PETER A. BRUCK
ANDREA BUCHHOLZ
ZEGER KARSSEN
ANSGAR ZERFASS
Editors

E-Content

Technologies and Perspectives for the European Market

Springer

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for the European Market

Peter A. Bruck · Andrea Buchholz
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(Editors)

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Technologies and Perspectives for the European Market

With 24 Figures and 28 Tables

Springer

Professor Dr. Peter A. Bruck
ICNM – International Center
for New Media
Moosstraße 43 a
5020 Salzburg
Austria
bruck@research.at

Dr. Andrea Buchholz
Dr. Ansgar Zerfass
MFG Medienentwicklung
Baden-Württemberg GmbH
Breitscheidstraße 4
70174 Stuttgart
andrea.buchholz@gmx.net
zerfass@mfg.de

Zeger Karssen
Digital Dispatch
45, rue de Belleville
75019 Paris
France
zkarssen@digit-dispatch.com

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Editorial

Every technology is only worth as much as the benefits that it has to offer. This is especially true with regards to the new digital technologies that surround us everywhere we go, in the shape of the Internet, PDAs, mobile phones or all the other digital devices that have become an integral part of our everyday life.

Technology is not used for technology's sake. It is always some content that we are looking for when using all those digital devices. Technology offers us the means of making our lives easier, but only through giving us more efficient access to content. We are looking for a specific information when using search engines, we want to acquire a certain skill when taking part in E-Learning, we want to be entertained when playing games on our mobile phones.

Content is king in the digital world. But content is also an economic factor, and it is especially important for the European Union with its ambitious goal to become the most competitive and dynamic, knowledge-based economy in the world by 2010, a goal often called the Lisbon process. With the enlargement of the European Union in spring 2004, new opportunities in the field of research and technological development as well as business cooperations are opened up. Cross-border cooperation becomes an important factor. One prominent field that is likely to profit from this development is the information and communication technology sector, as well as the multimedia branch and with it the whole E-Content industry.

This in mind, eleven partners from ten European countries – five of them from the new member states – collaborated from 2002 until autumn 2004 in a joint EU-funded project with the aim of "Anticipating Content Technology Needs". This initiative, abbreviated as ACTeN, dedicated itself to supporting the business community and strengthening the multimedia sector in Europe by stimulating innovation in tools, technical environments and product features. This book draws on the work of the project and presents edited and rewritten versions of some of the deliverables. The publication is undertaken as part of the exploitation of results and funded by partner resources.

Architecture of the Initiative

Charting the field of E-Content is a difficult task as technical, economical, and creative trends in this field are linked in highly complex ways. In order

to approach the field from various sides and offer multiple perspectives the ACTeN project used three different methods: 1) Business Roundtables in major European countries that gave practitioners the chance to bring together the different views of supply and demand of E-Content services and to understand how their counterpart is thinking; 2) Scouting Workshops where E-Content trendsetters presented their work to a business and scientific audience and gave insights at the edge of innovation, thus starting a transfer of excellence; 3) Scholars' Network Conferences where leading researchers presented their projects on the subject of E-Content and discussed problems and solutions of today's research in the field. With the presentation of extraordinary solutions and the various meetings of all parties involved, ACTeN helped to understand market developments better and has built a bridge between science and business.

In the course of the project, the general need for summarising the findings according to several fields arose, and thus the idea of "E-Content Reports" was born. Those reports were meant to provide readers with an overall view of the main issues of a specific field, a description of the major players in the market, a description of its trends and of the market's future developments. Because descriptions of the historical development of the field are available, the main attention was directed towards the present situation and future possibilities. The topics selected are covering the whole spectrum of E-Content, analysing some of the most innovative and seminal areas. Some of the chapters of this book are based on these E-Content-Reports while also additional chapters and resources were added.

Resulting Structure of This Book

The book is divided into *three main sections:* The section "E-Content Market in Europe: An Overview" charts the economic side of the E-Content sector in Europe, thus giving an idea of the market conditions in which all E-Content activity takes place. In the section on "Content Applications: Selected Cases" the articles deal with the predominant fields of E-Content. The last main section, "User-Centric Content Production and Interaction", focuses on the end user and his or her modes of using E-Content. The book also features an outlook together with a guide to important resources on E-Content in Europe.

The introductory chapter by Andrea Buchholz and Ansgar Zerfass, "*E-Content in Europe*: *Dimensions of an Emerging Field*", gives a well-founded definition of the term E-Content, something that has been missing both in theory and practice until now. After a stocktaking of the market,

the chapter then introduces major trends and challenges facing this emerging field as well as some findings and recommendations that result from the ACTeN project.

"*Digital Media Service Business*" by Tommi Pelkonen presents an analysis of the current position of digital media companies within the overall value creation process. The article also discusses the market development and presents the key trends that this industry is being confronted with nowadays.

In the next contribution, Jak Boumans deals with the hotly debated issue of "*Paid Content: From Free to Fee*". Especially since the dotcom crisis, it has become clear that online advertising is not sufficient to fund expensive online activities. Thus, a change is currently occurring towards paying for consumer content and trade information. The article combines a look at the Internet and at mobile services.

Attila Nagy then presents the field of "*E-Learning*" as one especially prominent case for E-Content applications. Due to our emerging knowledge economy and the information society, there is a higher demand on the individual for continuous personal learning development. E-Learning promises to offer the means to achieve this in a modern and efficient way. The article thus presents what E-Learning can and cannot do, and what might be future trends in the field.

A different, yet equally promising field of E-Content applications lies in "*Scientific Publishing: A European Strength*", as presented in the chapter written by Zeger Karssen. The possibilities of the Internet and E-Content have challenged the traditional structures of scientific publishing in the fields of Science, Technology, and Medicine (STM) and new business models emerge. This development comes along with a concentration in the STM publishing industry, where in the long run only the biggest players will be able to run profitable online journals.

"*Mobile Games: An Emerging Content Business Area*" are the topic of another chapter by Tommi Pelkonen. The author makes an inquiry into the entertainment possibilities of mobile phones. While games are a common application on computers and consoles already for decades, they also have conquered the mobile phone by now. The chapter illustrates selected key trends in the mobile game business market, including the value creation process.

The final chapter of this section by Jak Boumans deals with "*Cross-Media on the Advance*". Cross-media is a catch phrase in the contemporary media landscape, where content creation for convergent media opens up new markets across media. The chapter reflects upon impacts on the content production chain, the application fields, business models, and the future of cross-media.

A discussion of "*Interactive Digital TV in Europe*" by Janne Orava and Mika Pertulla opens the section on user-centric content production and interaction. Through digitalisation, television is now facing the biggest change process in its history, and all players in the European TV industry are affected by this. The article sheds light on this transition and highlights implications for the broadcast markets.

The article by Ansgar Zerfass and Bernd Hartmann on *"The Usability Factor: Improving the Quality of E-Content"* deals with an increasingly important aspect of digital media: The need to make applications, namely websites, mobile services and online games, as easy-to-use as possible. Business models will pay off if the user is able to access valuable E-Content in an efficient and satisfying way. The chapter discusses the concept of usability, its social and economic implications, methods of usability engineering, and major fields of application.

The section concludes with an overview over "*Experience Machines: Capturing and Retrieving Personal Content*" by Peter Werkhoven. As the permanent use of all kinds of digital devices from PDAs to mobile phones by major parts of the population generates unprecedented amounts of personal content, ways are needed to organise this flood of content in a meaningful manner. The chapter presents selected model applications that offer solutions to the problem, and also discusses social implications of a future where content is never lost.

In an outlook, Peter A. Bruck highlights the "*Prospects of E-Content in Europe*". He mentions past and present developments in the industry and sketches trends that pave the way into the future of European E-Content, also including insight gained from the ACTeN project.

The book concludes with "*A Guide to Resources on E-Content in Europe*" compiled by Andrea Buchholz, Bernd Hartmann and Swaran Sandhu. Information on E-Content is provided by different sources, e.g. online journals and portals, research projects dedicated to special aspects of the overall topic and branch associations. This chapter also portrays the partners who were involved in the ACTeN project and who have become centers of excellence on E-Content in their respective countries.

Credits and Acknowledgements

We would like to express our gratitude to the authors from all over Europe who agreed to have their texts published in this book. Bernd Hartmann and Swaran Sandhu from MFG Baden-Württemberg committed significant support in editing, layouting and proof reading this publication. We are

also indebted to Katharina Wetzel-Vandai from Springer, Heidelberg, for her support of this publication.

