in competition among them, the e-book introduction represents instead a radical innovation and generates the defensive strategy of editorial houses. The resistance of large editorial houses was the culmination of several innovations previously introduced to maintain - thanks to huge investments - the traditional value chain and its concentration of power. While the e-book benefits more the new comers like Amazon and Google, the printed book was seen as a key source of differentiation and control of changes. Consequently, a defensive strategy is

currently put into effect by the French publishing industry in order to gain time for being able to optimally adapt to such a disruptive innovation like the e-book (Riot, 2013). The deep weakness of the book sector is that it has no immediate driver for change (European Commission, 2005): this is the main reason for a focus on cost reduction more than on product innovation. Another argument is given by the absence of effective competencies and technological expertise developed inside the publishers. In short, economic changes in the e-book industry are clearly dominated by the technological strategies: this not only improved performance and productivity but it redefined completely the market designs, the business models, the boundaries and the book industry components.

4. CONCLUSIONS

The e-book diffusion fostered publishers 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 publishers' strategy and new investments. 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 publishers. The business ecosystems' leaders are not still identifiable. Publishers are focusing on some particular aspects and, therefore, could not be able to adopt a global reactive strategy against competitors and incomers. They demonstrate to be unable to select and establish the new dominant design of the digital publishing era (Anderson & Tushman, 1990). Furthermore, they have not been able to build strategic dynamic technological assets (Teece *et al.*, 1997) in order to build competitive advantage in the new publishing playing field. Global editorial projects as well as "effective" business models are still missing even if publishers are well aware of their importance. In conclusion, the actual main problem is linked to the concealed innovation in the publishing sector: absence of investments in technological development focused on an "effective" business model. Publishers are adapting their editorial strategy to the succeeding new digital demand needs and the emerging new technological devices, but they are not leading this evolving process with a convincing and consistent strategy. This raises questions about the durability of this fragile system and about who is taking the leadership role. R&D and innovation are somehow leading this evolutionary process but publishers are not really well aware of this aspect. In this context, the emergence of devices and modes of diffusion of dematerialized products in the book - like in the music - sector are really interesting examples of the way the economy of CIs is particularly disrupted

by R&D results of more technical sectors (readers, MP3, e-books, I-Phone). The price war and technological rivalry among publishers for e-books and for e-readers is led by different mechanisms and economic objectives: increase in revenues and market share for the former, creation of dominant terminals in order to benefit from networks and to impose a standard for the latter. As an example, according to Blasi and Rothlauf (2013), readers buying books from one international e-book retailer “subscribe” to this retailer as their exclusive e-book supplier for the future. The digital revolution of cultural industries is largely a revolution of the intermediation in its various components. New players emerge and offer unprecedented solutions for aggregating and distributing content, designing original terms of marketing and transaction adapted to this new framework (free subscriptions, micro-payments). Therefore, the weight of the technology is also the weight of intermediaries and economic actors supporting and supported by these technologies: Google, Amazon, Apple are representative examples. The ICTs revolution calls therefore for a prompt and effective response at the regulatory level. Gereffi et al. (2005: 98) argued that “*the structure of global value chains depends critically upon three variables: the complexity of transactions, the ability to codify transactions, and the capabilities in the supply-base*”. Technology may play a determinant role in this process, but also the effectiveness of the involved actors in adopting standards and responding to technological advances with a convincing strategy is another key aspect. Confronted to the traditional cultural sectors, the difficulty at stake is that in the digital economy of creative and information contents is particularly noticeable that there is not a single general business model, but several models coexist. Facing the e-book revolution, governments are indeed led to think about industrial policies and not just cultural policies. More precisely, they should be fostered to think and develop their action from an industrial reasoning and not just from a cultural objective or dissemination perspective.

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