Technical Foresight Report
Future Media Distribution

Magnus Boman

Executive Summary

This report aims to identify trends, challenges, and recommendations pertaining to Future Media Distribution. It assists in exposing future themes with high innovation and business potential based on a timeframe chiefly 3-5 years ahead, with some themes in imminent transformation and with an immediate urgency, and others having an outreach as far into the future as 2030. A case-based approach is taken, arguments and opinions stated being rooted in future media *music* distribution, a natural choice of application case, as the author has 30 years and counting of experience of acting as an entrepreneur in music performance, production, and distribution. The research effort on which arguments and opinions are grounded is wider, however. The carrier project was about supporting the European portal for digital culture, Europeana, sporting 3D images and other advanced modalities. Because media distribution is global and to some extent a borderless phenomenon, the object under study is international and hence the lessons learnt are too. That said, the business intelligence and strategic information perspective is charted with EIT ICT Labs as its point of origin for future applications and value generation. The overall purpose is to create a common outlook within the KIC on the future of media distribution, and to establish a nuanced and informed view across its nodes and partner organisations.

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Contributors

This report was written by **Magnus Boman** (SICS), but for some material credit is due to other foresighters, researchers, developers, and innovators. In particular, internal expert **Michal Dunaj** (Deutsche Telekom) directly contributed to this report. Important technical assistance was provided by external expert **Ulf Essler** (Innovationsinstitutet). The carrier project chapter benefited from extensive quotes from the carrier project Description of Work and other project reports, many of which are available from the ASSETS project portal at www.assets4europeana.eu. At LTU, **Kåre Synnes** lead the bottom-up innovation radar activity in NSFM in 2012. He has in this role contributed to this report in several ways.

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1   Introduction

1.1 Context

This Foresight Technical Report is part of the EIT ICT Labs foresighting and business intelligence activities, synchronised by the Innovation Radar, within the Networking Solutions for Future Media Action Line.

1.2 Methodology and Disposition

This report is a relatively subjective affair with a case study (Section 2) on issues close to my heart and personal experience, and a literature study (Section 3). The approach has been participatory in these elements, making full use of the Internet in concordance with modern methodology for futures research, recognising its non-linearity [6]. The case study represents inductive research, and it is entirely empirical in nature. The generalisation from music to other media is also inductive, part empirical and part conceptual. The literature study represents deductive research. The items on the list of lessons learnt from the carrier project (Section 4) augment the lessons learnt from the case and literature studies, resulting in an amalgamated list, as presented in the concluding analysis (Section 5).

This report represents a static snapshot of business intelligence at the end of the year 2012. In parallel, many KIC-, company- and institute-internal activities are progressing, and the Innovation Radar is monitoring and sharing many of the results from these activities. An important complement to this static report is therefore the dynamic reporting continuously made available through the Innovation Radar. The internal business process employed by the catalyst considers the dynamic reporting to be of at least equal value to the static reporting. Moreover, the participatory nature of the exercises within the KIC has led to a considerable amount of knowledge sharing and expertise building, which in itself has considerable value to EIT ICT Labs.

2   Case Study

2.1 Background

In 1982, I founded two companies; a record company, and a music publishing house. Throughout my career in academia, entrepreneurship, industrial R&D, and business intelligence, I have never lost sight of the music industry. On the contrary, my engagement in the industry as a producer, promotor, writer, curator, publisher, and performing artist has acted as a counterweight to the often theoretical world of research. What became true to Web developers at the end of the 1990s, namely that the Web offered an instant market response to all products and services on offer, had been true in music for decades by then. Put an artist on stage and charge people at the door, wait to see the audience show up, and count the heads and hopefully the revenue. Put a record out and see how many people buy it. Instant quantitative judgment: willingness-to-pay for a clear-cut product. Naturally, with the advent of digital distribution and increased throughput and ubiquity of media players, the step from idea and theory to product and practice has shortened the length of the loop considerably.

In the present case study, I will draw heavily on my own experiences as producer, prosumer, and consumer of music. The longevity of my experience makes the case study longitudal in a sense, and the literature study in the next section will elucidate this aspect. Naturally, this case study is biased and full of subjective views, but the important conclusions drawn are largely independent from the particulars, and so I hope the benefits of my hard-earned experience outweighs the drawbacks of myopia.

2.2 From Analogue to Digital Representations of Music

Just as mail became email and the typewriter turned into a word processor, much of music went from analogue to digital representation, about thirty years ago. Digital formats did in the case of music distribution allow for more compact physical formats. Remember that CD stands for Compact Disc, a brilliant invention by Philips, but actually not all that compact. The CD came with all the hype of its predecessors; like the vinyl LP, it was said to be non-breakable, scratch proof, audiophile quality, and forever durable. As with its predecessors, the hype was just that: hyperbole. Granted, in a comparison to vinyl, the 80 minutes or so that can be put onto a CD would have to be compared to a double LP, and in this case only the jewel box thickness of the CD loses out to vinyl: the CD being lighter, smaller, and less fragile. These properties, in turn, led to it being easier and cheaper to freight and hence to distribute. But most vinyl albums are not doubles, but single albums, with a playing time typically between 30 and 50 minutes only, so CDs often sport bonus tracks. An album could have single A- and B-sides, outtakes, demos, live recordings, or even material rescued from the actual waste bins at recording studios.