A research and dissemination project like ACTeN, combining eleven partners from ten European countries, spanning two years and reaching out to thousands if not ten thousands of people could only become a reality thanks to the overwhelming support of all the partners involved. These were: Digital Dispatch (France), ELET (Slovakia), EADIM European Academy of Digital Media (The Netherlands), Electronic Media Reporting (The Netherlands), ICNM International Center for New Media (Austria), OPI Information Processing Centre (Poland), SC ITC SA Institute for Computers (Romania), MATISZ Hungarian Association of the Content Industry (Hungary), MFG Baden-Württemberg Agency for IT and Media (Germany), MindTrek Association (Finland) and TC AV Technology Centre (Czech Republic). The European Commission funded the project within the IST Information Society Technologies action line; special thanks go to Werner Janusch for accompanying the initiative from Luxembourg.

Dr. Andrea Buchholz was a perfect project leader. Her work contributed to the excellent reviews given to ACTeN by the European Commission. Prof. Dr. Peter A. Bruck, the "spiritus rector" of the initiative, made sure that the project was intertwined with the EUROPRIX and World Summit Award networks. Those initiatives help to make multimedia innovations visible across nations and cultures, thus fostering achievements in content production and distribution.

Finally, thanks go to all the participants in the Business Roundtables, Scouting Workshops, and Scholars' Conferences. The success of the initiative and a lot of the insights reported in this book are due to your creative input and the points of view and experiences you shared in many discussions.

Stuttgart, Salzburg and Paris, February 2005

The editors

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Introduction

E-Content in Europe: Dimensions of an Emerging Field

Andrea Buchholz, Ansgar Zerfass

MFG Baden-Württemberg, Stuttgart, Germany

E-Content has come a long way: while it started mainly as text-oriented information on the Internet it changed rather speedily to multimedia content, rendering text, graphics, audio and video and combinations of these media types. By now, E-Content is also no longer a phenomenon of the computer only but has switched over to all kinds of networked digital devices, such as mobile phones or personal digital assistants (PDAs). This content explosion demands for an inquiry into the changes brought about in the different dimensions of content production and reception, such as the need for new business models, creation processes and modes of presentation. It also calls for a clarification of what we are talking about when speaking of E-Content. The term has become a buzzword of the new millennium, used in manifold ways. In this article, we will elaborate the concept of E-Content and establish a well-founded definition – something missing in theory and practice until now. We will then look at the dimensions of the market and sketch major challenges for the European E-Content industry. Finally, our article also presents some findings and recommendations resulting from the EU-funded research and dissemination project ACTeN (Anticipating Content Technology Needs), that ran from 2002 to 2004, and in the framework of which most of this book's contributions were produced.

1 Beyond the Technology Hype

When dealing with new media, it is normally just a matter of time until somebody quotes Marshall McLuhan's decades old saying that "The medium is the message" (McLuhan and Fiore 1967) – just as if this is the answer to all questions. What new media have to tell us is basically that they make things possible that were not possible with the older media. However true that may be, this insight doesn't offer any help once those new media aren't that new anymore but have rather created an industry of their own. The excitement over the newness of those media has calmed down and

they have become a regular component of society and economy. Thus, new media are no longer a fancy toy but they do have to serve a purpose. Customers and businesses in Europe nowadays start to reflect the limitations of technocratic visions in the same way philosopher Henry David Thoreau commented the American dream 150 years ago: "We are in great haste to construct a magnetic telegraph from Maine to Texas; but Maine and Texas, it may be, have nothing important to communicate" (Thoreau 1854, p 52).

In a situation like this, it is the content that comes to the fore again. If the initial phase of any new medium is much about technology and its promises, an old fashioned but solid factor like content is what really counts once we have understood the message of the medium.

Since the rise of the Internet in the mid-1990s, a lot of technology was developed while little focus was put on the content. Little thought was devoted to the question which kind of content would actually make sense to access online, and also how to use content to gain revenues. Instead, newspapers started to digitise the whole content of their print versions and published them online without any further modification. The surge was so strong that those who refused to jump on the train were immediately branded as not having understood the new information age. However, the crash of the new economy in 2000 put an end to this mindless trend and led to a reflection over how to actually use the new media in a meaningful way. Just like with older media the answer lies in the adequate use of content, not just in the technology.

Important lessons can be learned from the introduction of the video recorder: even a technically inferior device became the standard platform in Europe due to the superior content available. The more advanced German Video 2000 system lost the battle over the standard to the VCR system, due to the lack of enough movies adapted to this system (Heß 1993). Technology alone is quite obviously not sufficient: it is content that sells. When dealing with the new media, it has become customary to speak of E-Content when meaning content that appears online. However, the usage of this term is everything but clear. Therefore, a discussion of the concept and definition of E-Content appears necessary.

2 Defining E-Content

The term E-Content stands in a line of a large number of other terms that are being used in connection with new media without having a clear understanding what is actually meant by them. It has become common to add an

„E-“ to all kinds of fields: Government becomes E-Government, Democracy becomes E-Democracy, Business becomes E-Business, and so on.

Often it remains unclear, however, what exactly constitutes the difference between an activity and an E-activity and if there is one at all. Does adding the fashionable prefix “E-“ just mean that there are computers and the Internet involved in some way? But how does that make a difference? It should be clarified what exactly E-Content is supposed to mean and how it is different – if at all – from other kind of content.

2.1 From a Broad to a Narrow Understanding

A review of the relevant literature shows that a clear-cut and agreed-upon definition of the term is still missing. As a recent study notes “none of the international or national standard industrial classifications separately identify digital content products or industries” (Pattinson Consulting 2003). Although digital content has been the subject of debate at the OECD (1997, 1998, 1999), work on defining the content sector, digital content or E-Content has not proceeded for a couple of years now.

Thus, the term E-Content is used in a great variety of ways, often without clear indication of what exactly is meant by it. For example, in a collection of interviews that sprang from the United Nation’s World Summit Award 2004,[1] experts from a large number of countries worldwide were asked what E-Content means in their country (Manzar and Bruck 2004). Some speak of E-Content without defining it; others give definitions that differ a lot from each other. Therefore, people think about different concepts when speaking about E-Content. Some of the definitions are very broad (e.g. “E-Content is all forms of digital information that’s used for multiple purposes in different fields and areas” (Ibid., p 41)); others would also encompass broadcast media (e.g. “E-Content stands for products or services that are electronically delivered” (Ibid., p 271)). Most definitions thus base E-Content solely on the technological means of delivery (e.g. “…content that is in electronic or digital form” (Ibid., p 159); “…any information stored, processed or accessed by electronic means” (Ibid., p 306)). This view of E-Content is similar to a definition given by the OECD that understands the concept as encompassing all “data or information that can be displayed, processed, stored, and transmitted electronically” (OECD 1999).

However, approaches that define E-Content very broad carry some problems. First and foremost, one should make a distinction between data

[1] See http://www.wsis-award.org

and information: *Data* can be thought of as content only from a strictly technological point of view. Such a definition of E-Content would comprise any kind of data that appears on a screen, even the data produced when groceries are scanned when paying in a grocery store (Handshake Media 2003, p 33). However, these bits and bytes carry no meaning neither for the actors themselves nor for any observer of the situation. Therefore, it makes sense to think of content as being meaningful data or *information,* symbols that can be utilised and interpreted by human actors during communication processes that allow them to share visions and influence each other's knowledge, attitudes or behaviour.

But this doesn't answer yet what E-Content is in comparison to any other kind of content. Does the "E-" just imply a different means of delivery, or does the "E-" actually change what is delivered?

2.2 From Content to E-Content

Content has to be delivered by some kind of medium. Therefore, an inquiry into the history of media seems useful to track the specific attributes of E-Content.

Apart from the first medium ever in history – the human body – the media were always based on some kind of technology. Those technologies got more and more elaborated during the course of media history. This development is mirrored in the classical categorisation of media forms introduced by the German scholar Harry Pross (Pross 1972). He differentiates media according to the technology involved in their production and reception. Pross draws a distinction between primary, secondary, and tertiary media. *Primary media* signify those that are bound to the human body and do not need any kind of technological device, neither in their production nor in their reception. The natural language is the best example for this kind of media. *Secondary media* do need technology on the production side, but not on the reception side, e.g. all kinds of print products like books or newspapers. Finally, *tertiary media* require technological devices both for production and reception. All kinds of broadcast media like radio and TV fall under this category, but also film and CDs as well as the telephone and the networked computer. All kinds of new media are therefore tertiary media. But more generally this category encompasses all media that need electricity in their production and reception, whether the content is stored analogue or digital.

If one would understand E-Content quite literally as *electronic content*, it would thus be identical with the category of tertiary media, and digital content would only be a subcategory of that. Some of the definitions men-

tioned before could mislead to this interpretation. However, this is not how the "E-" is meant usually, and it is also not how E-Content is understood here. In fact, one must rather subdivide this category of tertiary media into media containing *analogue content* (video, broadcast TV and Radio) and *digital content* (DVD, Internet, Digital Radio). Digital content then consists of online as well as offline content. While *offline content* can be stored on a CD-ROM or a DVD, *online content* is always delivered via a network and allows for interactivity and feedback routines.

