NELME – Next Generation Electronic Media Multiproduction and Multicasting Processes, Services, Solutions and Tools

Conclusions

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Conclusions

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Abstract

The Nelme (New Electronic Media) project[1] had a mission to provide justifiable predictions of the most presumable and critical futures of electronic media, more specifically, electronic mass media and, even more specifically, the future of the 'broadcast' as we know it today by the year 2020.

To accomplish this task, a research framework was created to describe relationships and causalities between interdisciplinary trends and issues related to broadcasting and electronic media.

This report supplements the intermediate report by Nelme 2016 Foresight with results of (weak) signal analysis and potential consequences in linear broadcasting, related to the analysis. Internet delivery is seen as a disruptive technology in Christensen's sense. This theory supports the (weak) signal analysis and is used to extrapolate the history of Internet delivery and broadcasting to the future.

As a synthesis of the experiences from the current production, completed by the observations of the Nelme road maps with regard to technology and business development, a new electronic media production concept was outlined.

Two user groups of forerunners (in the broadcasting context) were interviewed and the interviews are reported in this paper. Linear television did not play a significant role for them, and pay-TV channels did not fit into their media use habits and expectations. Broadcasting had an important role in families with children.

Two strategic options were presented for broadcasters:

  A. Staying in legacy broadcasting while also providing services in broadband.

  B. Positioning themselves in broadband and using broadcast as a diversifying asset.

For a broadcaster, B seems to be the safer option. HbbTV is seen as a bridge uniting broadcast and broadband offerings. Furthermore, HbbTV is the only standard that would give the control to broadcasters.

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[1] The two-year project Nelme was launched in October 2010, and it has been funded by the Finnish Broadcasting Company Yle, Anvia Oyj, MTV Oy, Tieto Oyj, Genelec Oy, Jutel Oy, Sofia Digital Oy and Tekes – the Finnish Funding Agency for Technology and Innovation. The research partners in the project are VTT Technical Research Centre of Finland, Helsinki Metropolia University of Applied Sciences and Tampere University of Technology.

Preface

The business environment of electronic media is changing rapidly. Media enterprises are coping with challenges presented by society, technology and the changing use of the medium itself. There is substantial concern not only in the public and commercial media sectors but also among their partners and subcontractors. The Nelme (New Electronic Media) project will provide justifiable predictions on the most presumable and critical futures of electronic media, more specifically, electronic mass media and, even more specifically, the future of the 'broadcast' as we know it today by the year 2020.

To accomplish this task, a research framework was created to describe relationships and causalities between interdisciplinary trends and issues related to broadcasting and electronic media. The framework served not only as a framework for this project but also for studies and strategy planning to come.

The project addressed questions on how electronic media will be produced, the kinds of roles that will be found in content production and the kinds of processes that will dominate it. The aim of the project is to have an impact on the media industry, regulation authorities and policymakers with the project results and, eventually, to help the participants to develop their businesses and plan their R&D efficiently.

The method for predicting the future in the project was influenced by the Delphi method in which the expert group consists of people working on the work packages. The project forecasted the future from 2010 to 2013, from 2013 to 2016 and from 2016 and beyond, by processing Delphi three times, each time in two rounds: the initial and the final round. During the last Delphi period, the focus was on weak signals, giving an indication of how the foresight for 2016 is likely to change in the long term. As a result, foresights and multiple scenarios were generated for the years 2013, 2016 and beyond.

The steering group has been active in guiding the project and giving invaluable feedback throughout it. The steering group members were Atte Jääskeläinen (Yle, Chair), Jorma Kivelä (Jutel), Reino Lähdemäki (Anvia), Harri Maho (Tieto), Aki Mäkivirta (Genelec), Mika Kanerva (Sofia Digital), Teemu Varonen (Tekes) and Jouko Pesonen (Yle, Project Manager). Also Marianne Hynninen (Anvia), Jyri Naarmala (Anvia), Ari Pöyhtäri (Sofia Digital), Erja Ruohomaa, (Yle) and Mika Niilonen (Genelec) participated actively, giving guidance and feedback, while a large number of participants from companies took part in work package activities.

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Terminology

B2B   Business to Business

B2C   Business to Consumer

CDN   Content Delivery Network or Content Distribution Network, a system of computers containing copies of data placed at various nodes of a network. CDN can improve access to the data it caches by increasing access bandwidth and redundancy and reducing access latency.[4]

DRM   Digital Rights Management, a term for access control technologies that are used by hardware manufacturers, publishers, copyright holders and individuals to limit the use of digital content and devices.

DVB   Digital Video Broadcasting. European standard collections for terrestrial (DVB-T, DVB-T2), Mobile (DVB-H), Cable (DVB-C, DVB-C2) and Satellite (DVB-S, DVB-S2) broadcasting and related technologies.

Ecosystem

     A generic term with context-dependent interpretations. In this document, *ecosystem* refers to a device-oriented consortium that has control over, at least, content delivery and owns customer data.

EPG   Electronic Program Guide

HbbTV   Hybrid Broadcast Broadband TV, a definite collection of standards for combining broadcast and broadband services, including interactivity and content.

HD   High Definition, a resolution higher than traditional (standard) television, at least 1280 x 720.

Internet of Things

     Uniquely identifiable and accessible objects connected via the Internet.

IPTV   Internet Protocol Television, refers to IP-based television with a selection limited by the provider (walled garden). In practice, many IPTV implementations are actually hybrid solutions in which only part of the services are delivered over IP, the rest being delivered over broadcast.

IPv6   Internet Protocol version 6, a new version of the Internet Protocol (IP) that is designed to succeed the current Internet Protocol version 4 (IPv4). IPv6 was developed by the Internet Engineering Task Force (IETF) to deal with IPv4 address exhaustion using 128-bit addresses instead of the 32 bits used in IPv4.[4]

MHP   Multimedia Home Platform, interactive platform for digital television. MHP did not become a success as such.

NFC   Near Field Communication. Data exchange means for devices in close proximity.

NGN   Next-Generation Network, a generic term for a packet-based network (such as an IPv6 network) that is able to make use of multiple broadband, Quality of Service-enabled transport technologies and in which service-related functions are independent of the underlying transport-related technologies.[2]

NLP   Natural Language Processing, a field of computer science and linguistics concerned with the interactions between computers and human (natural) languages[4], for instance, speech-to-text conversion, question answering and machine translation.

nPVR   Network Personal Video Recorder, also known as Remote Storage Digital Video Recorder (RS-DVR), is a network-based personal video recorder (PVR) stored at the provider's central location rather than at the consumer's private home.[4]

OIPF   Open IPTV Forum. Aims to enable and accelerate the creation of a mass market for IPTV by defining and publishing free-of-charge, standards-based specifications for end-end IPTV services.[3]

P2P   Peer-to-Peer, a distributed application architecture that partitions tasks or workloads between peers. In P2P content-sharing systems, peers are both suppliers and consumers of content, in contrast to the traditional client-server model in which only servers supply (send) and clients consume (receive).[4]

Progressive download

Progressive download is a term used to describe the transfer of digital media files from a server to a client, typically using the HTTP protocol

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[2] ITU (2004). Definition of next-generation network. Accessed in December 2012 at http://www.itu.int/ITU-T/studygroups/com13/ngn2004/working_definition.html

[3] Open IPTV Forum (2012). About us. Accessed in October 2012 at http://www.oipf.tv/about-us

when initiated from a computer. The consumer may begin playback of the media before the download is complete.[4]

PVR   Personal Video Recorder, a consumer device or application software that records video in a digital format to a mass storage device, such as a hard disk drive. PVR functionality is typically integrated into set-top boxes, but it is increasingly a function of a television set with external storage.[4]

SD   Standard Definition, the resolution of traditional television; it depends on the local television standard, typically 720x576 (Europe) or 640x480 (North America and Japan).

SNS   Social Networking Site, such as Facebook, MySpace and Google+

QoS   Quality of Service, often refers to the content quality management in IP networks.

UGC   User Generated Content

UltraViolet

      A personal digital locker to store rights for content playout. It is an authentication and cloud-based licensing system that allows consumers of digital home entertainment to use streaming and downloaded content on multiple platforms and devices. UltraViolet adheres to a 'buy once, play anywhere' approach that allows users to store digital proof-of-purchases under one account to enable playback of content that is platform- and point-of-sale-agnostic.[5]

VCR   Video Cassette Recorder, such as a VHS recorder

Visual radio

      Visual radio is a generic term for adding visuals to normal audio radio broadcasts. Visual Radio is also a trademark for a Nokia solution for interactive radio with FM radio over a data connection.[4]

Walled garden

      Walled garden refers to a carrier's or service provider's control over applications, content and media on platforms (such as mobile devices) and restriction of convenient access to non-approved applications or content.[4]

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[4] Wikipedia, http://en.wikipedia.org

[5] Digital Entertainment Content Ecosystem (DECE) LLC (2011). UltraViolet. Accessed in December 2012 at http://www.uvvu.com

1.   Summary

In Nelme, clear statements have been requested for the final report. This report will follow this request. *Chapter 5 provides conclusions in a nutshell.*

1.1   Challenges of the electronic media production process

As a synthesis of the experiences from current production, completed by the observations of the Nelme road maps with regard to technology and business development, a new electronic media production concept was outlined. It was labelled the 'integrated production concept' and is characterised by two main features: it is based on a service-oriented business model and it exploits a non-linear and multimodal production process. The new concept is not technology driven but rather service and end-user driven.

According to this concept, electronic media production is organised in a networked manner. Content creation and management is the pivot of the three other critical functions of the process, i.e. planning and processing, publishing, delivery and use, and archiving and access. Another important feature of the concept is that interaction between professional producers and consumers is frequent in all functions of the production.

The integrated production concept was elaborated by accomplishing three concrete production pilots. Pilot 1 adopted a comprehensive view of the production process and developed a proposal for how work processes could be organised in news production. Pilot 2 focused on the means of producing supplementary material automatically. Pilot 3 demonstrated the possibilities of Hbb radio. The review of the results of the pilots made evident that *the generic production concept is a feasible framework* for steering the development of new production processes and the design of tools. It was also found that a shift to an integrated production concept is not constrained by technological factors but that obstacles rather relate to organisational cultures.

Pilot 1 introduced a model for a flexible production system. It is well aligned with the need for flexibility previously presented in Nelme 2016 Foresight[6]. This need holds from several viewpoints.

Turbulence in electronic media will be evident. Thus, from a production tools point of view, lock-in scenarios should be carefully analysed and, if possible, avoided. Cloud-based systems may offer flexibility by turning capital expenses into operational expenses, thus enabling inherent agility. However, at the same time as advertised flexibility, data, and possibly also training, may still be difficult to transfer further.

In media management, both hardware and software seek cost-effectiveness by compromising costs and exponentially increasing needs for intermediate storage, long-term storage and archiving. Meta-data-based asset management will still be in use for a while, but semantic retrieval and searching will emerge first in experimental systems.

Keeping an eye open for media agnostic production and delivery infrastructures is preferable to ending up with monolithic single media arrangements.

In addition to managing video, audio, text and still images, we can expect unknown content-related data, 'X', to become part of the production process. This X may be related to, for example, media management, process management, value added services and/or content processing. It may or may not be classified as metadata. In fact, by not knowing the exact meaning of 'X', we cannot assume that the selected single system vendor will eventually come out with the best solution.

In other circumstances, an 'open innovation' paradigm, introduced by Henry Chesbrough[7], attempts to solve similar problems. Introducing the open innovation paradigm to production infrastructure has the potential to lead to the most flexible environment in which to operate. For instance, if player A wanted to integrate visual radio into content production, he would have all of the interfaces open and be able to add the required functionality to the production platform, even though the platform itself would be provided by player B. Thus, both A and B would have the benefit of open innovation. Furthermore, with open innovation, the consequences of single vendor lock-in are not fatal, as they often used to be.