In virtually all these cases, the recording artists or producers were not consulted. I will return to what this means to the product, and how it is received, below. In the most recent decade, full re-recordings of original albums, or remixes/remasters, have sometimes accompanied the original albums. In such cases, the artists usually cooperate, but most reworkings are made without the participation or even consent of *all* original participants. The typical recording contract allows for licensing, often meaning that the consent of *one* original participant is enough to secure a reissue or a reworking.

The compactness of the CD were originally hampered by the jewel box, and amazingly enough, these plastic casings with all their negative properties (e.g., breaking easily, taking up unnecessary space, oil-based production of the plastic) are today still on the market.[1] After much complaining from stores and their customers about the jewel boxes, new formats were considered. More environmentally-friendly plastic-free casings were invented, usually made of cardboard. The fact that some people missed the original vinyls made a so-called replica format popular, which is still available in Japan, where the CD packaging is a near-perfect replica of the original LP sleeve. Such packaging is expensive, however, and also creates problems in the supply chain where much handling is standardised around the jewel box format.

2.3 Digital Formats

There were, in the 80s and 90s, many other digital formats, some being variants of the analog cassette, such as the digital compact cassette (DCC), the digital audio tape (DAT), and the minidisc. These examples were all on the market for a number of years, and each of them were considered serious alternatives to recordable CDs. But none of them

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[1] Comparing to the 80s, the situation has improved, however. When first marketed, retailers were complaining that CDs were too easy to steal. After the first year or so, many stores removed the discs from the packaging, but then some people stole the CD covers only, and copied someone else's disc (or shared the digital .wav files illegally). Then stores came up with plastic cases that would hold the CDs, and these cases would be unlocked and removed upon purchase. This prevented theft, but also took up considerably more space in the stores, and made browsing titles more difficult. In the U.S., the so-called long box was popular for a few years. A long box was a carton the height of a vinyl album and the width of a CD. This allowed for a better display in shops. This latter point was important from a marketing perspective, because customers were complaining from the outset that CD covers were too small for the artwork to be displayed properly; many customers were used to the near square-meter size of a vinyl album, which in some cases had inserts, printed inner bags, and even larger posters. With the long box, we had the CD itself housed inside an oversized jewel box, the jewel box often wrapped in cellophane to seal the product. This package was put into the long box, again oversized, so that the jewel box only took up about one third of the whole space available. The long box was then put into a plastic holder, as explained above, in the store. So, even if the disc itself was compact, the distributed physical format did not always compare favourably to vinyl, its predecessor. And I abstain from comparing it to the cassette tape, which could easily fit 80 minutes into a physical format of comparable weight and size, albeit with less fidelity.

lasted, and even in professional digital studios, hard disks have completely taken over the role of storing music digitally. To the end consumer today, downloads is the alternative to the CD when it comes to storing your digital music locally. If streaming is enough, there is a vast array of subscription services that gives you access to huge databases of digitally stored music. You can also customise with respect to playlists and favourites, and there is often a social media connection so that you can share those playlists and get feedback on them from friends. The digitisation of content, and the cheap and reliable storage solutions made available in recent years, have lowered the barriers to entry, and customisation and personalisation has as a result become an added value offer to end consumers. Subscription services also allow for new business models in branding and advertising, e.g., letting a company that sells energy drinks promote their brand through playlists tailored for special events (such as extreme sport events). The artists on those playlists may be sponsored by, or in other ways affiliated with, the energy drink company, and so the promotion of them is amalgamated with the promotion of the other company products. This important new trend is called content marketing.

Figure 1 shows sales of music in various formats over the last 30 years. The first thing to note is that the CD format is disappearing, and that its adoption period will most likely in the end prove to be shorter than that of vinyl. Second is that downloads have just recently surpassed CDs in sales.[2] The third thing to note is the enormous profits that were being made off CDs in its heyday a decade or so ago. Since the distribution of sales were fat-tailed, a small number of large sellers accounted for the vast majority of sales. Such CD titles were manufactured in tens of millions of copies, pushing the per unit cost to less than a tenth of the cost of a title selling only in the thousands. Hence, industry profits from their biggest sellers were phenomenal, and the same industry is expecting marginal costs to be pushed down also for downloads, where the unit cost and the cost for distribution are relatively small already from the outset. The cost of storage and distribution of digital content does not grow linearly, however, and it is simpler to store and manage fewer titles. In addition, digital downloads are often paid for per song. To get some indication of individual song download figures, the Nielsen SoundScan data cites the top three as having 6.8, 5.8, and 5.6 million downloads, respectively [3].