Only online content – this is our proposal – should be understood as E-Content in a strict sense. E-Content thus is a subcategory of digital content. It is necessary to point to this differentiation as the terms E-Content and digital content are often used as though they were the same. This is for example the case in the eContent programme of the European Commission where digital content is understood as "any information (interactive information, transaction, education, entertainment ...) published on any Internet platform, from the traditional web through wireless devices to Internet appliances and broadband video" (European Commission 2001, p 1). What is described here is actually E-Content, as offline content is explicitly excluded. On the other hand, the ever more important category of mobile content is ignored, which constitutes another limitation of this definition.

2.3 Towards a Qualitative Difference of E-Content

So far, our argument shows that E-Content is defined by different means of delivery. However, E-Content must also make a difference in qualitative aspects in order to distinguish itself from offline content or any other content, and thus to become a distinct content type. Only a qualitative difference gives us reasons for thinking of E-Content as a new concept and as the foundation of new business models and market segments. Indeed, it has been the big mistake of many dotcom companies that they were not able to create content that really made a difference.

E-Content defined as digital information that is integrated into a network has the potential of reaching another level of quality than any other kind of content. It may be changed within a couple of seconds, delivered to millions of people throughout the world, fitted to serve the need of specific communicators and recipients, stored and displayed on an ever-expanding number of devices like computer monitors, mobile phones, PDAs, interactive TV sets and many more.

Therefore, we propose the following *definition* of E-Content:

> E-Content is digital information delivered over network-based electronic devices, i.e. symbols that can be utilised and interpreted by human actors during communication processes, which allow them to share visions and influence each other's knowledge, attitudes or behaviour. E-Content allows for user involvement and may change dynamically according to the user's behaviour.
>
> It is a subcategory both of digital and electronic content, marked by the involvement of a network, which leads to a constant renewal of content (contrary to the fixed set of content stored on a carrier such as a CD-ROM, or the content broadcast via TV and Radio). This constant renewal of content in tie with its dynamic change allows for a qualitative difference, thus making it E-Content.

This concept is also supported by media history (Stöber 2004). While all the media that evolutionary developed do not replace each other and can exist at the same time, it is also true that each new medium builds on the former ones but expands the possibilities of what one can do with media. New media thus allow for new kinds of content that were not possible before. The invention of writing allowed for a new kind of organisation of knowledge distinct from the oral tradition; the invention of photography allowed for snapshots of reality; the invention of broadcasting allowed for radio plays.

So while each new medium opens up a whole new world of content opportunities it also brings with it a number of *new requirements and demands* that need to be dealt with in order to fulfil the promises. These demands can be divided into several levels, i.e. the *creation, technological and business* side of the new medium.

For example, with the invention of newspapers, the creation side had to deal with the question what qualifies as "news" and what is suitable journalistic writing, the technological side had to find ways of creating an adequate layout for the content with a satisfying print quality, whereas the business side had to come up with a suitable business model in terms of what content is worth and how to finance it, which in turn would eventually also lead to the rise of press agencies, freelance journalists, and public relations departments. A grander perspective would also include the changes brought about on the content reception side as well as the political and societal impact of content. Any new medium demands for a specific media literacy of the recipient: you have to be able to read to benefit from a newspaper. On the political and societal side, emerging media and their content were elementary more than once in the development of modern democracies.

All these dimensions are also relevant when thinking of E-Content and how it makes a difference. After a stocktaking of the European E-Content market, we will then chart the dimensions of the concept by looking at the technological, business and creation side of the game.

3 Stocktaking of the European E-Content market

In Europe content plays a key role both on the economic and the social side (Bruck 2002, 2005). The sheer size of the content economy at the beginning of this century has been estimated at more than € 400 billion, with over 4 million people employed in this sector (European Commission 2001, p 1). This number, originally proposed by the European Information Technology Observatory, was also confirmed by OECD reports. Content here refers to all kinds of media publishing, marketing, and advertising. According to this estimation, digital content made up for € 50 billion of the size of the whole content industry in the year 2000, with numbers increasing.

3.1 The Symbiosis of ICT and E-Content

However, one has to keep in mind the rather turbulent years that the digital media industry has gone through since then. The slowdown of the information and communication technology (ICT) market also affected the E-Content sector. The steady growth stopped and the market size remained at a certain level for some time as there has been a tendency by major media companies to freeze all kinds of E-Content production after the dotcom crash, focussing again on their core competencies. But while it is true that the expectations that were uttered at the peak of the Internet hype were exaggerated, it is also true that the rather negative vision of the ICT market – and the E-Content industry in tie – that followed afterwards does not have any grounding in reality either. Every single aspect of the value chain in businesses or non-profit organisations may be enhanced by implementing Internet technologies (Zerfass and Haasis 2002) and software is a major driver for innovation even in very traditional branches. For this reason the ICT market remains a thriving force in economic growth, worldwide. A recent study by IDC supports this claim (IDC 2004). Even more significant, the market growth rate that has been slowed down since the crash in 2000/2001 is accelerating again. Although far from the growth rates of the late 1990s, the ICT market has left behind its negative trend after the crash,

and the growth rate is now back to an estimated 4% by 2005 (EITO 2004, p 3)

It is safe to assume a correlation between E-Content and ICT market growth. Access to content stays the main reason to engage oneself within the digital world (Forrester Research 2004, p 149). E-Content is also identified as one of the main drivers for future growth of the ICT market (Lamborghini 2004, p 16). However, clear numbers indicating the current size of the E-Content market in Europe are missing. This is not very surprising keeping in mind the mishmash of terminology in this field mentioned before, and it is even not clear in which sense digital content was understood with regards to the market size in 2000. That's why one can only estimate the actual size of the E-Content market in 2005, based on the growth rates of the ICT market since 2000. Taking the E-Content market size of € 50 billion as a starting point, this leads to the following result:

Table 1. Development of the European E-Content market (Source: own calculation; ICT market growth rates from EITO 2004, p 3)

Year	ICT market growth	Estimated E-Content market size
2000		€ 50 billion
2001	3.2%	*€ 51.60 billion*
2002	0.1%	*€ 51.65 billion*
2003	1.2%	*€ 51.70 billion*
2004	3.0%	*€ 53.25 billion*
2005	4.0%	*€ 55.38 billion*

According to this calculation, the *European E-Content market nowadays is worth about € 55.4 billion.* While this is obviously not an empirical number as there are more factors that play a role in the development of the E-Content market than just the ICT growth, it is at least an indication. Probably that number is even higher as especially the mobile content sector has grown considerably since 2000, and also the Central and Eastern European countries have caught up in E-Content.

If one looks at the usage and production side of E-Content, people and businesses in Europe are well under way in terms of *Internet usage.* According to recent numbers compiled by Morgan Stanley, 29% of all "onliners" live in Europe, compared to 25% users from North America (TNS Infratest 2004, p 164).

Compared to other regions of the world, however, a lot still needs to be done about the *production of E-Content.* While Europe is rather strong in the field of traditional content (for example print publishing), it has to gain

ground when it comes to the creation and exploitation of digital information and services. The majority of content on the Internet still originates from the US. But one must also note that there has been a rise in the websites created in Europe by companies and institutions, thus increasing the amount of genuinely European E-Content (European Commission 2003). For a European E-Content market it is therefore important to catch up on the production side of E-Content.

3.2 A New E-Content Market Situation

The E-Content market in Europe is undergoing a structural change at the moment. One of the most remarkable trends in the past two years was the fast *breakthrough of broadband.* This isn't only of technological importance, but also has implications for E-Content, both on a quantitative and a qualitative level. A large data throughput is now possible, downloading music and videos has become easier and spread rapidly. Playing streaming music and video has become common. E-mail messages have got bigger attachments containing photographs, graphics and movies. If E-Content started as a mainly text-oriented category with added pictures, now the audiovisual media types come into focus.

A crucial change for the E-Content industry also lies in the development towards *paying for content.* Beyond doubt there is much money to be made with E-Content. According to the German W3B survey (Fittkau & Maaß 2003) every third German already pays for E-Content. So the "free of charge"-culture with which the Internet started off is on its fallback. In Europe paid content is still a nascent industry but is forecasted to grow rapidly over the next four years and will be worth € 3.2 billion by 2007 (Jupiter Research 2003). 23% of the Europeans are predicted to make online purchases in 2007 with an average yearly spending of € 70 per buyer. According to Jupiter Research, the breakdown of consumer spending on paid online content and services remains diverse. Whereas so far the largest category of paid online content and services remains adult-related content, Jupiter Research predicts that by 2007 this pattern will change, with multimedia related content – driven by high broadband usage – taking the lead. The experts forecast that multimedia content will represent 50% of total paid online content and services spending, ahead of paid text and picture-based services, which will count for just 25% of consumer spend-

ing. For the first time, adult content will not be the primary generator of revenues accounting for just 25% of consumer spending.[2]

A recent report by the market research company IRN Research (2004) that focuses on the information industry gives further reasons why the European online information market will show growth: sales in the *online scientific, technical and medical (STM) information segment* increased by 24% at current prices in 2003. Although this high double-digit increase in sales is explained mainly by significant switching of spending from hard copy sources to new online services, the total European STM market increased by 6% in rather difficult times.[3] With these new opportunities new players and new roles enter the market, as pictured in Figure 1.