For a buyer, flexible data structures (not necessarily relational databases), database access, modularity over open interfaces supported by several players and proper documentation are the most important issues to evaluate.

For a system provider, remember that most of the smartest people work for someone else. If there is a problem you cannot solve, invite other companies to innovate and let them provide solutions. Open up interfaces that they may need.

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[6] Ollikainen, V. (ed.) (2012). New Electronic Media (NELME) – 2016 Foresight. VTT Technology 31. VTT Technical Research Centre of Finland. Accessed in November 2012 at http://www.vtt.fi/inf/pdf/technology/2012/T31.pdf

[7] Chesbrough, H. (2003). Open Innovation: The New Imperative for Creating and Profiting from Technology. 1st ed. Boston, MA, USA: Harvard Business School Press 2003.

This note on open innovation reflects on the modular service-oriented process concept discussed in Chapter 4.

1.2 Bridging broadcast and broadband services

It is essential for broadcasters to get traction in broadband, which is gaining ground. To face the future of broadband, the broadcasters have a choice to make:

1) Stay in legacy broadcasting while also providing services in broadband.
2) Position themselves in broadband and use broadcast as a diversifying asset.

Both approaches would benefit from a technology bridge uniting broadcast and broadband. If focusing on broadcast services, the bridge can be seen as a value added service platform. If moving to broadband, the bridge would make the general audience aware of and familiar with the broadband services provided by the broadcaster. The convenience of moving from broadcast to broadband is an advantage most broadband competitors do not have.

No standard emerges overnight. For the European market, HbbTV is the only standard that is gaining ground, and it is based on open Internet standards. Furthermore, HbbTV and Open IPTV Forum (OIPF) are joining forces to increase their impact. If they fail to deploy HbbTV (or OIPF), the broadcasters leave the playground to ecosystems, which may only be interested in the original programming the broadcasters provide.

The ecosystems have a tendency not only to collect a substantial fee from their partners but also to obtain end-user customerships.

A number of non-standard approaches have been presented to support broadcast-broadband interaction too, especially in IPTV receivers and various second screen innovations. From a consumer point of view, they address similar needs to HbbTV. However, they fail to keep broadcasters in control unless a broadcaster goes for a proprietary consumer electronics business.

HbbTV is *the* standard, that is, if any.

1.3 Methods

The Delphi survey technique was applied to the Nelme forecasting. The most common implementation of Delphi relies on a panel of experts that judge the timing, probability, importance and implications of factors, trends and events regarding the problem in question. Delphi usually undergoes four distinct phases[8]:

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[8] Linstone, H., Turoff, M. (1975, reproduction in 2002). The Delphi Method: Techniques and Applications. Accessed in December 2012 at http://www.is.njit.edu/pubs/delphibook

- The first phase is characterized by exploration of the subject under discussion, wherein each individual contributes additional information he feels is pertinent to the issue.

- The second phase involves the process of reaching an understanding of how the group views the issue (i.e. where the members agree or disagree and what they mean by relative terms such as importance, desirability or feasibility).

- If there is significant disagreement, then that disagreement is explored in the third phase to bring out the underlying reasons for the differences and possibly to evaluate them.

- The last phase, a final evaluation, occurs when all previously gathered information has initially been analysed and the evaluations have been fed back for consideration.

Delphi is often carried out using a questionnaire, and it has at least two rounds. In Nelme, the role of individual experts was assigned to independent work packages, each of which anticipated the future from its own expertise. The Work Packages (with leader name/organisation) were:

WP1 – Technology Trends (Erkki Aalto/Metropolia)
WP2 – Production Processes and Workflows (Leena Norros/VTT)
WP3 – New User-Driven Services (Anu Seisto/VTT)
WP4 – Ambient Media Experience (Artur Lugmayr/TUT)
WP5 – Business Models (Ulf Lindqvist/VTT)
WP6 – Project Co-ordination (Jouko Pesonen/YLE).

In its first stage, Nelme produced three scenarios for the year 2013[9] using two Deplhi rounds. After this foresight, the next two rounds produced a further foresight to the year 2016 taking the three scenarios for 2013 as the starting point.

As far as working methods were concerned, WP1 and WP5 processed their data in workshop meetings with participants from the industrial partners. WP3 did the same but allocated a substantial part of its work to studying user groups via a questionnaire and group interviews. WP4 was the most independent in developing its expertise related to electronic media and future visions. WP2 created a framework that was later used in evaluating pilots conducted by the industrial partners of the project. WP2 and WP3 have specific contributions in this report: Chapters 4 and 2, respectively. WPs 1 and 5 have been integrated into this report using Clayton Christensen's explanatory theory of disruptive technologies.

When the 2016 foresight was finalized, the number of scenarios expanding to fourteen, it had become obvious to the project that the complexity of further fore-

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[9] Ollikainen, V. (ed.) (2011). New Electronic Media (NELME) – 2013 Interim Forecast, v. 1.02, a confidential document in the Nelme project. (Unpublished)

casting was about to exceed a reasonable limit. For further analysis, the project harvested news articles and observations related to media forecasting, referred to as '(weak) signals'. The word 'weak' was put in brackets, due to the fact that not all harvested news articles and observations were weak. The work packages evaluated their relevance, first independently and then by discussing the results together. The most significant signals were further analysed to find out what implications may they have in the long run.

The forecasting process is described in more detail in Appendix 1.

1.4   Four scenarios of 2016

Nelme created four main scenarios for 2016 that form the basis of this report. These scenarios were[6]:

1. **Linear Broadcasting**. This scenario assumes that the audience is not adopting non-linear viewing habits, not even in the younger age group. An increasing number of broadcast channels, including pay-TV, fulfil all the needs for demographics that are important to commercial and public service broadcasters. HD viewing has been promoted, bringing access cards to almost every household, which in turn makes channel subscriptions easy. Once the audience pays for extra channels, it is less interested in acquiring non-linear services

2. **Online Mass Media**. In this scenario, broadcasters have taken proactive countermeasures to defend their brand and business. At the same time, those print media corporations that already have broadcast-related operations step in to provide premium content over IP.

3. **Specialized Audiences**. In this scenario, the audience fragments into a few specific but recognizable groups. The move from mass media to specialized and even niche audiences has been a predominant trend since the invention of television. In accordance with age, personal preferences and personal needs, there are different requirements for content classification. Another trend is the growing proportion of virtual communities and social networking sites in people's lives. In terms of entertainment, social relationships and even official work, people are increasingly accustomed to using social networking sites to deal with daily activities and reducing the use of traditional media. Access methods are also more flexible and mobile, supported by technologies such as smartphones and tablets.

4. **Non-linear Era**. In this scenario, broadcasters lose their leading role in the entertainment market to other players providing services over IP: 50% of households have their entertainment services connected to the Internet, while tablets and smartphones with inherent connectivity and video and audio capabilities have also become commonplace.

These scenarios are not completely exclusive, as some consumer groups may follow one scenario and some another. They were divided into fourteen sub-scenarios and organized using two axes, presented in Figure 1.
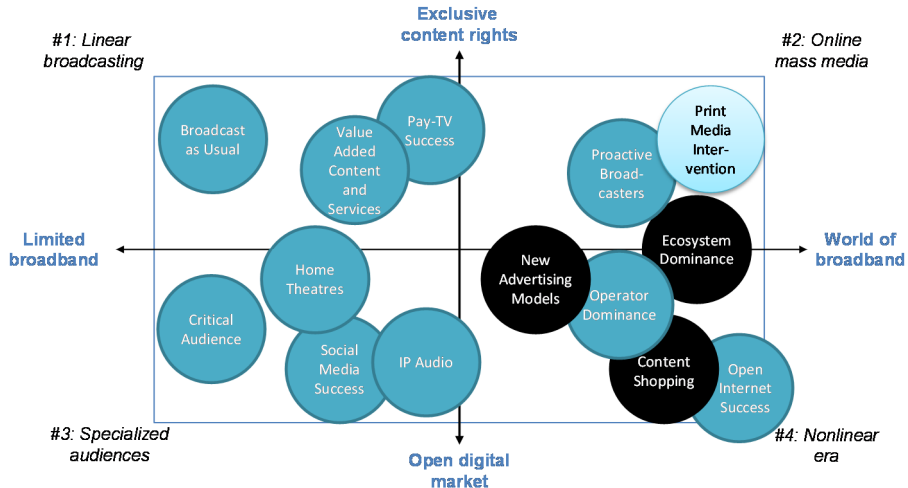

Figure 1. Chart for illustrating scenarios and sub-scenarios in two dimensions: the darker the background, the higher the expected probability.

The horizontal axis describes broadband success, how well the information society has succeeded in providing broadband for everyone and how it has been adopted by citizens: availability, speed and penetration. It should be noted that availability is an issue enabling penetration, which is most important within our scope. On the right-hand side, people have widely adopted fast broadband connections and the IP infrastructure is capable of supplying the increased demand with uncompromised quality. On the left, people are generally happy with Internet surfing over mobile networks that become congested from time to time, as does the whole IP infrastructure, lacking even reasonable Quality of Service.

The vertical axis describes content availability as a result of the actions of the content owners and possibly also regulation. At the top of the chart, content licensing is a game for only a few players in a region: premium content is sold at a relatively high price and as a result of negotiation; other content is bundled with it *with exclusive rights*. As a result, the price of premium content only becomes modest for those who also have enough capacity to use the bundled content fully. This is leading to the existence of a few big players in content acquisition. Strict regulation and strong copyright institutions do not leave any room for novel ways to operate either.

At the bottom, content licensing has adjusted to meet the requirements of flexible demand, even for direct sales. As usual, copyright issues on the Internet are applied according to the country of origin. Consequently, content that could not legally be presented here may be legal in the country of origin. There are few

countermeasures, while the blocking of Internet content in the Western World can only take place after strong political debate. If the country of origin is another Western country, for example, the USA, it would become practically impossible to block the traffic. In the face of competition to provide content, the stakeholders of strict regulation in one region may have to yield to more liberal, flexible and prosperous licensing policies elsewhere. Free content licensing, such as creative commons and distribution that is free for ideological and promotional content, is also at the bottom of the chart.

It should be noted that below the illustrated vertical axis, there is a possible world in which copyrights are not respected. However, we do not consider this to be likely.

1.5 Beyond 2016

Details of what may happen after Nelme 2016 foresight[6] are rare. However, we expect the upper-left corner of our foresight to lose its importance, whereas both of the right-hand scenarios are expected to gain importance (see Figure 2).
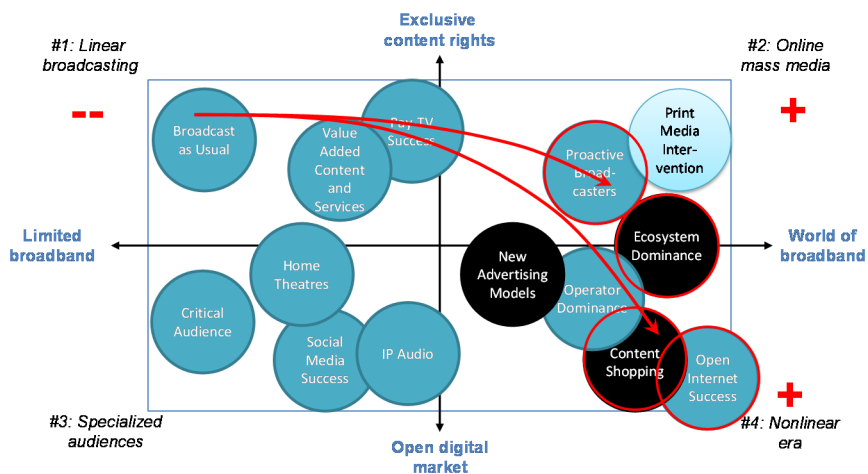

Figure 2. Expected changes in the importance of the scenarios.