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[2] To complement Figure 1, Nielsen SoundScan, a subscription service for measuring sales sampled from 14,000 outlets, registered a growth in vinyl sales for the sixth consecutive year in their U.S. sales estimates. The numbers of LPs sold in 2012 is estimated to 4.7 million (1.5% of total U.S. album sales), to be compared to CD sales and downloads sharing the rest (in about 60/40 proportion). Digital downloads gained 15.3% in the first three quarters of 2012 compared to the year before.
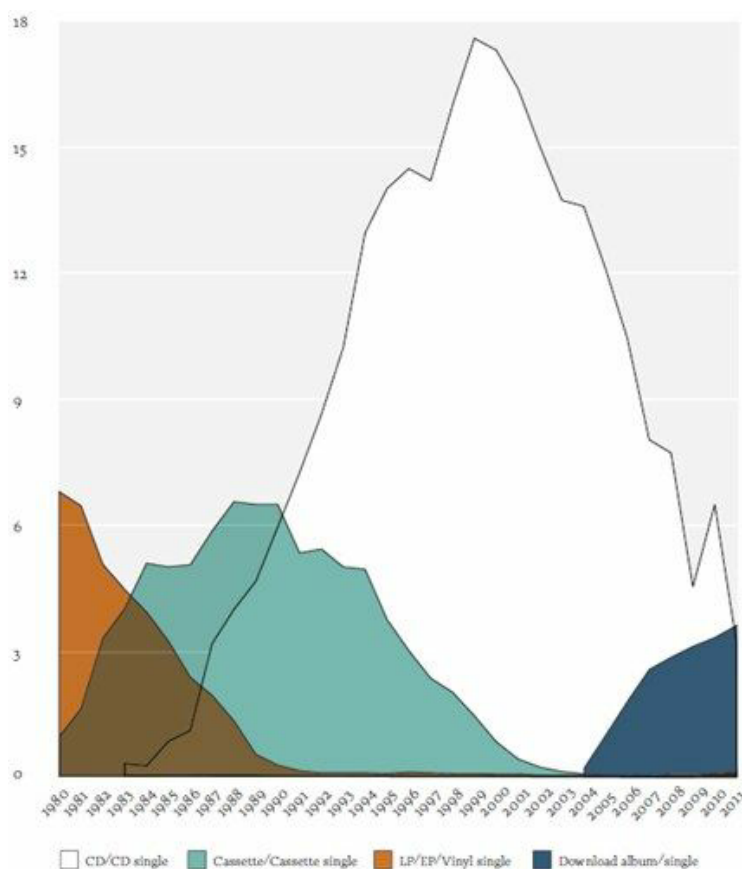
Figure 1: Sales of music by format, 1980-2011, in billions of sold units.
Data from the RIAA. Figure source: [8].

2.4 Music Distribution Business Models

The final thing to note about Figure 1 is that digital downloads overtaking CDs signals an end to the old family of business models, as employed by the music industry until recently. Going back to the definitions of disruptive developments, recall that a disruptive driver is one that has the potential to bring new competition to a leader or near-leader market position. A disruptive driver of change, in this case the switch from the CD to the download, affects the industry structure as well as the value chain. In the 2011 EIT ICT Labs Foresight Study on Future Media and Content Delivery [14], we described a situation were some decision on changes to music business models were made by the artists: "In music, some of the biggest acts have chosen their own path to marketing, distribution, and sales. Radiohead, for example, broke with EMI to release music in a way that let legal downloaders pay what they felt the digital files were worth. This clever way made explicit the economic notion of willingness-to-pay, and their 2007 album In Rainbows ended up selling more than three million copies" (p.5). Byrne ([8]: 220) has analysed the prevalent models for music distribution into six categories, listed in the order of artist control (from least to most):

1. 360° deal
2. Standard royalty deal
3. License
4. Profit share
5. Production and Distribution (P&D) deal
6. Self-distribution

The first category is equity deals, where an artist (usually a superstar, Jay-Z being an example) signs off a major piece of every form of revenue for a long time into the future, against a large upfront sum from a, such as Live Nation Worldwide, Inc, in the case of Jay-Z. The ambitions of that company to be a market leader is obvious from their own marketing material [7]:

> "Live Nation Entertainment is the world's leading live entertainment and eCommerce company, comprised of four market leaders: Ticketmaster.com, Live Nation Concerts, Front Line Management Group and Live Nation Network. Ticketmaster.com is the global event ticketing leader and one of the world's top five eCommerce sites, with over 26 million monthly unique visitors. Live Nation Concerts produces over 20,000 shows annually for more than 2,000 artists globally. Front Line is the world's top artist management company, representing over 250 artists. These businesses power Live Nation Network, the leading provider of entertainment marketing solutions, enabling over 800 advertisers to tap into the 200 million consumers Live Nation delivers annually through its live event and digital platforms."

Byrne [8] describes the preferred industry perspective (p.221-2):

> "All the major labels these days tend to want to sign artists to 360° deals. The question is whether the deal is 'passive' or 'active.' In a passive deal, the label skims off some percentage of sales from the licensing income but isn't inovloved in an artist's business in other ways. As long as the label gets their money when they come around asking, they won't be telling the artist how to run her career. Labels, however, tend to prefer an 'active' deal. For example, since all the majors have affiliated publishing divisions, they solicit interest in the artist from them and the publishers, then make a separate offer to the songwriters alongside the record deal."