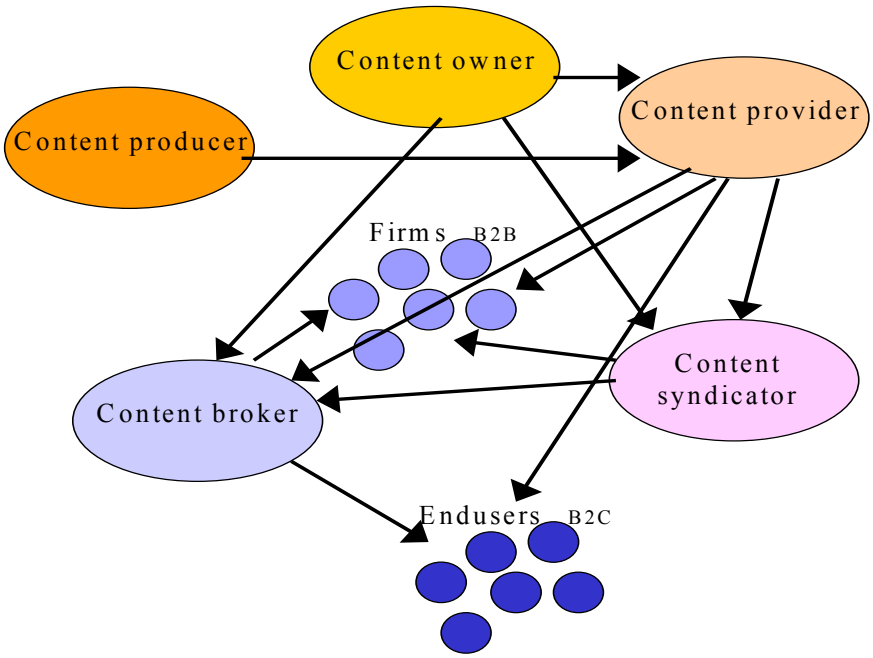

Fig. 1. The competitive environment and roles in the content market (Source: Schenk 2001)

[2] For further considerations see the chapter "Paid Content: From Free to Fee" by Jak Boumans in this book.

[3] For further considerations see the chapter "Scientific Publishing: A European Strength" by Zeger Karssen in this book.

3.3 The Rise of Mobile E-Content

The situation not only looks promising for E-Content on the Internet, but also for *information distributed via mobile phones.* Given the recent developments of the telecom industry, innovative content on mobile devices might matter as much as – if not more than – E-Content on the Internet. Europe is going mobile and has a leading position in the realm of wireless services. At the beginning of this century, the number of mobile users in Western Europe already doubled the North American market (European Commission 2001, p 1). Nowadays, 73% of all adults use a mobile phone regularly, and this figure is estimated to rise up to 78% until 2007 (Forrester Research 2004, p 197).

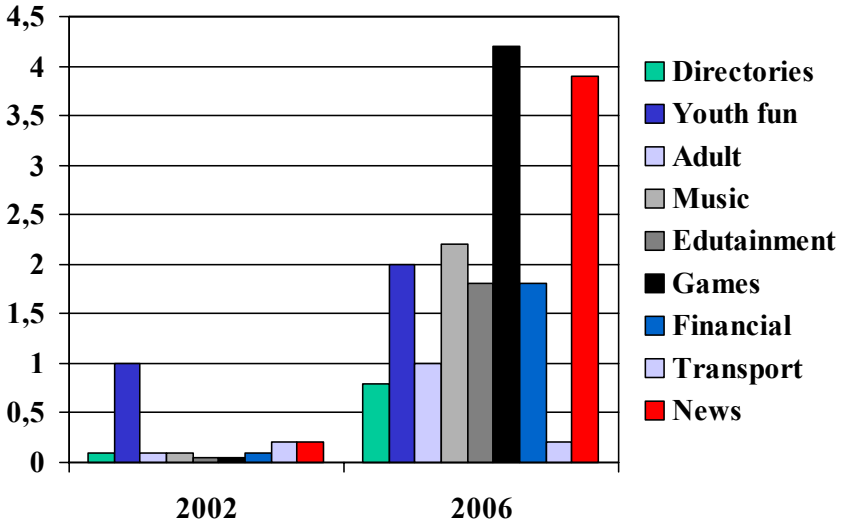

Fig. 2. Market size of content-centric mobile data applications 2002–2006, yearly revenue in EUR (Source: European Commission 2002, p 4)

Although mobile content applications are expected to make up just 4.6% of total mobile operator revenues and 7.9% of total content provider revenues by 2005 it will drive the consumption of content on more traditional media.[4] Today, ringing tones and icon downloads generate the largest part of the mobile content revenues in Europe. This shows that Europe today is still far away from exploiting its digital content via mobile applications.

[4] For further considerations see the chapter "Mobile Games: An Emerging Content Business Area" by Tommi Pelkonen in this book.

Nevertheless, providing content is seen as the most important value-added link in the value chain of mobile media and entertainment, as Figure 3 shows.

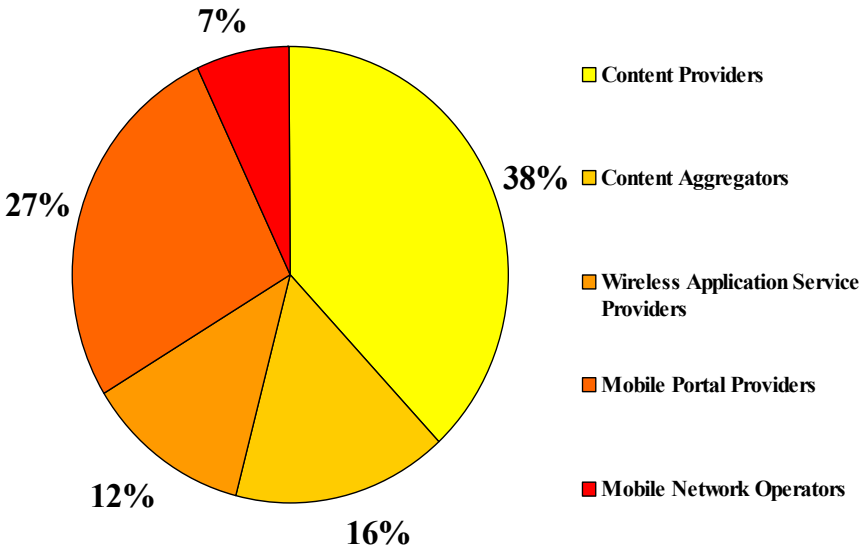

Fig. 3. Average split of content fees between mobile media & entertainment value chain players (Source: Ericsson Consulting 2002)

The *European mobile content market needs to be created.* Everything must be invented to reach the forecasted € 18.9 billion market: services and applications, a value chain, interactions between players, business models and customer segmentation. The successful creation of the market requires that a set of convergent forces drives all players in the same direction. The European mobile communication landscape today is populated with numerous players – handset manufacturers, mobile network operators, content providers, etc. – each competing to lead the market and striving to own the customer relationship. As a result, there is a lack of cooperation and ongoing conflicts between content providers and mobile network operators.

There is another factor hindering the development of the European mobile content industry: during the last years, the industry faced some difficulties in providing affordable handsets with the necessary features to use mobile content services. Also, high 3G license and network infrastructure costs have forced operators to become even more cost conscious. This results in the scrapping or delay of investments in key enabling technologies such as billing system upgrades and user localisation systems. In addition,

mobile operators want to control the largest possible part of the value chain in the hope of increasing their revenues. This reduces operators' willingness to provide access to their platform to third parties. The limited availability of sophisticated handsets justifies that potential players adopt a "wait and see" attitude. Finally, the proliferation of standards for the packaging and transmission of content over mobile infrastructure requires players to spread their investment capability over multiple technical options.

It still has to be seen whether users will move to access E-Content via mobile devices, adding this kind of usage to the existing success of voice and text messaging. Some voices say that the majority of users have no real interest in paying for anything except inter-personal communication from mobile devices. With this comes the question still to be decided: Will professional marketing, useful applications, speed to market and intelligent pricing enable the mobile to become a hand-held "everything" device? Or will health scare factors, lack of investment in networks and the dominant market position of telcos who are incapable of creating attractive content be predominant? These are the factors which will influence the take-off of mobile content in Europe.