More specifically, according to the (weak) signals evaluation, we expect the sub-scenarios 'Broadcast as Usual' and 'PayTV Success' to lose importance, while 'Proactive Broadcasters', 'Ecosystem Dominance', 'Content Shopping' and 'Open Internet Success' gain it. It may be worth noting that we do not expect all sub-scenarios on the broadband side to win: specifically, 'Operator Dominance' and 'New Advertising Models' did not show any major success, despite their expected relevance in 2016.

1.6   About this report

The remaining chapters in this report are as follows:

- Chapter 2:   A brief description of work packages and methods
- Chapter 3:   Analysed user profiles
- Chapter 4:   The Internet seen as a disruptive technology and the implications thereof
- Chapter 5:   Integrated production concept
- Chapter 6:   Conclusions, results in a nutshell.

The reports on the pilots are presented in appendices.

2. Independent studies

Nelme conducted independent studies in parallel with foresight work. Driven by the industrial partners, four pilots were arranged under the supervision of WP2 (Production Processes and Workflows). Additionally, WP3 (New User-Driven Services) conducted a questionnaire and interviews in order to find out about the behaviour of some advanced target groups.

2.1   Pilots

Four different pilot works were conducted by the end of the Nelme project (see appendices). The main focus of the pilots has been on how the production systems designed for large production companies fulfil technical and user-centric requirements in the new electronic media world. Additionally, the project has produced several fully functional HbbTV demonstration services in a demo environment showing how most of the functionalities are technically possible but commercial terms and copyright matters do not make that easy.

From a consumer point of view, there is not one special format in the future to publish a video. People use different devices for different things, which can be an advantage when optimizing the TV experience. Not everything has to be done on the TV set or with a conventional remote. IP-based services may also open up new opportunities for broadcasters for competition, collecting user data and for business and advertising models.

In new electronic media multiproduction and multicasting, the main tools to produce material for video, audio and the Internet are already good enough. Processes and workflows need development in many sectors and because of that, production has to be moved from being linear to non-linear in the future. The pilot for this project created one scrum-based producing model in which assets can be published in different environments as soon the material is available in the MAM system.

2.2 User profiles

2.2.1 Introduction

For the NELME 2016 report[6], WP3 conducted a user study including a web questionnaire that described potential media use situations in the near future. The link to the questionnaire was posted to several websites, such as yle.fi, mtv3.fi, teknari.fi and muusikoiden.net. The link was also further posted to social media channels, such as Facebook, Google+ and Twitter. Altogether 164 persons answered the questionnaire, with 100 male and 64 female respondents. The age group 31–50 was dominant (N = 82), and the youngest respondents were aged 15–19. The majority of the respondents lived in the city (Helsinki capital region or other city).

Five user groups were suggested for future observation based on the analysis of the questionnaire data (N = 164). The groups were called 'Multiscreen Users', 'Wealthy', 'Conservative', 'Ecological' and 'Aware & Critical'. After an evaluation was carried out in WP3, two of the user groups (see Table 1 below) were seen as most relevant to study more profoundly for this report, since these two groups were seen as forerunners in a broadcasting context. The two chosen groups were 'Multiscreen Users' and 'Wealthy'.

Table 1. Groups 'Multiscreen Users' and 'Wealthy' in the Nelme 2016 foresight.

Group	Description	Related 2016 scenario
'MULTISCREEN USERS'	Use of multiple devices and social media simultaneously OK; slight emphasis on young people, i.e. negative age correlation	*Success of social media; Value added content and services*
'WEALTHY'	Technologies that make life easier are good, positive attitude towards all media; high incomes	*All except Critical audience*

The group 'Multiscreen Users' was seen to represent younger people with active use of mobile devices, social media and Internet content. The 'Wealthy' group was a more established group (aged 30+) with higher than average incomes and willingness to purchase content, technology and services for several purposes. Both groups' media use habits and attitudes were seen as relevant and interesting to examine in relation to broadcasting and near future media environment.

Table 2 contains a list of media services and products the group representatives were paying for at the time of the interviews (2012).

Table 2. Media services and products for which the group representatives are paying.

Group Multiscreen Users	Group Comfortable
Spotify	Pay-TV
iTunes	Spotify
Voddler	Sony Music Unlimited
	Newspapers (print)
	Magazines (print)
	Newspapers (digital)
	Magazines (digital)
	EBooks
	Voddler
	Xbox for films

In order to create group profiles, representatives of the groups were interviewed in two focus groups. The interviews were conducted in May and June 2012. The following group profile descriptions are mainly based on interviews. The group 'Wealthy' was renamed 'Comfortable' for a more accurate description of the group.

2.2.2 Group 'Multiscreen users'

The group 'Multiscreen Users' is defined in Table 3 below.

Table 3. Description of the group 'Multiscreen Users'.

Focus group	N; Age	Criteria for group
Multiscreen Users	N = 6 (2 male, 4 female) Age 21–29	*Active use of social media, active use of mobile device(s), simultaneous use of different devices, aged under 30*

Group profile:

Nelme 2016 scenarios emphasised:
social media success, content shopping, proactive broadcasters*.*

The group is already in the World of broadband, partly in specialized audiences.

Photo: © Tekes, Pasi Hytti

Traditional media do not play any significant role in the everyday life of this group of young people under 30. Linear television serves as a background media, sometimes as a 'hangover media' on Sundays. Most of the content (produced by broadcasters or someone else) is consumed on the Internet. According to the interviewees, the 'media phenomena' produced by broadcasters (such as 'Munamies' in Finnish television) do not reach or interest them. Internet phenomena from services like YouTube and Facebook are more important. Generally, linear television does not fit in with the everyday rhythm and habits of the group members.

Linear television will have a role, however, when watching sports or other similar big events for the masses (such as the Eurovision Song Contest). The group members' attitude to sharing experiences through social media while watching these events is positive: they are already doing it.

From the device perspective, the laptop computer is the most important device at home. Additionally, the group representatives are constantly online through their smartphones in and outside the home. The shift towards tablets is also recognized and hoped for however. A large, stable (TV) screen is still desirable at home (a laptop can be connected to it). HD quality or quality in general is not mentioned as an important issue. In this group of rather young consumers, money often plays an emphasised role when planning the purchase of new devices. The group members are willing to buy new devices and services when possible.

The group is very active in using social media but hesitate to use, especially, Facebook for paying on the Internet. It was mentioned that a Finnish virtual community could be a more reliable actor in terms of buying goods. The main and practically only content the group is currently paying for is music (Spotify, iTunes),

thus content shopping (Spotify-styled) is a potential scenario for the group. Illegal downloading of TV content (series, films) is familiar to the group members, and they also use web services provided by broadcasters (such as Katsomo). In terms of advertising, the group members have some positive attitudes towards tailored and personalised adverts, with some caution. Friends' recommendations are very important to this group.

2.2.3 Group 'Comfortable'

The group 'Comfortable' is defined in Table 4 below.

Table 4. Description of the group 'Comfortable'.

Focus group	N ; Age	Criteria for group
Comfortable	N = 4 (3 male, 1 female) Age 41–70	*Incomes min. 50 000 EUR/ year, aged over 31, positive answers in WP3 questionnaire.*

Group profile:

Nelme 2016 scenarios emphasised: content shopping, proactive broadcasters, new advertising models, open Internet success.

The group is strongly shifting towards the World of broadband, still one foot in more traditional broadcasting (linear TV, pay-TV, print media).

Photo: © Tekes, Pasi Hytti

Members of the group currently use both traditional and 'new' media. They are subscribers of newspapers and magazines, as well as pay-TV channels. eBooks and digital magazines are also familiar to them. Music is listened to through Spotify, Sony Music Unlimited and car radio (net radio is also mentioned).

The attitude towards linear TV is rather negative in the group. It does not fit in with the rhythm of everyday life and does not provide interesting content in a flexible and tailored way. However, linear television is important because of the group members' children, and it is used for watching news and sports as well. The group also recognises the strengths of broadcasting in creating national media phenomena and common, shared experiences, if such are wanted. The group is not satisfied with its current pay-TV channels and some have decided to end their subscription (Welho Mix with a changing channel set is mentioned as a good service).

The group members already use tablets for different purposes, such as watching YouTube and reading magazines and news. Tablets and laptops are important devices at home, increasingly replacing television. HD channels are mentioned as interesting, thus quality plays an important role for the group. The current pay-TV channels could be replaced by HD channels. Google TV is also hoped for because of open source (compared with Apple).

The group has a positive attitude towards tailored and personalised advertising because it can provide more interesting and apposite adverts instead of useless information. For this group, friends' recommendations are not necessarily important (because even good friends may have different opinions and styles).

2.2.4 Summary

Linear television does not play a significant role in either of the groups. Furthermore, current pay-TV channels do not fit in with their media use habits and expectations. However, linear broadcasting still has an important role in families with children. For the group 'Comfortable', quality has its place and thus HD channels are welcome.

Illegal content downloading is not at all unknown in the 'Multiscreen Users' group. Currently, music from Spotify and iTunes seems to be the only content they are paying for, thus Spotify-styled shopping of other content as well could be a potential scenario for this group.

Friends' recommendations are important for 'Multiscreen Users', but not very important for the 'Comfortable' group. Tailored content and ads could be more favoured in the 'Comfortable' group, which possibly relies more on personal preferences than on other peoples' opinions.

3. Internet as a disruptive technology

"Disruptive technologies emerge and progress on their own, uniquely defined trajectories, in a home value network. If and when they progress to the point that they can satisfy the level and nature of performance demanded in another value network, the disruptive technology can then invade it, knocking out the established technology and its established practitioners, with stunning speed." (Clayton Christensen[10])

3.1 Disruption in other media

Internet has been a game changer for print media. In the U.S., a noteworthy downturn in newspaper advertising revenues has taken place since 2000 (Figure 3), indicating diminishing popularity of printed newspapers in the U.S., mainly caused by the Internet.

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[10] Christensen, C. (1997). The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business. Reprint by HarperCollins Essentials, New York, USA, 2011.
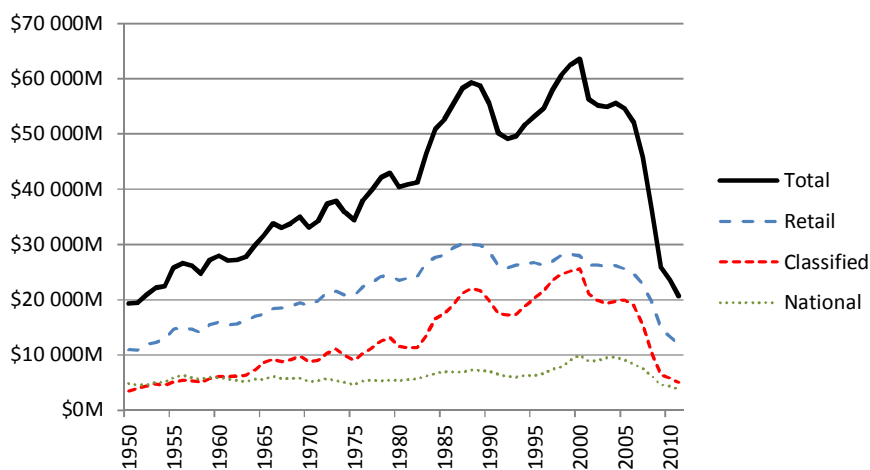
Figure 3. Annual newspaper advert expenditure in the U.S.[11] (inflation adjusted to USD 2011 value[12]).