The second category is the traditional deal, where the artist is linked to a record company. The latter pays for all costs and the former gets paid royalty from sales (and also standardised fees from radio play, and other forms of public performance). Unlike the 360° deal, the standard royalty deal has been offered to almost all artists over many decades now. I have myself signed such deals as an artist, with labels all over the range from smallest record company to Warner (which incidentally also had Byrne on such a deal around the same time). Like most not very successful artists, I have never received any royalty payments. This is usually explained by the record company as a case where costs must first be covered before any royalties are paid out. I also found my recorded music in various

contexts, such as a national TV broadcast children's show, and a theatre production, without my permission. This was explained by the record label owning the copyright to my recordings. In the standard deal in this second category, the artist is only asked for permission in certain cases, e.g., if the music is to be used in an advertisement or to be recorded by another artist.

In the third category deal, the artist retains this copyright. The record label licenses the recording for a limited time only, seven years in the standard contract. After that time, the artist is entitled to all or most of the income. In the first seven years, income is split in a proportion part of the deal. The artist typically comes to the record company with a finished recording, paid for by herself, or by her publishing company, so there are less initial cost to cover by the record company.

In the fourth category deal, all costs and all income are shared between record label and artist, usually 50/50, the "small independent model" [14], decidedly more popular among those smaller labels. These also favour the fifth category, where they pay only for the actual manufacturing and distribution, leaving all copyright control to the artist. Finally, the self-distribution, or DIY, category leaves the artist with all the rights but also all the risks in the music production. It is not unusual also for very successful artists to start in this category, and then 'move up' towards more lucrative deals, giving up some creative control in the process.

2.5 Creative Input in Music

In ICT, we often talk about the user experience of a product or service. We say that should the user not be taken into account early in the design process, the consumer will surely not be happy about its end result and hence refuse to put time or money on the product. Since music is often about design by one or more artists, the creative input is more important to the end product than in ICT. Even if a world class artist makes the cover for the latest Rolling Stones album (they have previously hired Andy Warhol and Stefan Sagmeister, for instance), another famous designer makes the backdrop for the stage performances, and a famous director makes their videos, it all means very little to the listener if they cannot hear Mick Jagger sing and Keith Richards play the guitar. Because so much of music put on the market today is rehashes and remixes of old material, packaging and all other aspects of marketing have come to mean so much for sales that the importance of the creative input and the respect for the artist behind the creative process has been diminished. What is referred to as a mash-up within ICT services has its roots in the remixing and mix-tape culture in music.

A concrete example is the famous case of jazz musician Miles Davis going electric. Towards the end of the 1960s, Davis were inspired by the power of rock festivals drawing audiences of more than 100,000 and witnessed Jimi Hendrix and Bob Dylan (whom had himself gone electric in 1966, much to chagrin of the folk movement he belonged to) and put together a young group of musicians, relatively inexperienced of free jazz

music. Under the direction of producer Teo Macero, Davis went into recording studios and made live recordings with his group, recording hundreds of hours of improvisation. These were then cut down, spliced, edited, mixed, and mastered with Macero in reportedly excruciating studio sessions, and around 1970 more than a dozen albums were issued [10].

When first issued, many of these albums were unfavourably reviewed. This is hardly surprising, given that the creative process was new and from an innovation perspective the process as well as the end product was disruptible. Today, however, all of those albums are considered classics not only of jazz, but of other genres of music, such as funk and progressive, and they have frequently been sampled by hip hop and dance artists. When CBS, Davis's record company, were preparing reissues of this material for CD, they gave it the deluxe treatment, putting out multiple CD packages in lavish packaging with great essays and annotations. While many fans were happy to hear the unedited tapes, Macero famously remarked that they put "all the crap back in". Macero's opinion was an example of how the packaging of the new product based on old material in effect inversed, or re-engineered, the creative process. This was done without the involvement of Davis (who had passed away) or Macero, and so the artists were almost disregarded entirely, even if one of the musicians were paid, at least. In the words of Macero [*ibid.*]:

> "...we made the record and the record became a classic. *In A Silent Way*, I don't know, must have sold a couple of million. I have know [sic] way of knowing. And then just recently Joe Zawinul, the [sic] conned him into using the outtakes! And I said 'Please! If you wanted to use the outtakes, do it in a different format, or give it away as an archival kind of thing, you know, to students. Don't destroy the original record because a lot of work went into that!' But they did manage to put all the crap back in. And I called up Joe Zawinul and really gave him hell for it. I said 'Look it, don't do it but if you're that hungry for the money then do it.' And he did it! I guess he wanted the money. I guess I don't know how much money he got out of it but that was the way I used to do Miles Davis' records. Edit them, put them all together piece by piece by piece. He would walk out of the studios."