4 Technological Trends and Challenges

4.1 Broadband and Its Implications for Europe

As already mentioned, there is a major trend in the European ICT landscape towards broadband connections. After incumbent telecom operators were summoned to unbundle the telephone line, dial-up started to disappear. The *advantages of broadband* were immediately apparent: It is much faster, the connection is always up; dial up and check in are no longer needed. And broadband is having – besides its core function to have a high data throughput – a major impact on the way people consume media at home in general. Certain content types – namely audio and video applications – have become common to download or consume via streaming modes, almost like broadcast media. Broadband technology will thus bring new market opportunities for multimedia solution providers and E-Content providers.

But while all European countries are developing their own IT industry and are working on improving their abilities in this area, the establishment of the *communication infrastructure differs between the European countries.* Especially with regards to the spread of broadband technology the penetration, adaptation and acceptance differs between the EU member states. Countries like Sweden, Denmark or the Netherlands are leading

when it comes to the proportion of users connecting at home via broadband, while other countries like Germany or the UK show an intermediate broadband penetration. Almost all of the new member states (with the exception of Estonia) lag considerably behind (Empirica 2003, p 12). But even by 2007 only 27% of European households will have broadband connectivity, compared to 50% of North American households (Forrester Research 2004, p 190).

Even if falling prices will propel the European broadband market (PwC 2004), user behaviour will not change over night and stick with some of the traditional suppliers of content, particularly TV channels. The limited broadband market means that European developers will have less experience of engaging with broadband users and emerging markets than developers in markets with quickly growing broadband penetration. Underdeveloped local and regional markets for broadband network supply, dominated by one or two players, will persist. This creates huge *access barriers and power imbalances in market transactions for content producers and suppliers* who are not in the cross media business. Companies who do not have privileged access to a relationship with a broadband network provider are largely shut out of the market and have little or no alternatives open to themselves. This is particularly discouraging as policy makers are keen to advertise the gains in broadband penetration and usage. Producers thus are faced with a regional lack of competitiveness in the access to broadband networks. This turns out to be a challenge on a European scale and needs to be solved.

4.2 Mobile Content

The realm of mobile business is the new frontier of the digital economy (Stanoevska-Slabeva 2004). Looking at today's situation, altogether 1.3 billion people use cellular phones worldwide (BITKOM 2004, p 12). These are *more users than fixed networks ever had.* With a highly flourishing zone in Asia, it is estimated that the 2 billion barrier will be taken by 2008. With 242 million users of mobile phones in Western Europe, they too have become important carriers of content (European Commission 2002). This is largely due to the technological development of mobiles that turned them into mini-computers and multimedia devices. Mobile Content started off with text messaging, but step by step new services were possible, e.g. mobile games. In a recent study, market researchers Frost & Sullivan (2004) have estimated that the yearly revenue for mobile games in Europe will increase up to € 6.3 billion until 2006, thus climbing from just

€ 720 million in 2002. Thus, mobile communication and mobile E-Content is getting increasingly important.

Our research within the ACTeN project identified several technological trends in mobile content (Buchholz et al. 2004, p 20):

1. *Vision is on its advance:* The European multimedia market currently transits from text-based to picture-based communication. With this shift from mainly voice-oriented usage to multimedia data-dense services comes a side-effect beneficial for carriers: networks are used to full capacity. However, customers are not yet hooked on to the use of mobile E-Mail or MMS as much as to SMS due to slow transfer rate, expensive rates and lack of cost transparency. Industry visionaries in Europe anyhow predict the shift from audio to vision, although the users have not yet clearly committed themselves.

2. *E-Mailing via the mobile Internet*: A mobile content study by market research company PbS illustrates that although the private, stationary Internet usage as well as the mobile phone usage has increased, the combination of both in form of GPRS, WLAN or HSCSD has not increased in the same way (PbS 2003). 11% of the users interviewed are interested in mobile Internet. Especially high is the interest in wireless local area networks (WLAN) (33%), although the actual usage lacks much behind (14%). When asked for reasons why they would start using WLAN the answer given most often was to send and receive E-Mails, followed by accessing the Internet when being on the move and accessing appointment and address details. Similarly high is the interest in UMTS, although actual activities on the side of the customers are still missing.

3. *Zapping on the mobile phone:* In order to receive television programs, the digital video broadcasting terrestrial mode (DVB-T) is indispensable for future mobile phone TV. The advantages are obvious: digital TV is on its advance (in Germany the whole of Berlin and Brandenburg is fed with digital), plus the DVB-T mode is making mobile transmission possible even if the receiving end is moving fast. However, an optimised DVB version for handhelds is necessary due to the high electric power consumption. To expand the possibilities, the big players in the cellular communication world are already working on scenarios in which digital TV gets linked to interactive services. The integration of GSM and UMTS makes it possible for customers to use the feedback channel and access services like info sites, E-Commerce or sport betting.

4.3 Interactive Digital TV (IDTV)

Apart from broadband internet and mobile content, Interactive Digital TV (IDTV) can be identified as a third major trend affecting European E-Content markets. People are already very familiar with television sets, therefore acceptance towards IDTV might come easier than when being confronted with totally new devices. Combined with the possibilities of ICT *the television set can thus become a digitally and interactively rich medium* that helps to spread information in a way people are already used to.

IDTV should also not be limited to television only, but use cross-media with combinations of IPTV, mobile and interactive film. This would include innovation outside the broadcasting environment. In most countries, IDTV is still looking for its place. The biggest challenge lying ahead is posed by the perception of not seeing the value added towards regular TV. Apart from the return channel and the interactivity, more features have to be made clear. These could include e.g. a wider range of channels, a sophisticated program guide, or the possibility of switching angles during sports programmes. [5]

5 Business Trends and Challenges

5.1 Looking for Suitable Business Models for E-Content

One of the biggest challenges that the E-Content industry is facing lies in finding suitable business models to gain revenues from providing content. There aren't clear solutions yet, also due to the *very different market situation in contrast to traditional media markets.* As Figure 5 highlights, revenues are made in much more complex ways in the E-Content industry.

When considering – for example – the case of interactive broadband TV it becomes apparent that interactive screen content is still in its infancy, both as a cultural form and as an industry. Linkages across the various developments are still feeble. For creatives this area is a big switch. On the content production side, one can illustrate generically the demands and challenges to creatives when they move into new technology in terms of platforms and delivery channels. A company which started out as an advertising agency or as an independent film maker has to evolve into a firm with arms covering documentaries, animation, and now networked content

[5] For further considerations see the chapter "Interactive Digital Television in Europe" by Janne Orava and Mika Perttula in this book.

delivery. This requires the use of extremely high compression technologies to deliver high quality video in real time. Such a company has also to develop in-house capability to support a networked "virtual animation studio" to enable it to access global talent pools – and international contracts. Technology and skill investments can pay off only if there is a supranational marketing. This requires a huge investment to set up and maintain the virtual studio linking people with various skills for an animation project. Such a company would need to secure significant equity funding to enter the content delivery business. Companies where the original business of web services has been used to support diversification into new areas show that these challenges constitute problems in an acute way.

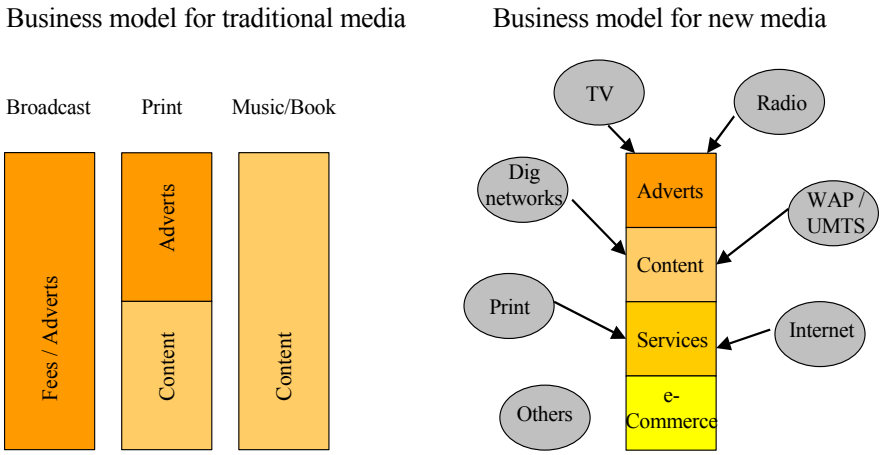

Fig. 5. Change of business models for media (Source: Schenk 2001)

So while new media allow for new kinds of content, it is of *crucial importance to develop new kinds of products based on that content,* where the benefit is so obvious to the user that s/he is willing to pay for it (Welfens et al 2004). Different business models for content services, such as music, online newspapers, E-Magazines, games and movies need to be developed. Only when projects and services exist that can demonstrate the new commercial possibilities, an industry based on E-Content will have a chance to survive.