The music industry has also had an impact from the Internet: CD sales have dropped while music downloads have become popular (Figure 4[13]). During the past ten years, the annual revenues have dropped to a fraction, although the total number of shipped units has almost doubled[14]. The most likely reason for the price erosion has been that Internet distribution is far more efficient than shipping tangible goods. At the same time, too high a price on the Internet would have the controversial effect of increasing piracy: the downturn in CD sales began years before the significant increase in Internet downloads was observed by RIAA. Meanwhile, a substantial amount of illegal music was available on the Internet.

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[11] Newspaper Association of America (2012). Advertizing Expenditures, March 14, 2012. Accessed in October 2012 at http://www.naa.org/trends-and-numbers/advertising-expenditures/annual-all-categories.aspx

[12] Bureau of Labor Statistics (2012). Consumer Price Index, All Urban Consumers – (CPI-U). Accessed in October 2012 at ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt

[13] In the figure 'Digital disc' comprises CD, DVD audio and SACD.

[14] In music downloads, the 'unit' is typically a 'single', not an 'album' (13:1 ratio in shipped units in 2011) whereas in digital discs albums dominate the market by far (200:1), yet, the change has been drastic.
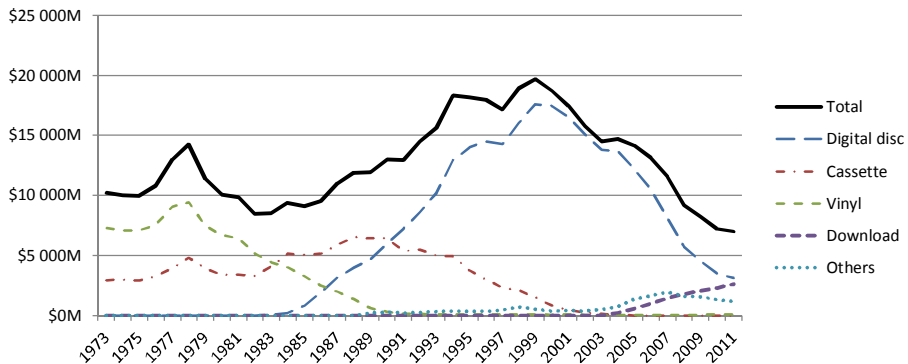
Figure 4. U.S. Music shipment by value (inflation adjusted to USD value in 2011).[15]

The lesson to be learned is that the Internet *may* lead to rapid changes in the established industry. This does not mean that a rapid change is always likely, but possible: yes.

Newspapers and the record industry were the first to be hit by the Internet because they do not require substantial bandwidth: individual newspaper articles may be measured in kilobytes, music singles in megabytes. Neither of them requires substantial Quality of Service, since content is typically downloaded before being presented. However, at the same time as rapidly developing video compression, the Internet has evolved to a level of providing enough quality and bandwidth for video services comparable to broadcasts.

In this respect, comparing broadcast and broadband delivery resembles a textbook example of a disruptive technology.

As Clayton Christensen describes in his legendary book 'The Innovator's Dilemma', a disruptive technology [Internet video in our case] often underperforms the current technology [broadcast] on the attributes that matter most to mainstream customers [quality, reliability]: "By and large, a disruptive technology is initially embraced by the least profitable customers in a market [Internet video, e.g. YouTube]." Furthermore: "Products that seriously underperform today [yesterday], relative to customer expectations in mainstream markets, may become directly performance-competitive tomorrow [e.g. Netflix, Hulu, Lovefilm]."

Disruptive technologies often develop faster than the current technology, eventually being capable of taking over not only the least profitable customers but the market as a whole.

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15 RIAA (2012). Annual Music Shipment Data 1973–2011. Accessed in October 2012 at http://www.riaa.com

Having said this in our context, it should be noted that the development of the broadcast is not only dependent on technology but also on public opinion, which *does not always favour developing broadcast* as a distribution technology: terrestrial frequencies are public property by nature and carefully regulated. Regulation also takes into account those who are least prepared for new innovations, inevitably slowing down broadcast development. Broadband in turn does not share the same burden; on the contrary, broadband Internet is promoted by regulators trying to avoid a digital divide.

3.2   Nelme 2016 foresight

In the 2016 foresight[6], the Nelme project anticipated hybrid broadcast/broadband viewing to penetrate the consumer market.

In the foresight it was noted, however, that having *the opportunity* to use IP services does not, by any means, lead users to abandon broadcast reception: hybrid reception will be commonplace in 2016, since people in general would still use broadcast while broadband exists. Electronic media still attract the biggest share of advertising revenue and distribution licences for the most interesting content, but, as the audience fragments, and due to competing distribution channels, they will lose their sharpest edge by 2016.

The most probable vision is that the foresight expected telecom operators to bundle entertainment services with their broadband offerings. These services include, but are not limited to, films on demand, network PVR and audio downloads. One motivation behind the bundle is to reduce customer churn in broadband networks: obviously, the more hours a customer has collected on his network PVR, the less interested is he in changing operator.

3.3   By 2020: change in broadcast too?

We go back to the U.S. market, but, for a while, we could assume that linear broadcasting could follow the newspapers and the music industry. Taking into account also that the television and music industry are global, the habits of watching television are more likely to be globally adopted from the U.S. than the habits of reading a newspaper. In fact, the Nelme results indicate that there may also be a similar trend in broadcasting here, although not necessarily before 2016.

In Nelme, the Work Packages evaluated the impact of the most significant news and observations harvested as the last phase of forecasting. The result indicated that the importance of linear broadcasting, including Pay-TV, is diminishing, while open Internet-related activities are gaining ground (Figure 5**.**).
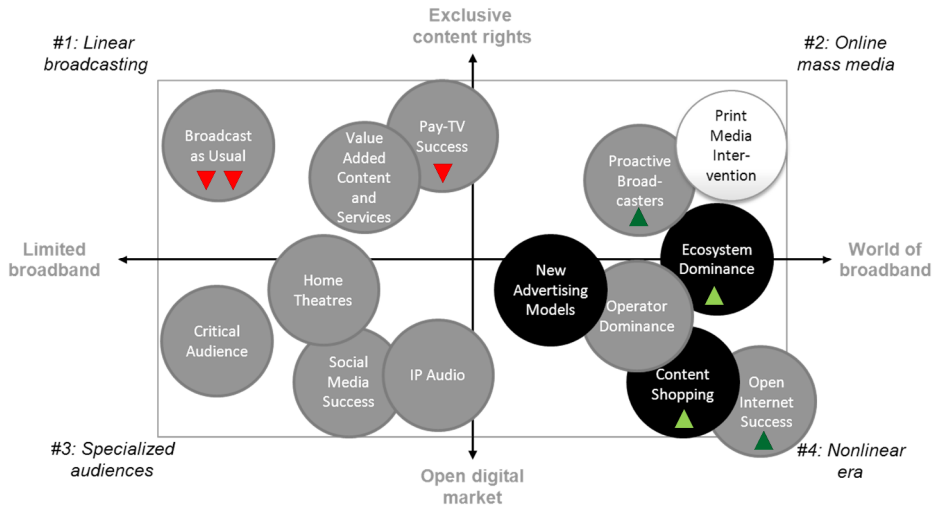
Figure 5. Impact of (weak) signals.

Johan Peter Murmann and Koen Frenken have stated that a complex system consists of core and peripheral components: in a dominant design, changes in core components have a very low probability of success, while changes and quality improvements are usually made with the peripheral components. A change in the core component would suggest the birth of a new dominant design.[16]

Having a look at the two axes of the Nelme 2016 foresight[6], a dominant design in broadcasting may be considered the vertical axis related to content acquisition. As long as content providers benefit from selling content in large quantities (top of the axis; see Figure 5 above), the broadcasters benefit from having less competition from the open market (bottom of the axis) and prefer the practice of acquiring exclusive rights also to content which has less value to them.

One of the key issues on the horizontal axis is the cost of distribution. Taking Finland as an example, the annual revenues of the largest terrestrial distributor, Digita, in 2011 were 91 M€[17], leading to an average cost of about *18 € per person*. Currently, CDN prices in broadband distribution for over 3PB/month customers are

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[16] Murmann, J., Frenken, K. (2006). Toward a systematic framework for research on dominant designs, technological innovations, and industrial change. Research Policy 35 (2006), 925–952. Elsevier B.V.

[17] Digita (2012). TDF-ryhmä. Accessed in November 2012 at www.digita.fi/yritykset/yhtio/tdf-ryhma

no more than 3 US cents (2.5 € cents) per GB[18]. According to Finnpanel[19], an average Finnish person watches about three hours of TV per day. Since television content can be delivered with full quality at about 0.2 MB/s (ca. 1.5 Mb/s), *the distribution over CDN would cost about the same as the distribution over broadcast today.*

In the future, CDN prices will decrease rapidly while compression technology advances at a rate of a 50% bit rate reduction every five years. This can be expected to reduce broadband distribution rather than giving any substantial benefit to broadcasts.

If new distribution channels begin to become more profitable for the content providers, they will pose competition to the broadcasters, which, with decreasing revenues, would be less likely to acquire content in large quantities. This could lead to a new design in content acquisition, bypassing exclusiveness and accelerating the change towards an open digital market.

As a disclaimer, there was some discussion in the project about which programme types will be influenced most by nonlinear broadband services and how important their role is to broadcasters. Looking at the most popular programmes [19] of the four largest broadcast channels in Finland (TV1, TV2, MTV3, Nelonen), the top ten lists are mainly populated by programmes that have a certain relation to time, such as news, sports and reality series. These programme types flourish in broadcasting rather than in non-linear broadband and apparently produce the most substantial revenues for commercial broadcasters. At first sight, letting films and TV series go to broadband distribution would not necessarily have a critical impact on broadcasting. However, a television channel is an entirety, not necessarily to be divided into segments to be analysed separately: by not underestimating hardly measurable channel prestige, even a basic function of selling advertisements is a mixture that benefits from reaching different audiences. Losing one substantial segment would change the manifestation of a broadcast channel.

3.3.1 Broadcaster-oriented ecosystems

According to Christensen[10], a strategy of waiting for a new market to be large enough to be interesting is often a failing. In general, it is difficult to replicate success factors presented by new entrants in a new market. The new entrants are a step ahead in their own playground, so to speak.

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[18] Rayburn, D. (2012). Video CDN Data: Pricing, Contract, Volume and Market Sizing Trends. Content Delivery Summit, May 5, 2012. Accessed in November 2012 at http://blog.streamingmedia.com/wp-content/uploads/2012/09/2012CDNSummit-Rayburn-Pricing.pdf

[19] Finnpanel (2012). Results From The TV Audience Measurement, 2011. Accessed in November 2012 at http://www.finnpanel.fi/en/tulokset/tv.php

Acting early, that is, being proactive, helps broadcasters meet their goal to leave as little playground to new entrants as possible, keeping themselves at the epicentre of the electronic media universe.

In the 'proactive broadcasters' sub-scenario of 2016, broadcasters have succeeded in creating compelling public demand for their online services. It is an ultimate necessity for operators and an advantage for ecosystems to include these services with flawless quality.

As broadcasts by definition provide an advantage for broadcasters, they will be used to the highest extent while also operating on broadband. In fact, the broadband services will be competitive by themselves, while the service package integrates the best of both worlds.