Unfortunately, this example of disregard and disrespect for the creative process is typical for the music industry. I have personally witnessed similar chains of events many times, and as long as there are commercial incentives and the record companies have the power to do it, it will keep happening. I can only hope that the creative artists in other parts of the media industry are better protected judicially, or through *de facto* industry policy. A creative programmer or ICT service creator certainly faces those same risks.

3.1 The Book Industry

In the book industry, U.S. publishers are doing extremely well on the electronic publishing side, with $2,1 billion in revenue in 2011, up by more than 3,200 per cent from 2008 [1]. The trend is here that customer willingness-to-pay is decreasing, and that each eBook must think about the added value, as compared to a physical book version. For example, a book about music may have musical snippets inserted at just the right place in the eBook version (as has the here cited [8]), whereas a CD included with the physical book would be less practical. The physical industry has seen several mergers recently, and in America the bankruptcy of Borders, which in 2005 operated 1,329 stores [2], were seen by many as an important signal about where the industry is headed. There is also widespread irritation among consumers concerned with DRM for eBooks, no doubt fuelled by the unsuccessful attempts in the music industry earlier to make copyright control a smooth user experience. This has led to many alternatives for eBook handling that can strip eBooks of DRM, such as Calibre (http://calibre-ebook.com/).

3.2 The Media Industry in General

Like the music business, the power of the media business in general is largely concentrated within a few large companies. On October 30th, 2012, Disney (already the world´s largest media company) bought Lucasfilm for $4 billion, to give one example of the concentration of power in progress. There are also significant bottom-up activity, however, just like in the music industry. On November 13th, TED (a conference, a brand name, and a portal for combining Technology, Entertainment, and Design) celebrated one billion downloads of the talks they have continuously made available since 2006. Run by a non-profit foundation, the TED conference, run once per year in California, has turned into one of the most important places to be for trendspotting, not least for media industry events and launches. I have been attending these conferences since 2008. In a surprising move, TED diluted its own trademark considerably by letting amateur and specialist meetings worldwide use the TED brand for a format called TEDx. A far cry from the elitist conference concept, TEDx has nevertheless turned into an important market player, and is now considered a success also from a management perspective [4].

3.3 Media Distribution Research within the KIC

Corporate foresight is usually referring to objectives "explicitly and functionally related to specific strategic tasks and process" [5], p.335. Hard objectives include:

- supporting strategic decision making
- improving long term planning
- enabling an early warning system for issue management
- improving the innovation process
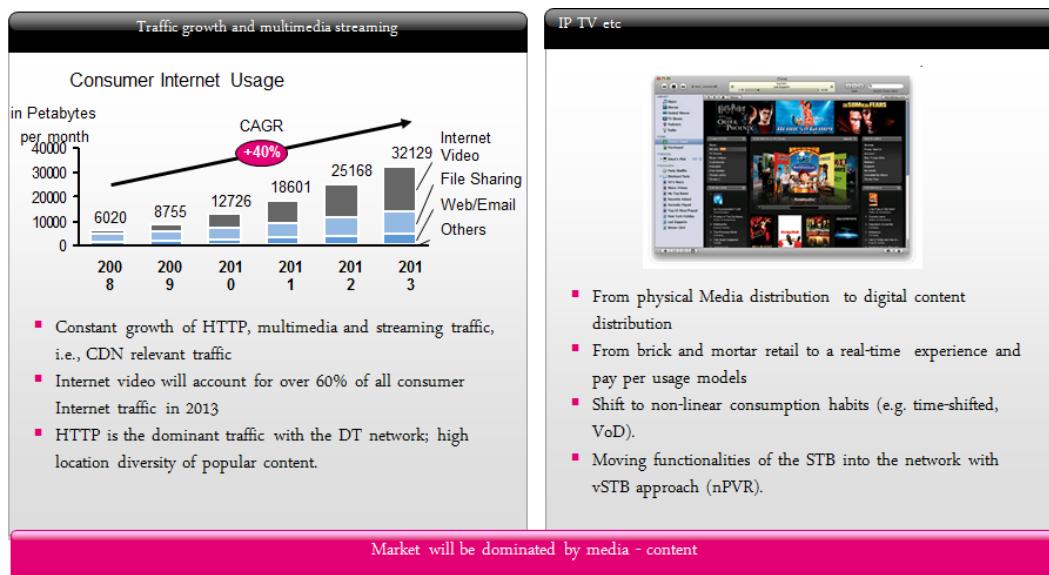- improving the speed in reacting to environmental change.