5.2 Enabling Digital Rights Management

Closely tied to the question of the business model is also the challenge of *securing the copyright of E-Content* (Picot and Fiedler 2004). Part of the change from "free to fee" is therefore concerned with how to avoid illegal copying of content. However, this position is not beyond dispute: Some actors in the content industry, especially from smaller European markets, even consider that copyright will only serve and pay for the big players and that the vast majority of producers, independent or contractual, would have more to gain from a vibrant "digital commons". The increasing complexity of the issues and changes in digital rights management and of the reuse of digital materials create *high levels of business uncertainty and management insecurity* even with established players in the traditional mass media. The specific issue of exploiting public sector information resources is recognised by the European Commission which has a specifically funded programme to fuel the development of contents using these resources. But apart from the specific areas of educational content and digital applications for E-Government services the matter of government policies about copyright and intellectual property is largely a terra incognita. Moreover, along with the copyright issues some other important questions have to be answered when considering how to cash in on creative ideas. The most relevant issues are *content standards* and *data formats.*

5.3 The Industry Has Consolidated

Digital media has stabilised its position as a professional service industry. Electronically provided services are an increasingly important part of any business activity and the importance of digital communication and transactions via digital devices and transmission networks is growing steadily.

Despite of that, *hyper-growth is history:* most of the companies are profitable, but the industry turnover is expected to grow just at two to five percent a year up to 2006. Digital media has become similar to any other industry. There is no longer a "new economy" (Buchholz et al. 2004, p 26).

The industry has consolidated, both regionally and by its turnover. A typical digital media company employs less than 10 persons. Yet, most of the industry turnover is created in the few largest companies. Specialisation is therefore one of the key factors for success: it is crucial for digital media companies to find out their core competence. They need to offer their clients and partners services that offer true added value.

6 Creation Trends and Challenges

6.1 New Players Compete for Survival

The value chain for content production has changed dramatically through digitisation and the resulting interconnection and convergence of delivery channels and technologically defined media. The new chain has dropped all simplicity and consists of crossed paths, clusters and clouds, not streams and sequential organisation. The *value chain shows vertical and horizontal integration and new differentiation.* There are new freedoms and new gatekeepers, new delivery networks and new business models. Apart from publishing houses, press agencies, newspapers, magazines as well as financial and stock market services a lot of small content producers have emerged. Content brokers – also called content syndicators – bundle the content on offer and mediate between those offering and those interested. They negotiate singular or monthly fees, clarify on legal issues and provide content in the appropriate forms and formats. It is noteworthy that some of the most interesting and innovative web developer firms show one or both of two characteristics. First, their founders have a strong background in event management and approach the web more as a "venue" than a publishing site. Moreover, sites seek to provide a rich content experience and strong production values and score with innovation known and demanded in the advertising markets. Both severely limit the development of the web as a new medium with its own cultural formats and forms.

6.2 Challenges of Cross-Media Content Production

One major trend in the contemporary E-Content creation industry certainly lies in cross media content production. It aims at *producing content once and using it across a number of each platforms,* each one referring to the content on the other platform, but each one also offering a singular view on the content which can only be offered by this medium. E.g. a TV series that also offers an online platform on which the content is part of the overall realm but presents a unique version. As E-Content has the means of interactivity, this possibility will be used to stay in touch with users, allowing them to follow a story differently, feeling more engaged by having more ways to use the information.

The big challenge in cross-media content production lies, of course, in generating an *integrated cross-media approach to content* that keeps in mind what every medium can do best, but doesn't loose sight with the overall connection to content in other media. Another challenge in cross-

media content production is also posed by the fact that this kind of content production will often be limited only to the big content players, i.e. large media companies, that possess the necessary resources. Smaller companies will have to *cooperate within interfirm networks* (Sydow and Windeler 1998) in order to cope with the complex value chain of E-Content products.

Moreover, the industry had to learn that the way recipients use E-Content and especially websites differs fundamentally from the traditional style of reading books or browsing magazines. The conversion of information into E-Content is not a simple task. It especially requires ways to secure the *usability of websites and mobile applications,* for example self-sustaining navigation wordings and intelligent retrieval functions (Zerfass and Zimmermann 2004).[6]

6.3 Suitable Content for a Heterogeneous European Market

E-Content is key to the quality of the information society as experienced in the daily lives of citizens. Due to its rootedness in the diverse linguistic and cultural landscapes of European countries, *E-Content remains a local and regional creator of value.* Whereas technologies develop rapidly and reach hurricane levels of velocity, quality content and innovative applications lag behind. Digitisation has made the production of content simpler, but it takes time to produce – and also to use. The consumption of content cannot be sped up without changing or even loosing meaning. While technology is turning pervasive and ubiquitous, content remains local and connected. According to a recent study, on the average only ten percent of all websites viewed in the European Union originate in other EU countries. The rest are either indigenous or North American offerings (European Commission 2003, p 15). Hardware and software can be marketed globally, *contents are tied to culture and language.* Unlike technology they do not ship easily and work only where people share and understand them. The technology push is obvious and commercial technologies, both hardware and software multimedia, have made content production a high performance activity in terms of tools. One gets an entirely different picture when one looks at other aspects, such as interactivity. If one compares the rapid advances in the technology measured by performance, one can note with curiosity the slowness of the advances in interactivity measured by new cultural forms.

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[6] For further considerations see the chapter "The Usability Factor: Improving the Quality of E-Content" by Ansgar Zerfass and Bernd Hartmann in this book.

However, this clash between technology and content is as old as media based culture. It is *not a fundamental contradiction, but a dynamically created structural gap.* The content gap is a social and economic one and is created by the imbalance of pay and inequity investments. It is even widening as we move ahead within the information society. So there is great need to understand the E-Content market and its technology needs more thoroughly. During the next years, cultural and linguistic boundaries will persist. For this reason much effort has to be spent on the localisation of contents.

6.4 The Rise of User-Generated Content

Apart from professional E-Content producers, a new trend has emerged in content creation that concerns user-generated content. As the Internet and mobile phones make it easy for everyone to download – or upload – information, community content is becoming increasingly important. Sites and services are created where people can upload their own texts, music and videos in order to share this with people of their community. The fast diffusion of both digital (video-)cameras and camera phones is accelerating this trend. Moreover, *personal content* is becoming a trend. With people building up terabytes of digital data, personal content will have to be organised, stored for the future and made accessible.

7 Findings and Recommendations from ACTeN

Within the EU-funded project ACTeN (Buchholz et al. 2004),[7] one of our main objectives has been to detect *content technology needs of creative multimedia producers.* The focus has been appropriately on the use and usefulness of the results of technology research in terms of technologies and tools for creative content production. Content creatives were in turn approached during the course of the project to learn (Scouting Workshops), consider (Business Roundtables) and reflect (Scholars Network Conferences) on the adequacy of European approaches for their own needs and the changing business requirements. Some of the most notable findings gained from the assembled experience of professionals in the field can be summarised in the following way:[8]

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[7] See also http://www.acten.net

[8] For a more in-depth consideration of the findings see the chapter "Prospects of E-Content in Europe" by Peter A. Bruck in this book.

- Digital content production is not distinctive and different in its own right. Issues around the industrial organisation and structure of digital content are common to content and creative industries generally. More important is however the change in overall content industry.
- Although business models aren't clear yet, there is a consensus that content suppliers will gain market influence on two levels: traditional media operators through cross-media offering of content; small independent producers will find their market with institutional and corporate content products.
- There is a constant need to reinvest in new technology platforms, tools and skills for all kinds of content producers. This need can pose a limit to the growth of European companies.
- The service and benefit for the user has to go first.
- Incumbents have the advantage of market power, and new entrants have to fight for their shares.
- Production values change with the emergence of new genre templates for formats and content presentation.
- The opening up of new channels is likely to create a shortage of appropriate content.
- There is a need for new and highly efficient tools for interactive content production.
- The linking between content companies and ICT firms can sometimes be difficult. They have different cultures, different agendas and see each other intuitively not as partners or worthy collaborators.
- For content producers to act successfully in markets, the record of finished products and reference list of clients becomes equally important as the mastery of technologies and tools.
- In spite of the new media's tendency to be globally accessible, there still remains a high importance of geography for opportunities in personal and industry development. Content producers that live and work in London, Munich, Stuttgart or Vienna have better career chances than those that are seated on the periphery of Europe.

All of these findings of course serve as a base for further consideration of what needs to be done to improve the situation of the E-Content industry in Europe. The recommendations that one can deduct from the findings

address decision makers on various levels, from those running a company involved in E-Content production up to policy makers on the EU level. All of those levels can contribute to the process of improving the standing of the European E-Content industry.

Companies have to invest in business models and EU-wide partnerships. They also should establish international linkages and networks which serve as low cost ways for technology and tools training and exploitation. On the creation side, they must offer users more control over content and also improve the usability of content. *Researchers* have to dedicate themselves to researching how the industrial organisation and market functions of the content industries overall evolve within a digital environment and how the competitive landscape is being changed (as digital content production is not different in its own right). *Policy makers*, finally, have to establish a stable legal framework for the distribution of content over digital networks. They need to pave the way for appropriate technical conditions to make the networks function and foster the development of new and highly efficient tools for interactive content productions.