- Hybrid broadcast broadband standards for as wide terminal support as possible, including tablets

- Uncompromised ease of use with personalized views on the service

- An efficient advertising platform

  o Mass advertising, complementing broadcast channels
  o Targeted advertising supported by detailed customer data
  o Advert swapping, no advert skipping
  o Immediate and accurate ratings for commercials

- Unparalleled entertainment

  o Catch-up for all programmes over at least 4 weeks; no need to buy a PVR
  o Long tail catch-up as a premium service
  o Films on demand
  o Music downloads
  o Portal for third-party content brokers in another region whenever local regulation de facto prohibits certain services
  o New generation teletext for quick news updates
  o New online services in parallel with traditional broadcasting, e.g. big sports events

- Technical superiority

  o Tablet, personal viewing and multi-screen support
  o Support for mobile use
  o Home theatre support by Full HD and 5.1 audio
  o Progressive download with a customer-friendly digital locker
  o Micropayment
  o Geek corner for experimenting with the latest technology bells and whistles
  o APIs for user-generated value-added services
  o Enabling an Internet of Things
  o Rapid and active reaction through the use of semantic databases to issues relevant in social media
  o Profiling services for the consumers to offer personalized use of content

- Social media support

  - Going for targeted advertising using social data and data collected from personal device services
  - Updating social network site statuses automatically
  - Inviting friends to watch a programme simultaneously
  - Communicating with friends on a second screen while watching
  - Sharing photos, videos and music
  - Flee market for content
  - A chat site also accepted by a critical audience
  - Hyperlocal and community services over text, audio and/or video

- Value-added and interactive services including but not limited to

  - Gaming
  - Voice assistants
  - Gambling
  - Ordering pizza

- Information society basics.

Targeted advertising would compensate for decreasing revenues from broadcast advertising as well as offering proactive broadcasters an opportunity to enter the market of classified advertising. New service concepts using linear TV brands and original long tail content may be an additional source of direct revenues.

The services would be provided in co-operation with other partners, in an eco-system controlled by the broadcaster. User acceptance is critical from a usability and social point of view, which may promote the importance of current broadcasters.

It would be essential for broadcasters to turn viewers into an engaged audience and take them into the broadband world of broadcasters.

3.3.2 Device-oriented ecosystems

In the following description, the term ecosystem refers to a device-oriented con-sortium, which, at least, has control over content delivery and owns customer data. Furthermore, it is beneficial for an ecosystem to have control over the whole distribution chain, since the perceived quality of ecosystem services depends on individual components in the chain. Currently, most active players in ecosystems are device manufacturers, not forgetting large IT corporations providing operating systems, such as Google (Android OS) and Microsoft, and content shops, such as Amazon (Kindle).

In ecosystem dominance, the ecosystem owners manage the entire value chain of electronic media, providing equipment and content to the consumers. Global players, such as Sony, Apple, Samsung, Google and Amazon, are active, while telecom operators have reached an equal position at national level. Ecosystems achieve high penetration through tablet and smartphone sales inherently connected to broadband Internet. Consumers may get discounted terminals as ecosystems

earn profit from content and adverts. An ecosystem typically collects a fee of about 30% of the sales revenues.

With ecosystem dominance, current broadcasters fall into a category of content providers, although they may see the ecosystems as their delivery channels. Operators, too, may lose significance because their native role as the party of billing relationship diminishes:

- customers are locked into personal services provided by ecosystems; hence the services and the personal storage is operator agnostic

- ecosystems have a deeper knowledge of customer behaviour and are able to provide targeted advertising; measuring the impact of advertising is also more straightforward

- the size of the ecosystems is such that it becomes lucrative for large advertisers; this should also concern broadcasters

- possibly decreasing distribution costs and regulated network neutrality.

Ecosystems also have a tendency to compete against standards such as HbbTV. Whereas ecosystems have a tendency to operate as walled gardens (i.e. Apple iTunes), standards open up content selection from sources that are not under ecosystem control. The weak point of ecosystems is that the devices must support some standards and open Internet, opening a door to content that is not paying ecosystem fees.

Ecosystems may be convenient partners for large retailers if they change their current way of advertising. Whenever mobile devices are concerned, advertising benefits from location information are often reported by the device.

From the customer's point of view, a large selection of content may become available because broadcasters have had a tendency to outsource their production, and the producers are free to sell their programmes and concepts to whom they wish. Furthermore, the better English skills people have, the higher the demand for global content, even without translations.

The fact that the most innovative consumer electronics manufacturers have been entering the ecosystem market may lead to re-invention of television; these corporations have skills, consumer understanding and secured financing to make a change, supported by an ever-developing IP infrastructure with governmental promotion.

Specifically, so-called 'second screens' have a role in ecosystems, and it would be most suitable for manufacturers if the 'second screen' would turn into the 'first screen' using the large television sets only as dummy displays.

Sophisticated content delivery arrangements, sometimes referred to by the more generic term of cloud services, are typical of ecosystems. However, some consumers may find it confusing why one terminal can access some content and another cannot.

3.3.3 Operator-oriented ecosystems

Ecosystems may also be created by telecom operators and mobile network operators (hereinafter 'operators' in this chapter). The operator-dominated ecosystem is last-mile oriented, yet it may have alliances with content providers, advertisers and, possibly, terminal manufacturers. Cable TV operators also increasingly provide content over IP, bundled with broadband cable Internet access. In this respect, there is no distinction between telecom and cable TV operators.

Nelme expected operators to have a crucial role in online services by 2016. Mobile devices, including tablets, have gained a role as a second screen for electronic media. Mobile devices also provide ubiquitous access to IP network services. At the same time, operators have billing contracts with customers, enabling premium services with minimal charging costs as well as accurately targeted advertising. It is significant, however, to see that most of the content has to be produced by some party other than an operator. In addition to entertainment and Internet services, operators are key players for ambient media with IPv6 enabling an Internet of Things paradigm.

Consumers will choose the most commonly used electronic terminal to access the Internet. Smartphones and tablets will take up a position in a terminal market. Consumers will use the most convenient terminal for the moment. When networks become further integrated, when the Internet, mobile Internet, telecommunication network, broadcasting network and other sensor or communication networks get together, the operator will be in pole position to enable and develop new services.

Operators may reduce churn by providing personal cloud services, such as network PVRs as well as photo and personal video albums. Having a substantial amount of personal data residing on the operator's services may inevitably lead to operator lock-in, especially if the services are proprietary.

Thus, also having a note on the operator's inherent local presence, there is a similar chance to build a bundle of services drafted for proactive broadcasters in 3.3.1, this time operated by a telecom operator. Targeted advertising, in particular, is an inherent advantage, and because of their size, operators may be suitable partners for large retailers. A further advantage of targeted advertising is inherent location awareness. As an additional strength, price and availability of radio spectrum are not an issue for landline distribution. Furthermore, the developing IP infrastructure is of a general interest.

From the consumer's perspective, the available content is one key reason to select a broadband operator. Since broadcasters have outsourced content production, it makes content acquisition possible for any ecosystem. Operators may get both content acquisition and a sales channel.

The (weak) signals studied in Nelme, however, did not provide any substantial hint of operators' success in the future: as far as generic services are concerned, the more content and services are available over the open Internet, the better the CDNs are, and the more net neutrality is requested, the less important an operator becomes. Those consumers that stay on linear broadcasting also do not benefit the operators. It seems that the most beneficial target group could be people between the forerunners of today and traditional customers, but it is not necessarily growing.

This observation may rely on the assumption that the operator stays with the traditional operator role, which is not necessarily the smartest way to go.

Operators have a role in the distribution of almost all end-user services, as illustrated in Figure 6, while all novel use of IP infrastructure has to be approved by the operator.
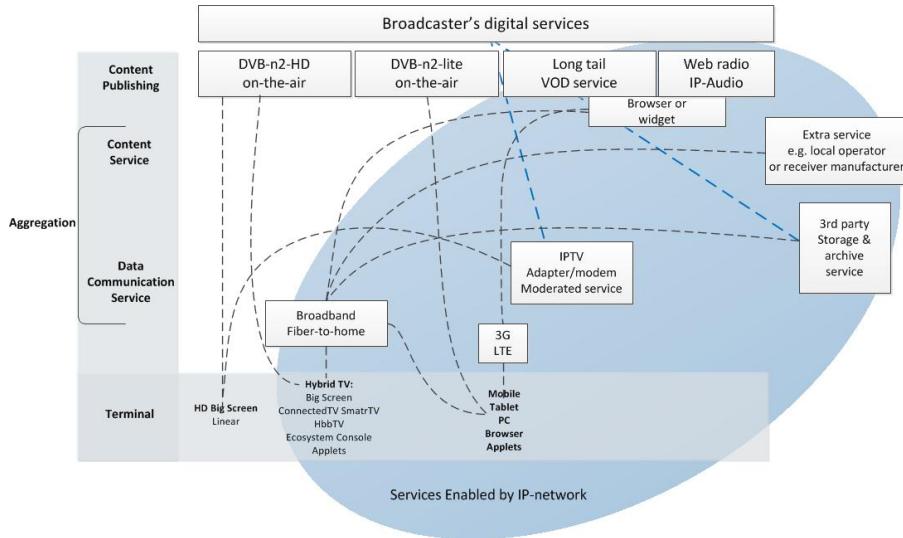

Figure 6. Distribution Services. The up-to-date services in the blue oval require a telecom operator to supply IP connection.

3.3.4 Content shopping

Content shopping refers to buying content, services and applications from the Internet, either by progressive download or streaming. After downloading, the content can be used on different terminals, such as smartphones, tablets, PCs, television screens, multimedia navigators and other smart devices.

There is no tablet, no smartphone and, increasingly, no television set without a related content store. Due to the wide selection of available content, only a fraction of the offerings become popular.

Content acquisition of OTT (Over The Top) services is likely to become easier, since only a fraction of content is produced in-house by broadcasters, and the trend is still towards outsourcing. Consumed content originates from different content providers, which promotes content shops. With an increasing number of content providers, content brokers may also emerge in content shopping.

Independent content brokers

A content broker is an economic organization or individual specializing in the exchange of content between producers and consumers. By definition, independent content brokers are not affiliated to a single producer, ecosystem or operator. Thus, they are also efficient sales channels for independent content producers, with a variety of genres, whereas consumers appreciate subsequent wide selection. The young generation, in particular, is used to content shops, with a tendency to decide 'when and what' they want to consume. Amazon, Voddler, Netflix, Hulu and Spotify are examples of independent content brokers. Content brokers sell video or audio content on the open Internet.

The supply in the shops should adapt to consumers' consumption habits. Consequently it is likely that different content will be promoted for different terminals.

The number of independent content brokers is slowly increasing, but the rate of increase will slow down when the market becomes saturated. Third-party content brokers have to guarantee almost flawless streaming or quick downloading, which inevitably requires the use of content delivery networks, increasing otherwise moderate costs.

Although these third-party content shops or brokers are not the original content producers, they have networks for acquiring content, a wide range of sales channels and a solid customer base. There are at least two ways to generate revenue, one is from the subscriber payment (Netflix) and the other is from advertising (Google)[20].

Following the trend of the above-mentioned U.S. Music shipments, a price erosion is likely to happen, making people buy in smaller quantities at a time, thus reducing total revenues. Compared with delivering content in tangible formats, net shops have cost savings in logistics. Once they are able to get discount prices, more consumers are attracted to buying content from net shops.

In the long run, there are only two choices for a company: continue to grow or wait to die out. There is no exception for third-party content shops or brokers. Even if Amazon and Spotify do not expand their business scope, they will face close challenges from other industries, such as the net and physical retail stores from Apple and Google[21]. We expect content-related activities from these well-established players by 2016.