Figure 2: Market observations from T Labs, noting that media is 'king'. Figure source: Deutsche Telekom.
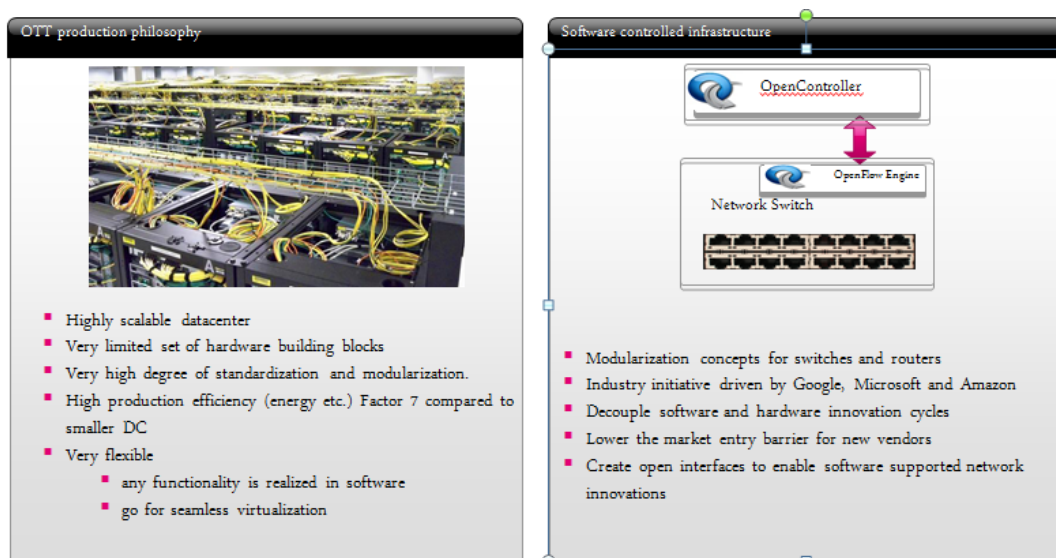

Figure 3: Market observations from T-Labs on Over The Top services. There are economies of scale as well as software control. Figure source: Deutsche Telekom.

Deutsche Telekom is one of the ICT Labs partners that has dealt with foresighting relevant to media distribution within their corporate foresighting activities. Figure 2 and 3 provide examples of analyses brought into the Innovation Radar catalyst, and the annual report has a wealth of material brought in from the technology scouts employed by the company. Figure 3 in particular explains the important new trend of providing Over The Top (OTT) services. An example is Skype, providing phone services over the IP infrastructure.

Figure 4: The music browser prototype, from the Ambient Intelligence project. Figure source: Philips Research.

Philips is running a number of relevant projects, one of which once produced the CD discussed above. One company project is Ambient Intelligence, which has yielded many insights into the future of media distribution. An example is the focus on new prototypes for music browsing (see Figure 4). Ericsson too has massive research efforts put into the future of media distribution, much of which was highlighted in last year's Foresight Study already (see [14] for examples). An example of a current trend for which the interests of Deutsche Telekom and Ericsson meet is interactive high-end media, as explained in Figure ww. Scouts from T-Labs observed no less than nine important technological developments and 40 market developments underlying this trend. Naturally, Siemens has several issues of its Pictures of the Future series devoted to the questions at hand, and many other industrial partners of the KIC also committed resources to corporate foresighting on future media distribution.

recommendation
social
multimedia
cloud
music
entertainment
interaction html5
companion DRM streaming
encryption app subscription
search
security TV ipad publishing Big-Data
rating1 photo events
broadcasting codecs
drm display tv crowdsourcing
touch content
standardization marketing
magazine copyright
guide broadband gaming share
HTML5
mobile
media

- New display technologies enable scenarios, where users can watch different content from different angles, experience haptic feedback, and in general an enhanced user experience.
- New approaches to media streaming come along with the trend, not to necessarily own content anymore.
- DRM features built into HTML5 make web-based content more attractive for both, providers and users.
- New codecs ensure keeping pace with the increasing demand for high-quality video content delivered in high speed.
- New services mainly include solutions for mobile broadcasting, publishing, companion devices for social video, streaming, gaming, and security for cloud-based media.

Examples of related T-Labs activities

'Interactive Hybrid TV' addresses new modes of Future TV regarding the different user habits and needs ('Tryptichon') as well as innovative applications that enable access to information, social networks, education and entertaining purposes through smart TV environments.
Contact: Ulrich.Staiger@telekom.de

'TV Apps' seeks solutions for opening the current IPTV service delivery infrastructure, in order to create an open environment especially for 3rd parties to implement and deploy CE-HTML based TV apps within the T-Home Entertain service offering.
Contact: Randolph.Nikutta@telekom.de

Figure 5: Market and technology observations from T-Labs on interactive high-end media. Figure source: Deutsche Telekom.

4   Carrier Project

The carrier project *Advanced Search Services and Enhanced Technological Solutions for the European Digital Library (ASSETS)* was a two-year best-practice network, and came to an end in 2012. The aim was to improve the usability of Europeana (the European Digital Library platform, see www.europeana.eu) by developing, implementing and deploying large-scale services focusing on search, browsing, and interfaces.