8 Conclusion

The development of a truly European E-Content industry has only just begun. The trends and challenges described in this chapter need to be dealt with in an efficient way in order to foster a sustainable growth in this industry. The history of new technologies shows that after an initial hype and an inevitable burst of the bubble, the industry based on this technology is very likely to show *sustainable growth.* With the ICT market and the E-Content industry having already left behind this crash, all signs indicate to a sustainable growth for the future.

With regards to the European Union, one must also note that E-Content has a *wide cultural potential* for all European countries. It creates added value by exploiting and networking European cultural diversity and paying special attention to multilingual, localised services. Through this, E-Content may indeed form a basis of the future Europe.[9]

[9] The authors would like to thank Bernd Hartmann for valuable discussions and his assistance in preparing this article.

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E-Content Market in Europe: An Overview

The State of Digital Media Service Business

Tommi Pelkonen

Helsinki School of Economics, Helsinki, Finland

1 Introduction

1.1 Constantly Evolving Industry

Professionally oriented companies and highly skilled individuals create digital media services. The industry formed by these actors originates from early 1990s' multimedia production agencies. It developed into a full-scale professional business field led by the exponential growth and business need for Internet services. At the turn of the century, the industry was characterised by unrealistic earnings and growth expectations, the so-called hype. Venture capital flooded into service creation, as well as to related areas, e.g. into start-up companies selling their products online. Salaries in the industry were on the constant increase, and aggressive recruiting and rewarding schemes were used. In those times, several European companies, such as Icon Medialab, Framfab, Adcore, Adera, Satama Interactive and Pixelpark, were expanding rapidly into global service business markets.

In 2001, the global economic downturn smashed the positive prospects as well as the market value of digital media service-business-related companies. The companies withdrew rapidly from a major part of their international operations and focused on cost savings and on their core customers. In 2004, the situation is about to normalise – digital services are being created and bought just like any other business services, such as consulting or advertising and marketing services.

The digital service creation industry has been the subject of several studies. For example, Sandberg (1998) and Sandberg and Augustsson (2002) analysed the development of Swedish digital media companies, and New York New Media Association (1997, 1999, 2001) carried out a series of analyses of the industry development in the New York region. In Finland, the development of the digital service creation industry has been analysed most thoroughly. The research programme jointly led by the

Digital Media Knowledge Centre of Uusimaa[1] and LTT-Research Ltd[2] produced a total of seven separate publications on the industry development in Finland. Though the industry was thoroughly analysed at the peak of the hype in 2000, only few current studies exist Europe-wide with a strong focus on the current status of digital service companies or on the actual service creation process and value-webs in the business area. This report aims at filling this gap at least partially.

1.2 Focus of the Chapter

The key objective of this chapter is to 1) present an analytical framework to help digital media companies to understand their strategic positions within their key business areas both in the domestic markets and in foreign operations. Furthermore, the chapter 2) discusses the current key trends in this challenging service creation industry. The chapter is not a full-scale market analysis. The scope is rather an illustration than a thorough business analysis. The analysis is based on the experience of the author as an industry professional as well as on a longitudinal analysis effort of the development of the digital media industry in Finland (Pelkonen 2003). The report is written from a Northern European perspective of the markets and can therefore have limitations in the depth of its analysis in comparison to other regions of Europe.

2 Defining Digital Media Service Business

The main objective for a company operating in the digital media industry is to create substantial benefit for its clients with the help of new technologies, e.g. Internet technologies. The benefits are created by: 1) adding more efficiency into company organisation and working processes; 2) creating additional sales/revenues and/or 3) increasing corporate brand recognition. These three activities can be seen as having a similar four-stage value creation process. The four stages in the process are: strategic planning; creative planning; implementation, and distribution of the actual service/production. In addition, in order to provide added value to their customers, digital media companies create "content products", which are sold either via an intermediary or directly to consumers. This content produc-

[1] See http://www.culminatum.fi
[2] See http://www.ltt-tutkimus.fi

tion process has a special value creation model. It is illustrated in Figure 1. The content creation business has been analysed thoroughly in multiple studies and is not the core focus of this chapter.

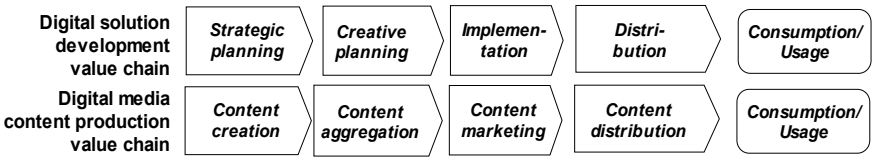

Fig. 1. Digital solution and content production creation value chains (Source: modified from Pelkonen 2003)

To sum up, a digital media company creates value for its customers by forming solutions that operate in one of four roles, as summarised in Figure 2.

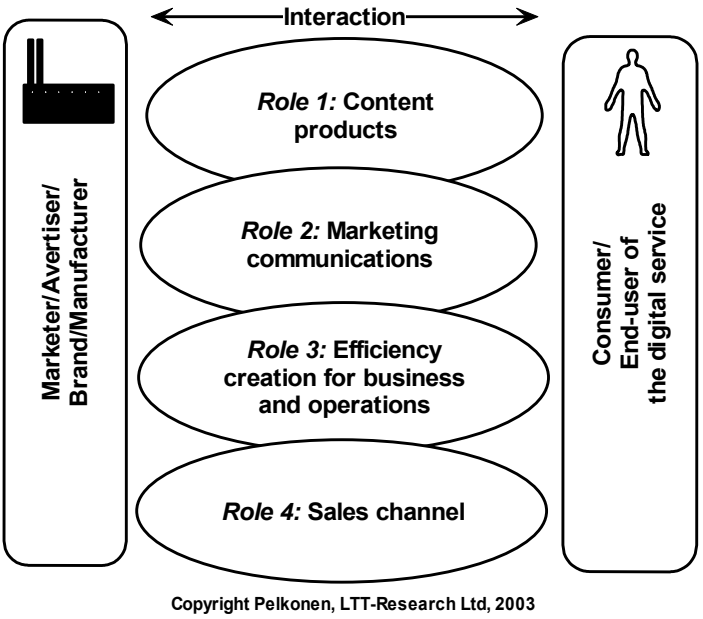

Fig. 2. Different roles of digital media companies (Source: Pelkonen 2003)

In the evolving field of digital communication, it is more common to discuss a specific technology solution or delivery platform than to really understand the relations of this solution/platform to other similar activities. In this article, a two-fold matrix is used to assist in defining digital media industry activities (see Fig. 3). On the horizontal axis are the four delivery platforms (online, mobile, digital broadcasting and digital storage media). On the vertical axis are eight solution areas (information services, entertainment, marketing communications, corporate communications, learning, loyalty and community, self-service, and commerce). [3]

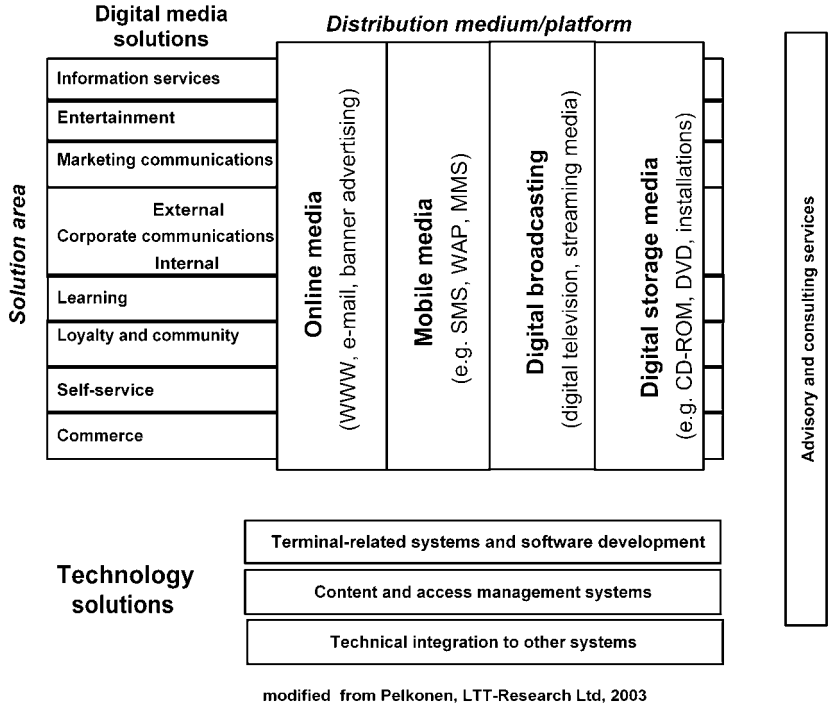

Fig. 3. Digital media activities (Souce: Pelkonen et al 2003)

Digital media companies offer these solutions via the selected delivery channels to their customers. Although the solution can be offered only through one channel, a general trend in the digital economy goes towards cross-media solutions, i.e. offering suitable features of the solution on each delivery platform. The matrix can also be used to map each company's business activities within the digital service creation business.