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[20] Trefis Team (2011). Netflix Needs To Go Deep Into Personalized Streaming, Forbes, June 10, 2011. Accessed in October 2011 at http://www.forbes.com/sites/greatspeculations/2011/06/10/netflix-needs-to-go-deep-into-personalized-streaming

[21] Betts, R.A., Malhi, Y., Roberts, J.T. (2008). The future of the Amazon: new perspectives from climate, ecosystem and social sciences. Philosophical Transactions of The Royal Society, B (2008)363, 1729–1735. DOI:10.1098/rstb.2008.0011

Long tail content

Long tail content refers to content made available after being in mainstream delivery. Due to the Internet, the long tail effect has broken the classical 80–20 rule known as the Pareto principle: 80% profit is obtained from the 20% best-selling products, while the remaining 80% of the products do not have a significant profit value. However, the long tail effect makes some of the content that is not best-selling in the short term become best-selling in a longer sales cycle.

The long tail effect helps broadcasters to produce new income, especially with DRM. Broadcasters have had much exquisitely made content, which could generate long-term revenues. The long tail effect makes some of the content, without being best-sellers in the short term, become best-sellers in the long run. Once it is possible, childhood favourites are likely to be shown to children or grandchildren. An increasing supply of long tail content is likely to result in greater demand – more content shopping.

The development of long tail content is closely related to net shops and films on demand. Consumers are able to conveniently access long tail content from net shops or Internet databases and also use it over a long period of time, such as in film on demand systems. Long tail content itself does not have any special technical meaning but is merely a description of the market effect. The term *long tail* also describes more independent and random consumer behaviour, especially of minority groups such as immigrants and hobbyists. Chris Anderson's book provides examples of the long tail effect: Amazon's book sales, Google's advertising, Netflix and Real.com, and Rhapsody online music services[22].

Films on demand

Films on demand is also a form of content shopping that has gained in popularity since 2013. Films on demand are not exclusively for HD screens and multichannel audio but also for tablets and even smartphones.

Video rental and PVR follow the same decline as the CD personal audio recorder industry before, as almost all films and broadcasted programmes are available on the net. It is a change in lifestyle boosted by science and technological advances.

Even if 2013 was an era of slowly developing HD, films on demand is going strong in 2016 for whoever has a TV set connected or owns a tablet.

With wise decisions, convenient DRM and the long tail effect, the films on demand industry is becoming stronger[23]. Covering the whole scenario, ecosystems

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[22] Anderson, C. (2006). The long tail: Why the future of business is selling less of more. New York, USA: Hyperion.

[23] Waterston, A. (2005). VOD and DVR in the home – a glimpse of the future, sky. Report, July 7, 2005. Accessed in October 2011 at http://www.horowitzassociates.com/white-papers/vod-and-dvr-in-the-home-a-glimpse-of-the-future

and independent content brokers such as Voddler also contribute to this trend. Entertainment packages are gaining in popularity, making DVD and Blu-ray discs and boxes obsolete. Basically, films on demand is an evolution from packetized media. As such, it will not substitute broadcasting but because of its ease of use it may compete with broadcasted films.

3.3.5 Open Internet

Open Internet success requires an almost flawless broadband infrastructure and an open content market. Availability of long tail content expands content supply in an open market.

Emergence of a Next-Generation Network

By 2016, networks will have been integrated further. The Internet, mobile Internet, telecommunication network, broadcasting network, Internet of things and other sensor or communication networks will emerge and gradually form a universal network – the Next-Generation Network (NGN). The next-generation network will become the most important network. The current Internet, telecommunication network, broadcasting network, mobile Internet and other sensor networks are parts of the Next-Generation Network. This leads to people being able to surf the Internet using their living room TV, searching the Web with video links and using tablets to watch programmes[24].

Mobility and Quality of Service are two important factors of NGN. Peer-to-peer delivery has partly offloaded core network congestion. Due to regulation, shared Internet provides Quality of Service, has basic CDN functionalities on top of HTTP streaming standards, supports multicast and is cost-effective for broadcasters and other content providers.

Direct sales

With the help of a rapidly developed broadband infrastructure, content owners such as studios, production houses and sports associations have launched their independent services over IP. Led by horse racing, BBC iPlayer, HBO shop and Universal HD offerings and followed by football, ice hockey, baseball associations and independent producers, content rights owners sell their contents in quantities to mass audiences globally.

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[24] Tatipamula, M., Grossetete, P., Esaki, H. (2004). IPv6 integration and coexistence strate-gies for next-generation networks. IEEE Communications Magazine January 2004, Vol. 42 Issue 1, 88–96.

As a result, these players do not only gain revenues but also loyal customer bases for future expansion to related content, targeted advertising and value-added services, such as betting, merchandise and ticket sales. Other major beneficiaries no longer exist in the value chain.

Once they have broadband and connected devices, domestic customers find international offerings and quickly adopt the concepts. Digital lockers represent key technology in all downloaded content.

Smart Interaction Terminals

Service guides are an integral part of devices, acting as remote controls, especially tablets and smartphones. End-user equipment is easy to use and configure, especially with multi-touch and Near Field Communication (NFC) technologies. Some of the devices may use advanced interaction methods beyond multi-touch, such as voice control or visual search.

Three major players share the operating system market: Android OS has become popular as has iOS by Apple, although iOS is handicapped by a closed ecosystem. The third ecosystem is the Nokia-Microsoft ecosystem supported by the Windows OS (Windows phone OS and Windows 8). The competition on the tablet and smartphone markets has catalysed new innovations. Almost all PC makers will produce tablets by 2016.

Near Field Communication (NFC) will become a mainstream standard for configuring mobile device systems, although it can also be used as a convenient payment and micro-payment medium.

Mobile Media

Mobile media generally refers to any media that can be watched or listened to in transit. Tablets and smartphones are platforms for consuming mobile media as well as for social interaction and content sharing. However, push-type services based on user profiling and context awareness will only have gained success in small user groups in 2016: in general, a world that is too ubiquitous is seen as oppressive.

Other players, such as pay-TV operators are likely to offer added value services by providing content over mobile networks.

Mobile TV broadcasting will have some interest in 2016, but the use of multiple screens (TV + mobile phones or tablets) will have developed faster and therefore have local and hyper-local content in mobile media.

3.4   A pitfall of comparing broadcast and broadband

Christensen points out the danger of comparing legacy and new technology using the attributes set by the current market. The attributes are due to change over time as a consequence of the disruption, and some of the new attributes may have no specific value to the established market when a new entrant comes in. As an ex-

ample, the ruggedness of 3.5" hard disk drives in the IBM XT era provided no added value compared with mainstream 5.25" hard disk drives of that time.

In our case, seeing broadband as a pipe promotes comparison, how does this new pipe compare with broadcast? Initially, not too well: lower bit rates, inferior robustness and it does not scale up to serve millions.

Broadband brings other values however, such as non-linear viewing, which appeals to some new markets from the very beginning. The size and ruggedness of 3.5" hard disk drives made smaller desktop computers possible and laptop computers feasible. Very soon the capacity also began to exceed legacy 5.25" hard disk drives, although the large disk had a larger surface to write to.

Eventually, the Internet will be capable of exceeding the bandwidth of a broadcast, match the robustness and additionally provide all of its native values, which broadcasting is not capable of fulfilling. Figure 7 illustrates what may happen when the quality of the pipe is no longer an issue.
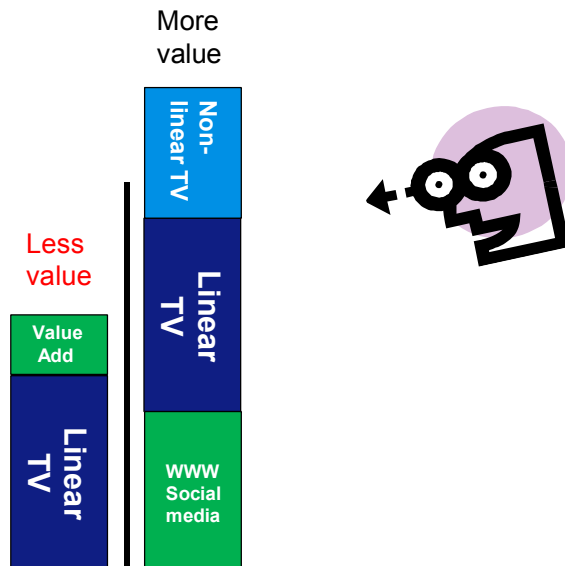

Figure 7. A concept of seeing broadcast values from a broadband value framework.

3.5 Should there be a bridge between broadcast and broadband?

Assuming there is disruption, a couple of questions remain: Has the train already left the station? If it is just moving, how can it be jumped onto? What should broadcasters do? Our project presents one approach.

3.5.1 Need for convenience

To catch a large audience, convenience is key. There are quite a few success stories underlining the importance of uncompromised user experience, take Apple and iTunes as an example. Thus, if a broadcaster were to provide slick change from broadcast to its broadband services, the users would be more likely to use it. Eventually, the difference between broadcast and broadband will not need to be visible to end-users.

An example of a broadcast-broadband synergy is one of the 'red button' services by the BBC: if a user misses the beginning of a television show, he can push the red button on the remote control and watch the programme from the beginning. Technically, this means moving from broadcast to broadband, but from the user's perspective it does not matter which network is in use. The broadcaster is the one who provides the service, period.

Related to the subject, there is a question: which device will become the 'first screen'? Traditionally, it has been taken for granted that a stationary TV set is the 'first screen' and a handheld device the 'second'. In Nelme, we expect that the terminal device, *which we use first,* has the best stakes to become the 'first screen'. This may happen if it continuously fulfils the momentary needs. In Nelme, a group of ten forerunners were interviewed, of which a vast majority switched on a tablet or laptop first instead of a TV set. This may imply that a personal computing device could become the 'first screen', taking the following further:

- A tablet or a smartphone can use a stationary TV set as a display at its native resolution.
- Wireless connection technologies for using TV sets as displays for tablets and smartphones are emerging.

These users may well slip to broadband altogether. When it comes to the general audience of today, however, we should start thinking about *how to keep the TV set as the first device to be switched on*. Which services should we provide there? How can subsequent actions be directed to the services provided by broadcasters?

3.5.2 Broadcaster assets for broadband

At IBC2012, one message was presented repeatedly[25]: current broadcasters should take advantage of the Internet instead of seeing the Internet as a competing threat. The broadcasters have two key assets for successful broadband launch:

- an engaged audience
- original programming.

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[25] IBC2012 (2012). Related speeches, e.g. by Brian Sullivan/Sky Deutschland (CEO), Daniel Danker/BBC (General Manager, Programmes & On-Demand), Mike Dorsey/BskyB (CTO)

For instance, Sky Deutschland produces and broadcasts the widely beloved domestic soccer league. It is fairly straightforward to offer the audience added value services on broadband and at the same time make it familiar with the non-linear services Sky Deutschland has to offer. It may be a slow transition, as nothing takes place overnight among the general audience.

If we consider these assets from the Finnish perspective, Yle seems to have an edge with a high degree of domestic original programming. Furthermore, the Yle audience was at least fragmenting during the digital switchover, proposing that there is a high degree of engagement for Yle. A large degree of the Yle audience has also already become familiar with Areena, the non-linear platform of Yle, not only having television and radio content but also children's games etc. Commercial broadcasters could consider their position accordingly.

3.5.3 HbbTV as the bridge

To create hybrid services, an appropriate platform is essential. Unlike broadband, for which numerous proprietary solutions may co-exist, *broadcasting must be based on standards*.