The European-wide coverage of the ASSETS consortium included 24 partners from ten European countries (Italy, Austria, Spain, Netherlands, Greece, France, Germany, Cyprus, Luxembourg, and Sweden) and one partner from Japan, and had a multi-disciplinary dimension. The project included all significant stakeholders in the cultural heritage value chain: cultural institutions, research organisations, ICT developers, content providers, and last but not least the users of Europeana. The strong involvement of the EDL Foundation partner, responsible for the overall strategy and policy for Europeana, enabled effective and broad networking activities, aimed at raising awareness and further promoting the adoption of the recommendations envisaged within the ASSETS project. Moreover the UNESCO participation in the project guaranteed a worldwide coverage related to both content provision and engagement of potential adopters of the ASSETS services, and consequently to Europeana.

The project completed the deployment of digital libraries and a set of coupled services by adopting a user-centred methodology, in which the targeted user groups were directly involved in requirements analysis, design, large-scale implementation, testing, and evaluation. Service development and employment resulted in a vast array of experiences on how to synchronise the efforts of a large R&D team with the massive data volumes, provided by a large number of content providers. The services developed address:

- searching multimedia objects based on metadata and on content similarity;
- ranking algorithms for improved result display;
- browsing multimedia objects for rapid navigation through semantic cross-links;
- developing interfaces tailored for interacting with multimedia objects;

- planning long-term access to digital information;
- ingesting metadata requiring normalisation, cleaning, knowledge extraction, and mapping to a common structure.

Among the lessons learnt from ASSETS with respect to future media distribution are the following:

1. The concept of Web portal is not dead.

    In spite of the failures at the end of the 1990s to gather B2B and B2C Web commercial services (with local search engines) in portals, the concept lives on in the form of thematic portions of very large data. In the case of Europeana, much-accessed content themes include one for WW1 (1914-1918 collection of items and memoriabilia), for instance. Europeana itself can also be seen as a portal, with ASSETS providing new means to access multimedia content.

2. State-of-the-art digiculture requires new means to increased interoperability.

    The ASSETS project resulted in a set of recommendations, guidelines, and best practices concerning the technology adaptation and service roll-out. The massive data (including video and 3D-images) made available by content providers presented ASSETS and Europeana developers with harsh requirements on interoperability and adhering to existing standards.

3. To the user, efficient and deep search is very important.

    Search based on metadata as well as content was implemented in ASSETS. Semantic browsing gave users a more intelligent interface towards the massive digiculture data sets at hand.

5	Analysis

5.1 Challenges

Drivers of change are subjected to three kinds of uncertainty [11]:

1. state uncertainty,
2. effect uncertainty, and
3. response uncertainty.

The first pertains to the likely evolution of the driver, and its underlying probabilities. The second pertains to the impact of the change. The third pertains to the options available to a firm trying to utilise the effects of the driver, namely to either invest in it or to build strategic options [13]. A disruptive driver is one that has the potential to bring new competition to a leader or near-leader market position. A disruptive driver of change affects the industry structure as well as the value chain. One example of how the activities of the Innovation Radar can be used to identify and select one of the two options available to EIT ICT Labs (for the partners to invest now, or to build strategic options now for possible investment later) is to use scenario analyses. Another example would be technology roadmapping [12]. Because the future of media distribution has a history of being hard to predict and not without distracting hype cycles, strategic foresight in general and corporate foresight in particular proves a hard challenge.

5.2 Trends

The following trends are hereby identified and named, in the light of the case study, the literature study, and the sweep of KIC-internal competence and investment.

5.2.1 WebRTC

High quality Real-Time Communications (RTC) applications may now be developed in the browser via simple Javascript APIs and HTML5. An open and free initiative, supported by Google, Mozilla, and Opera, WebRTC was released for Chrome in November, 2012. This release is already affecting Web and app developers in their choice between HTML5 and going native. The effects of such deployment should be measurable already at the beginning of 2013. Because the browser is now available to the user on so many devices, and because notification services is keeping the user abreast with relevant professional and private information, the step to peer-to-peer communication and cooperation through the browser just got shorter. This may also assist in re-introducing portals of new kinds, as was hinted at in the carrier project description above. Moreover, WebRTC is presenting a new kind of operability, addressing the requirements elicited in the ASSETS project. Music, literature, films, and the fine arts in general will surely benefit from WebRTC, starting now.

5.2.2 OTT

Over The Top (OTT) content means broadband delivery without ISP involvement in the control or distribution of the content itself. Third party providers sell audio and video to end-user devices (PC, tablet, smart phone, set-top box, PlayStation, Wii, Xbox,...) directly, leaving the ISP responsible only for transporting IP packets. Figure 3 above gives a quick overview of key observations here.

5.2.3 CM and the Digitisation of Everything

Content Marketing (CM) is a new industrial marketing practice that purportedly builds bridges between brands and customers. Its track record is not yet proven. Branded and digitised content is produced and made available to customers, in a personalised and customised fashion. Commercial brand and reputation building is achieved via sharing of rich content between customers. The above trend on WebRTC is related to such sharing.

Also related is the notion of a future in which everything is digitised. Companies today need a digital strategy. Moreover, the business or operating model of a company has an innovation component that should relate closely to the digital strategy. Part of a digital strategy can be to provide content directly to users of a particular medium, such as music. This makes an energy drinks company not only a sponsor of an event, but perhaps a provider of music via a portal. The company can also enter into (at least) any of the first three kinds of artist deals, listed under business models in the case study.