During the time of the Finnish digital TV switchover, MHP was promoted as the value added platform. It failed miserably by falling into too many expectations, too high a price for consumers and intolerable usability, especially regarding the utterly sluggish start-up and response times.

However, MHP could have had its moment by entering the market as a new generation of teletext. The way it was promoted, however, promised more than teletext: it was a platform for the information society that was for everyone. The services had to meet the over-inflated promises, consequently consumed too much bandwidth and failed to penetrate the market. With a state-of-the-art alternative, would now be the time to forget the ghost of MHP failure and move forward?

Worldwide there are a number of standards and activities for adding broadband services to broadcasts. Of them, HbbTV[26]/OIPF is the only pan-European standard and, thus, the only relevant option for the Finnish market at the moment. 'At the moment' means at least for half a decade. After a standardization activity has been established, it takes years before a standard is ratified, after which it takes about two years to roll it out to the consumer market in quantities. As the European standardization HbbTV is active, there is hardly any room for competing activities of the same scale.

Having said this, it should be noted that a number of non-standard approaches have been presented to support broadcast-broadband interaction too, especially in

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[26] European Telecommunications Standards Institute (2010). Technical specification, Hybrid Broadcast Broadband TV, ETSI TS 102 796. Accessed in December 2012 at http://www.etsi.org/deliver/etsi_ts/102700_102799/102796/01.01.01_60/ts_102796v010101p.pdf

IPTV receivers and in various second screen innovations. From a consumer point of view, they address similar needs to HbbTV. However, they fail in keeping broadcasters in control unless a broadcaster goes for proprietary consumer electronics business.

HbbTV is *the* standard, that is, if any.

3.5.4 The choice to make and its implications for production

It is essential for the broadcasters to get traction in broadband. To face the future of broadband, the broadcasters have a choice to make:

A. Stay in legacy broadcasting while also providing services in broadband.
B. Position themselves in broadband and use broadcast as a diversifying asset.

In option A) the broadcaster positions itself to broadcast, considering broadcast content as its main offering. Production may also take place as usual, adding some flavour of value added services. In Figure 8, the cornerstone is in broadcast and other operations are subject to it.
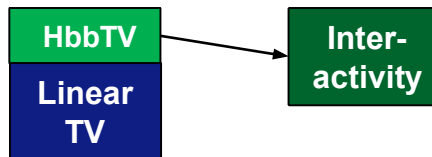

Figure 8. HbbTV as a technology for value added services.

This option is not likely to attract the audience, which is already adopting broadband habits. It would be more likely to slow down the movement from broadcast to broadband. With this approach, the broadcaster aims to keep the pace set by broadband entrants, maintaining the main business and production in linear broadcasting.

Option A is close to the Nelme 2016 sub-scenario 'Value–added services', which the project did not expect to gain importance.

In option B, the broadcaster changes its perspective to be an interactive media company, having the production to support broadband first. In producing fiction, for instance, the richest storytelling may take place in the non-linear broadband domain, whereas broadcast follows just one storyline and helps the audience find the story. In news, the main target may be in broadband, while broadcast content is a by-product. Figure 9 illustrates the idea of having HbbTV as a bridge between broadcast and broadband services.

Figure 9. Producing interactive media enhanced by broadcast, HbbTV acting as a bridge between the services.

As it has its cornerstone in the Internet, option B would provide flexibility and expandability. Operating natively in the Internet domain would bring the broadcaster part of the value network there.

Option B is close to the Nelme 2016 sub-scenario 'Proactive broadcasters,' which was expected to gain importance due to the (weak) signals.

The Nelme project had an opportunity to get an insight into Yle production 'Uusi päivä', which already has flavours of option B. The production processes are described in more detail in Appendix 2. On the other hand, Nelme Pilot 1 had an approach to producing news content first for the web, once again in line with the same option B, while two other pilots focused on HbbTV services. A report on pilots can be found as Appendix 3.

As a final note, *the Internet is more than a pipe between a content provider and the end-user*. It is a platform for business, co-operation, novel concepts and new terminal types. Instead of expanding the market, it may cause price erosion both in production and in end-user services.

4. Towards an integrated production concept

In the previous section, the strategic options for the development of the electronic mass media were outlined. Option A outlines a strategy for maintaining the current broadcaster identity with a gradual adoption of the new possibilities that the Internet provides, while option B is more radical and implies a change of identity to a broadband actor with full use of the benefits of broadcasting. In this chapter, these options are considered from the point of view of production.

4.1 Responding to the general trends of electronic mass media

In the earlier phase of the NELME study, current advanced production examples in radio and TV broadcasting were studied. These cases were 'The Voice Heräämö' representing radio broadcasting, 'MTV News' and 'Yle Uusi päivä' representing TV broadcasting[27]. On the basis of these cases, NELME road mapping and additional literature[28] assumptions were made of the future development of the ways of organising production and designing work processes. As a synthesis of this work, a hypothesis was formed of the new form of production or production paradigm. This paradigm can be labelled as an integrated production concept [27].

The new integrated production concept was conceived to have two major features: its existence is based on a service-oriented business model and it exploits a non-linear and multimodal production process. In the definition of the concept, the distinction between broadcast and broadband does not take a central role. In this sense the new concept is not technology driven but rather service and end-user driven.

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[27] Norros, L., Liinasuo, M. & WP2 partners (2011). Production Processes and Workflows. Concept of Operations analysis for projecting New Electronic Media Production. NELME WP2 Report, VTT.

Figure 10 depicts the generic model that was outlined of the integrated production concept. The production is organised in a networked manner and content creation and management are the pivot of three other critical functions of the process, i.e. planning and processing, publishing, delivery and use, and archiving and access. An important generic feature of the concept is also that interaction between professional producers and consumers, who could rather deserve the title of prosumers, is frequent in all the functions of the production.
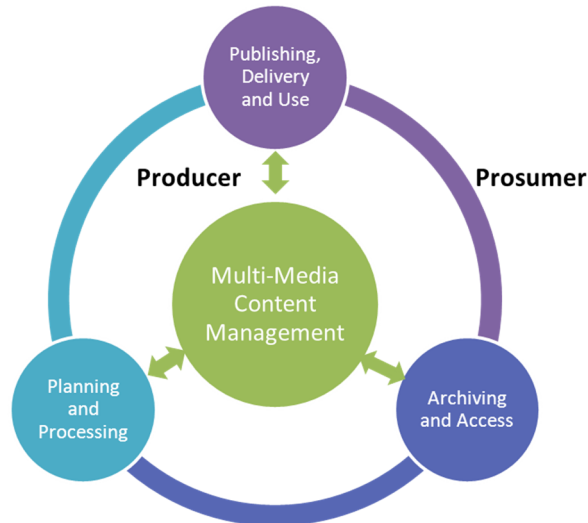
Figure 10. Integrated production concept of future electronic mass media.

In order to study more concretely what the proposed integrated production concept would require from the work processes and tools, or of the competencies of the different actors, production pilots were to be designed and analysed. The aim of the pilots was to demonstrate how a service-oriented and non-linear multimedia production process can be developed and how the user demands for non-linear consumption and new types of user experience are to be realised. In the selection of the content of the pilots, the results of the case studies concerning current production were exploited. From the Nelme road maps 2012 and 2016, the predicted scenarios of 'Personal viewing', 'Nonlinear TV' and 'HbbTV' were considered important components of future broadcasting and, hence, ideas from these were seen to be relevant in designing the pilots. According to the judgements of the broadcasting technology experts within Nelme, the use of tablets and Internet services in interaction with large TV screens will be realised under any conditions. Hence, this phenomenon should also be portrayed in the pilots.

4.2 Review of production pilots

This section reviews the pilots developed in Nelme by the industry partners. A short introduction to the pilots is given in the next section, and a more detailed description can be found in a separate report indicated in the appendices of this document.

4.2.1 Mapping pilots with the integrated production concept context

Three separate pilots were developed during spring 2012:

Pilot 1 was titled 'Future production processes, tools and automatic production of supplementary material', led by Jutel. This pilot was aimed at clarifying future production processes. It was divided into three main tasks: the first one focused on conceptualising the future news production process, the second one focused on the means of producing supplementary material automatically and the third one demonstrated the possibilities of Hbb radio. This pilot adopted a comprehensive view of the production process and developed a proposal for how work could be organised in news production. The results were produced in five workshops, the material of which was systematically refined. Task 3 was accomplished in collaboration with Sofia Digital.

Pilot 2 was titled 'HbbTV vs. tablet as a second screen'. It was led by Sofia Digital. The focus was to elaborate different Internet-based services that could be implemented by using the HbbTV standard. A further aim was to test services that could be suitable for combining these services with a hand-held device, either tablet or smart phone, representing the so-called second screen service. Compared with Pilot 1, this pilot focused more on new forms of publishing and delivery. One of the main aids of the applications tested was that they should run automatically and not induce any or very little demand on work and work processes. Pilot 2 used work shopping as the main method and organised 4 larger workshops with additional small-scale technical meetings. Pilot 2 collaborated with Pilot 1 in the HBB radio study.

Pilot 3 was titled 'Content management and processes in linear and non-linear production' and was led by Tieto. The pilot focused on several issues of content management. It was particularly interested in questions related to evaluation production formats and file handling. Production planning issues and programme planning issues were also dealt with. Work was accomplished in workshops, which were reported to have suffered of lack of participants. Hence, the pilot urged to gain from collaboration with Pilot 2 on the topic of HbbTV – second screen services. A third area of interest in Pilot 3 was consumer comprehension of risks of new media services and their reactions to new equipment and user interfaces. This topic does not belong to the focus of this chapter and its results are not reviewed here.

The focus areas of the pilots are mapped on the integrated production process model in Figure 11. As the figure indicates, Pilot 1 is comprehensive and has connections to all the production functions, whereas the two other pilots highlight more specific aspects of the process and can be seen to elaborate Pilot 1.
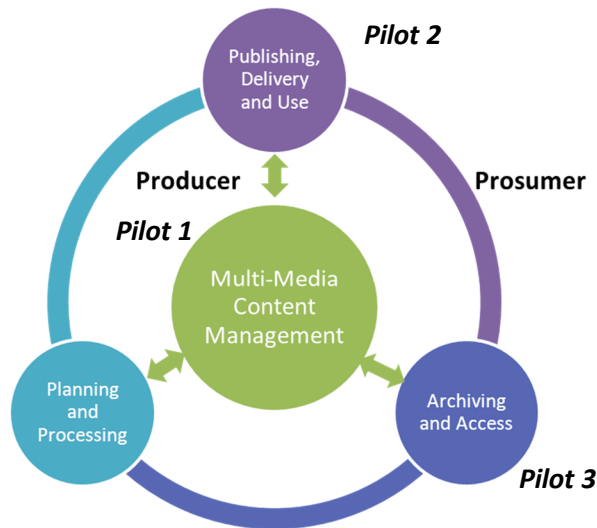

Figure 11. Mapping the pilots with the integrated production concept of future electronic mass media.

4.2.2 Characterisation of future production in light of the pilots

The pilots provided interesting insights regarding the challenges and possibilities that need to be taken into account in the production processes, assuming the changes in the strategies of the electronic media actors described in earlier chapters of this report. In this review, the three pilots are considered as a whole, i.e. as a 'super pilot' of future production. The aim is to describe how the experts projected future production process characteristics in the pilot. The pilot will be reviewed in light of the dimensions that were found to be relevant when analysing the production case studies concerning current advanced production examples[27]. The emphasis in the pilot review is on the work processes, tools and personnel competences.

   Business concept. Here, the business concept refers to the issue of how electronic mass media is positioned between the traditional broadcasting orientation and the developing broadband possibilities, and how electronic mass media is aware of the emerging consumption habits connected to Internet-based media use. The business concept also refers to balancing between technology-driven and business-driven development. Considerations concerning the business concept were by no means the focus of the pilot work. However, the super pilot conveys

a clear inclination towards electronic media that would flexibly exploit broadband possibilities. This becomes clear through the pilot's assumption on availability of Internet broadband connections, preferably also a WLAN access point support station by the households and via boosting multimedia production processes through which media content can be flexibly used in different delivery channels. The pilot work also brought up that technological enablers are not sufficient pre-conditions for adopting the new business concept. It was observed, that there is a need to develop an organisational and production culture that supports the new business concept. In this respect, different media companies currently appear to have different readiness to apply the new business concept and exploit the multi-media production fully.

Production concept. The production concept refers to the general approach adopted in organising production. The commonly used distinction on this issue is linear production vs. non-linear or parallel organisation of production. In the pilot, a strong pre-assumption was that in the future, production will be organised in a parallel manner. This non-linearity was conceived as one of the main challenges for managing the new production processes.

Production functions and technologies. This dimension refers to what are considered to be the primary functions of production needed to obtain the business goals and what the technologies are that are considered critical in enabling these functions. If the above-described integrated production concept (Figure 10) is taken as a reference, the main production functions are multi-media content management, planning and processing, publishing, delivery and use, and archiving and access. As regards the pilot work, it appears, as the model also assumes that content management is considered the central function, around which the other three functions are active in a parallel manner. The pilots focused on the detailed analysis that planning and processing processes (of news production) and developed detailed proposals of how the planning and processing functions could be accomplished with regard to news production (see the next section).

Publishing and delivery also gained much focus. This was reflected on in the attempts to study the HbbTV standard and its capabilities to support a new type of programme list service, additional Internet content on the TV screen, additional Internet news content on TV news and other TV programmes and, finally, diverse forms of second screen services. The leading design rationale here was that these new delivery services should be made available automatically, without introducing extra work processes. The pilots were technically successful, as demos could be established. The aim of an automatic supply of additional services on TV is achievable when the TV programme already has a www-service available. If the additional services should go much beyond what the existing www-service provides, more effort would be needed to establish them, and new work processes would probably also need to be established in the production. (Details are provided in the final report of the pilots; see the appendices.)

The archive and access functions deserved less attention by the pilots. In the case studies accomplished earlier on the current production[27], the archive and

access functions were found to be very challenging and resource-intensive functions that would deserve attention in the future development of the production.

In the integrated production concept model (Figure 10), one important message is that the consumers take an active role in the formation of the electronic mass media. Such close interaction between production and consumption naturally shapes the production and the way it maintains the central functions. This issue was not tackled by the pilots directly, i.e. no deliberate solutions were created to enable interaction, but challenges that increased consumer interaction would create production processes and demands on work practices of the journalists/reporters listed (see below).

Work processes and personnel competences. With this dimension, we refer to the actual processes of work and to the competences that are required of human actors to accomplish these processes. The pilot tackled this issue by assuming a particular production, i.e. TV news. This choice of programme content was motivated by the possibility of demonstrating extensive multimedia delivery demands on production. This programme also has strict temporal constraints, and the current organisation of the production focused on fulfilling these, i.e. it is oriented to deliver set news broadcasts. One advantage of this choice as pilot content was that in the earlier phase of the Nelme work, MTV News had been studied as a case. Insights into the current constraints and ideas for new concepts could also be drawn from its results.

In the pilot, the delivery options were first analysed as potential routes through which multimedia news delivery could take place. Altogether, nine delivery channels could be identified ranging from traditional linear TV broadcasting and radio broadcasting through diverse Internet-based forms of publishing to different social media publishing forums. As a lessons learned from this analysis, taking into account the current Yle news production process, a proposal was made of a future news production process (details are provided in the final report of the pilots; see the appendices).

The main focus of the pilot was to enable distributed and parallel production of news and the delivery of the content as flexibly as possible into different publishing channels. One of the core demands for the editorial personnel is to orient well into the external world for identifying news items and to maintain a 'common operational picture' of the continuously on-going news production process, including the delivery via diverse channels. Different constraints and restrictions, and quality demands on information that need to be considered in the delivery were also considered in the design of the new concept. There were several new solutions that the pilot proposed to the organisation of the production to enable these aims.

A scrum-type process for the generic organisation of the news production was proposed. The scrum process is an iterative development of outputs that enables an emergent but manageable production process when the process and output cannot be strictly pre-defined. The pilot proposed an implementation of the scrum process for the news production that could be studied further in the pilot report (see appendices).

The editorial item basket was proposed as a main tool to enable an emergent and manageable iterative news process. The editorial item basket is an artefact to support the complex process of creating meaningful and interesting contents and managing a large amount of information. This artefact, which is supported by improved means of creating associations between editorial items, would support individual journalists and their collaboration while identifying and creating news by enabling an illustrative overview of the emergence of news contents. The editorial item basket would also support the news manager to maintain an oversight of the content production.

The concept for an editorial environment and user interface was sketched in the pilot. The environment would provide an overview of the current state of the main functions of the news production process. (See further the final report of the pilot in Appendix 1.) A need was identified to provide tailored views for different actors of the news process, e.g. journalists and news managers.

The demands that the exploitation of the proposed production would make on work were also considered in the pilot, due particularly to the many experts on news production who participated in the development of the concept. The central observations with regard to future work were that the editorial item basket type of solution would provide added value by improving the creation of meaningful contents and maintaining the common operational picture during the complex, fast and continuous news production and publishing process. A clearly expressed demand by the news production actors was that the editorial environment should not restrict or shape the news creation too much. There should be a possibility to use the system in different modes. Automatic aids, information structures and interfaces should be very well designed so that no excessive burden on information input would be caused and the use would be easy. The importance of consumer participation in the news process was identified and a number of constraints on both the production technology and the journalists' work demands were mentioned. The main trend there is that beyond the still relevant journalistic competences and the ability to master different styles of creating news and technologies, depending on the publication channel, capabilities to act as leaders or moderators will be demanded. The control of own work also changes as the published news will live and develop further in other publication channels.

Quality of output and desired user experience. This final item refers to the significant determinant of the entire production process, i.e. the quality of outcome and the effects that are aimed for among the final consumers and in society. This issue may be viewed from at least two different perspectives. First, it is possible to consider what the internal criteria of good production are for the production process. In this issue, we may refer to criteria like multimediality, i.e. exploiting diverse delivery channels and perceptual modalities; topicality, i.e. content-orientation; and visuality, i.e. illustrative presentation of the process. These criteria were developed on the

bases of earlier literature[28] but would need development and concretisation to fit the electronic mass media production better. In the pilot work, the multimodality goal was very important and it was made explicit. The topicality aim was touched on in developing the editorial item basket. This quality characteristic could deserve even more emphasis as content has been identified as a key business factor and content management as the central function of the new integrated production concept[27]. The illustrative presentation in production was identified as an important enabler of a good overview of the production process. The illustrative presentation is also a central quality demand in the presentation of contents in different channels. This aspect was dealt with in the pilot in connection with identifying the different competence demands that publishing in different channels requires.

The second aspect of quality is the reactions of the consumers. In the NELME project, this aspect has been dealt with in another work package, though it would probably also have deserved attention when discussing production. Within the production process, the aims of the user experience (UX) that the production would like to create would need to be clear. With reference to the discussions within the production pilots, at least one UX goal was explicitly mentioned, i.e. emotionality. By this, the pilot partners meant the aim of the electronic mass media production to create emotionally laden experiences within the public.

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[28] Oittinen, P. (2011). Media content access, production process and tools. PowerPoint presentation. Accessed in December 2012 at http://www.nextmedia.fi

5.   Conclusions

We believe that the Internet is a disruptive technology for broadcasting in Christensen's sense.

We also believe that once the disruption begins, there may be a quick change, following the examples of print media and the record industry in the U.S., in our case accelerated by a change in content acquisition.

We presented two strategic options for broadcasters:

A.   Staying in legacy broadcasting while also providing services in broadband.

B.   Positioning themselves in broadband and using broadcast as a diversifying asset.

When interviewing forerunners (in the context of television), linear television did not play a significant role. Furthermore, current pay-TV channels did not fit into its media use habits and expectations. Broadcasting, however, had an important role for families with children.

For a broadcaster, it is a safer option to start thinking of the offerings and production from the Internet perspective, having broadcasting as a diversifying asset (option B).

A convenient bridge between broadcast and broadband is to familiarize the general audience with the broadband offerings of the broadcaster. It would be essential for broadcasters to turn viewers into an engaged audience and take them into the broadband world of broadcasters.

Due to standardization, the only feasible platform for a convenient bridge now and in the foreseeable future is HbbTV. It is *the* platform a broadcaster can control.

The integrated production concept proposed in NELME does not emphasize the distinction between broadcasting and broadband on a general level. The concept defines higher level service and production functions that combined broadcast/broadband-based production should be able to deliver. It is evident, however, that already in the cases analysed in defining the concept (especially the Yle 'Uusi Päivä' and 'MTV news'), and even more in the production concepts developed in the pilot, features that could be linked to the strategic option B are emphasized.

An important observation of the pilot was that the restricting factors in the development towards option B were probably not technological but rather social, i.e.

it deals with the capability of the broadcasting organisations to adopt new production practices and culture.

Promising proposals were outlined concerning the organisation of future production in the case of news. The pilot was designed for the comprehension of a vast information supply, identifying meaningful news contents by developing a common operational picture of the news production and publishing process. The importance of the role of consumers in the production was identified but not demonstrated concretely in the outcome of the pilot. Nevertheless, the proposed iterative organisation of production and the editorial environment as a generic tool in accomplishing the production process were considered promising by the news production professionals who commented on the pilot work. More profound and systematic elicitation of domain expertise would be needed to develop the concept and its evaluation in the future.

Acknowledgements

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Appendices

The appendices will be available on request.

1. Nelme forecasting process
2. (Weak) signal impacts on 2016 scenarios
3. Pilot 1 report
4. Pilot 2 report
5. Pilot 3 report
6. Pilot 4 report
7. WP 4 (Ambient Media Experience) report

Title	**NELME – Next Generation Electronic Media Multi-production and Multicasting Processes, Services, Solutions and Tools** **Conclusions**
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Abstract	The Nelme (New Electronic Media) project had a mission to provide justifiable predictions of the most presumable and critical futures of electronic media, more specifically, electronic mass media, and, even more specifically, the future of the 'broadcast' as we know it today by the year 2020. To accomplish this task, a research framework was created to describe relationships and causalities between interdisciplinary trends and issues related to broadcasting and electronic media. This report supplements the intermediate report by Nelme 2016 Foresight with results of (weak) signal analysis and potential consequences in linear broadcasting, related to the analysis. Internet delivery is seen as a disruptive technology in Christensen's sense. This theory supports the (weak) signal analysis and is used to extrapolate the history of Internet delivery and broadcasting to the future. As a synthesis of the experiences from the current production, completed by the observations of the Nelme road maps with regard to technology and business development, a new electronic media production concept was outlined. Two user groups of forerunners (in the broadcasting context) were interviewed and the interviews are reported in this paper. Linear television did not play a significant role for them, and pay-TV channels did not fit into their media use habits and expectations. Broadcasting had an important role in families with children. Two strategic options were presented for broadcasters: A. Staying in legacy broadcasting while also providing services in broadband B. Positioning themselves in broadband and using broadcast as a diversifying asset. For a broadcaster, B seems to be the safer option. HbbTV is seen as a bridge uniting broadcast and broadband offerings. Furthermore, HbbTV is the only standard that would give the control to broadcasters.
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