5.2.4 Interactive High-End Media

This is essentially Global high-quality free viewpoint media, featuring an open platform with identity management. Pertaining to future TV and media infrastructure, cf. Figure 2 above. One example of a technological observation underlying this trend has to do with compression (Figure 6). A new VCEG/MPEG standardization initiative, High Efficiency Video Coding (HEVC)/H265 is aimed at significantly better compression enabled by using brute force computing cycles to enable more complex encoding. Though less complex, the decoding scheme, for receiving devices, also will need more computing power, which can be handled by the increasing processor power found in newer devices. Next generation MPEG encodes video at lower bit rates; 35-40 per cent more efficient than H.264, offering more immersive video experiences to a broad range of devices without incremental bandwidth consumption.
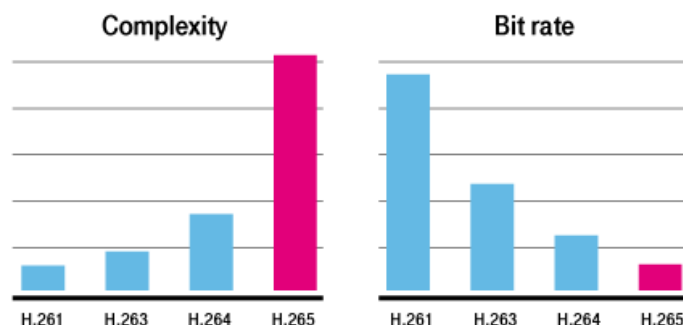
Figure 6: Complexity vs. compression rate in an analysis from T-Labs company scouts. Source: Radvision.

The trend observations here include the following.

- New display technologies enable scenarios, where users can watch different content from different angles, experience haptic feedback, and in general an enhanced user experience.
- New approaches to media streaming come along with the trend, not to necessarily own content anymore.
- DRM features built into HTML5 make web-based content more attractive for both, providers and users.
- New codecs ensure keeping pace with the increasing demand for high-quality video content delivered in high speed.
- New services mainly include solutions for mobile broadcasting, publishing, companion devices for social video, streaming, gaming, and security for cloud-based media.

References

[1]   "Waddling forward: The merger of two big publishers shows the book business's challenges", *The Economist*, November 3rd 2012, p.58. www.economist.com/news/business/21565665-merger-two-big-publishers-shows-book-business%E2%80%99s-challenges-waddling-forward

[2]   Checkler, J and Trachtenberg, J A, "Bookseller Borders begins a new Chapter...11", *Wall Street Journal*, February 17th 2011. online.wsj.com/article/SB10001424052748703373404576147922340434998.html

[3]   Christman, E; Album Sales Slightly Down, Digital LP Sales Up 15% So Far in 2012: SoundScan, Billboard.biz, October 3, 2012. www.billboard.biz/bbbiz/industry/retail/album-sales-slightly-down-digital-lp-sales-1007972162.story#TR3hPqYjck0qlxQR.99

[4]   "Corporate TEDucation: What a nonprofit events group can teach business", *The Economist*, November 3rd 2012, p.59. www.economist.com/news/business/21565677-what-nonprofit-events-group-can-teach-business-corporate-teducation

[5]   Daheim, C and Uerz, G; Corporate foresight in Europe: From trend based logics to open foresight, *Technology Analysis & Strategic Management* **20**(3): 321-336, 2008.

[6]   Gordon, J G, Glenn, J C, and Jakil, A, "Frontiers of futures research: What's next?", *Technological Forecasting & Social Change* **72**: 1064-1069, 2005.

[7]   Live Nation; concerts.livenation.com/h/about_us.html. Last accessed Dec 7, 2012.

[8]   Byrne, D; How Music Works, McSweeney's, San Francisco, 2012.

[9]   "Monetarists anonymous: After a spectacular crash, an online currency makes a surprising comeback", *The Economist*, September 29th 2012, p.73. www.economist.com/node/21563752

[10] Artistshouse; Teo Macero on Working with Dave Brubeck and Miles Davis, Artistshouse interviews, April 2004. www.artistshousemusic.org/videos/teo+macero+on+working+with+dave+brubeck+and+miles+davis

[11] Milliken, F J; Three types of perceived uncertainty about the environment: state, effect, and response uncertainty, *Academy of Management Review* **12**: 133-143, 1987.

[12] Phaal, R, Farrukh, C J P, and Probert, D R; Technology roadmapping: A planning framework for evolution and revolution, *Technological Forecasting & Social Change* **71**: 5-26, 2004.

[13] Vecchiato, R and Roveda, C; Strategic foresight in corporate organizations: Handling the effect and response uncertainty and social drivers of change, *Technological Forecasting & Social Change* **77**: 1527-1539, 2010.

[14] EIT ICT Labs; Future Media and Content Delivery, Foresight Study,
      Innovation Radar, December 2011.

Innovation Radar