[3] The solution areas are described in more detail in Appendix 1.

3 The Digital Media Services and Value Creation Process

This section presents a value-network-based approach to analyse the activities and market positions of the market actors of the digital media industry in more detail. In this allocation, various market actors are in their most representative position in the value chain. The aggregate of the actors creates the *value-web* of the business area. The section presents two main business areas of digital media companies: 1) digital marketing communications and 2) digital solutions creation.

3.1 Digital Communications Business Value-Web

Digital communications solutions are linked either to marketing or to corporate internal or external communications. The key objective within the discipline is *to facilitate the message delivery* – reaching the target group in the most efficient way. A company offering these services to their customers needs to possess expertise in communications channels and their varying roles. Digital tools are only one option in the choice of message delivery, other possibilities are e.g. television, radio, print, word-of-mouth, direct marketing and events.

When providing solutions to their customers, a digital media company is one of the only actors which can operate throughout the whole of the value chain, from strategic planning through creative planning and implementation into delivery of the solution. Yet, in many cases a digital service company focuses on a selected part of the value chain, e.g. solution implementation. Other actors within the communications value creation process are communications agencies, media agencies, design houses, print houses, reproduction houses, audiovisual producers, PR agencies, and in the distribution phases of the production the various media channels (media companies). The digital communications value-web is illustrated in Figure 4.

The most common conflict and thus the key challenge for digital media companies lies in their relationship with the communications industry core actor: the advertising agency. Advertising business actors, though currently under transformation, have formed a sustainable and pretty stable industry position over decades. They have pre-negotiated key media deals with a media agency (often owned by the same holding company) and are thus motivated to sustain a fruitful situation for their operations.

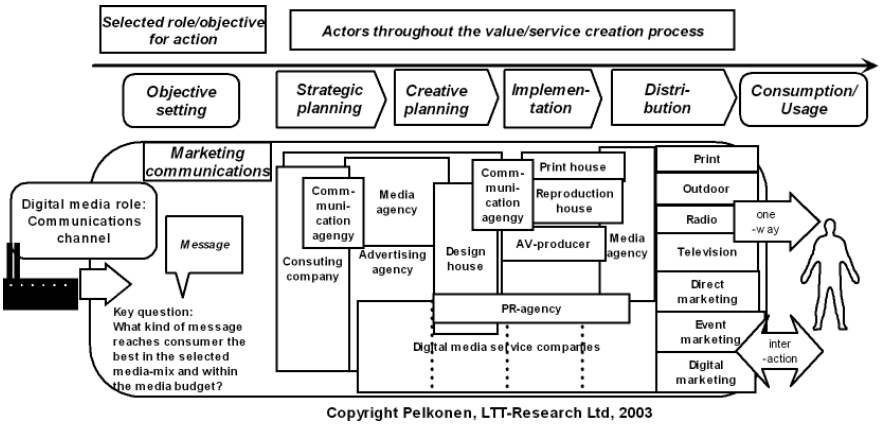

Fig. 4. Digital communications value-web (Souce: Pelkonen et al. 2003)

Digital media as the newcomer in the media landscape threatens this balance to some extent and has thus not been seen the most lucrative business area for large advertising companies. In addition, advertising agencies most probably do not possess the most up-to-date knowledge of digital communications possibilities and may thus not reach the same quality level of expertise here than with other media. Yet, the importance of digital media has been on constant increase, and multiple cases already exist where digital solutions have become the core marketing offering – the centrepiece of "the customer dialogue"[4], i.e. the interaction between the brand/ manufacturer and the consumers.

3.2 Digital Solution Creation Value-Web

Creation of digital solutions is most probably the most characterising feature of the digital media business. Digital companies are expected to be able to create lucrative, relevant and easy-to-use services for their customers. The key issue in service creation should constantly be in helping the *interaction between the manufacturer/brand and the end-users of the service.*

Solutions that digital media companies design for their customers vary depending on the need. Based on a consultative analysis of the customer needs, the outcome can be e.g. a tool to help learning about a new business area or business strategy; a self-service solution for guiding customers to repair their goods better; a reporting tool for sales personnel of an organi-

[4] See e.g. http://www.bionicle.com

sation; and/or a forecasting tool for delivery chain management. At best, the digital solution helps to strengthen the relationship between the brand/manufacturer and its customers.

When creating digital solutions, a digital media company needs to co-operate with several other actors – just as in the communication solution markets. These actors include various technology providers, consultants for strategy and service development, ad agencies, design houses, and service location planners. As in marketing communications, the group of actors that digital media companies co-operate with consists of both domestic and international actors. Especially if the customer is a multinational company, it is very likely that digital media companies have to prepare themselves for international co-operation.

Figure 5 illustrates the value web for digital solution creation. In comparison to the communications value web, the digital agency has a much stronger position here due to the closer relationship with the customers. The digital media company is very often directly hired to improve a certain service area and is expected to specialise into their media – to be the experts of the "digital channel and solutions".

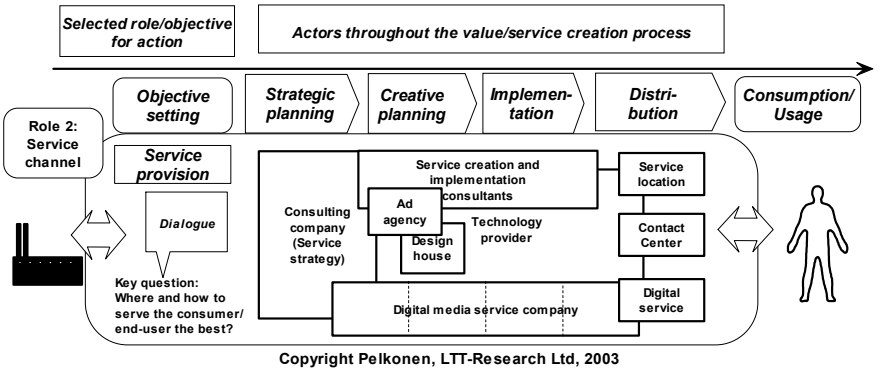

Fig. 5. Digital solution creation value-web (Souce: Pelkonen et al. 2003)

3.3 Leveraging the Value-Web Models

The selected approach aims to create a model that can facilitate market actors to identify their critical partnerships as well as to understand the linkages of their operations in a much broader context than pure digital media solutions. For researchers, the presented framework offers possibilities to target analyses into relationship-based challenges of the companies instead of analysing pure technological possibilities. This is very important due to

the fact that currently the most successful digital media companies are the ones that have been able to form and manage efficient partnership coalitions with other actors in the markets.

International operations increase the complexity of the network – co-operation, business activities and various partnerships have to be planned and organised to match the needs of international business. These methods include e.g. improved knowledge-sharing methods, offshore operation management, international project and programme management capabilities, various collaborative tools, international meetings and audio-/video-conferences. For an internationalising digital media company, creating this crucial substance for international business may become the critical obstacle for growth and access to larger international customer accounts.

The key challenge for a digital media company in the solution creation business is to gain sufficient credibility in comparison to specialised consultants and well-established technology providers. Both these actors are – through their history and company size – much better positioned in the markets than the service sector newcomers, like digital solution designers. Although a digital media company can create direct customer relationships with their corporate customers, they are constantly faced with the pressure of having to be able to co-operate with companies much larger than they are. In addition, these larger companies are also very experienced in working with large customers. With a well-designed partnering strategy a digital media company may be able to strengthen its position within the value chain.

4 The Business Model/Work Flow

The work objects in the digital media service creation are digitally formatted texts, pictures, voices, videos, and database materials. These are modified in such a way that they can be used and consumed with information technology equipment: e.g. personal computers or mobile phones either locally or through data networks. In their production process digital media companies use computers, data networks and equipment and software and programming languages closely related to them.

Professional experts carry out the digital media production. They create solutions in close relationship with the customer information system or with the product to be consumed and utilised by the client. In addition, digital media companies offer training and consulting services related to their field of expertise.

A digital media company operates in project-delivery mode i.e. allocates its resources to meet the customer needs in the most efficient manner (Helomaa 1999, Pelkonen 1999b). When the project is delivered, the resources are re-allocated to new projects. Typically, a project related to digital media is carried out in phases somewhat similar to the value creation process in the previous section. With customer solutions on a larger scale, the operational mode is changed into delivery /site operation programmes. A development programme consists of several linked projects. Within these a more stable organisation is created. The service to be delivered is very often developed in phases/releases. Figure 6 illustrates both the project and programme delivery modes of digital media companies (Bruck 2002, p 70).

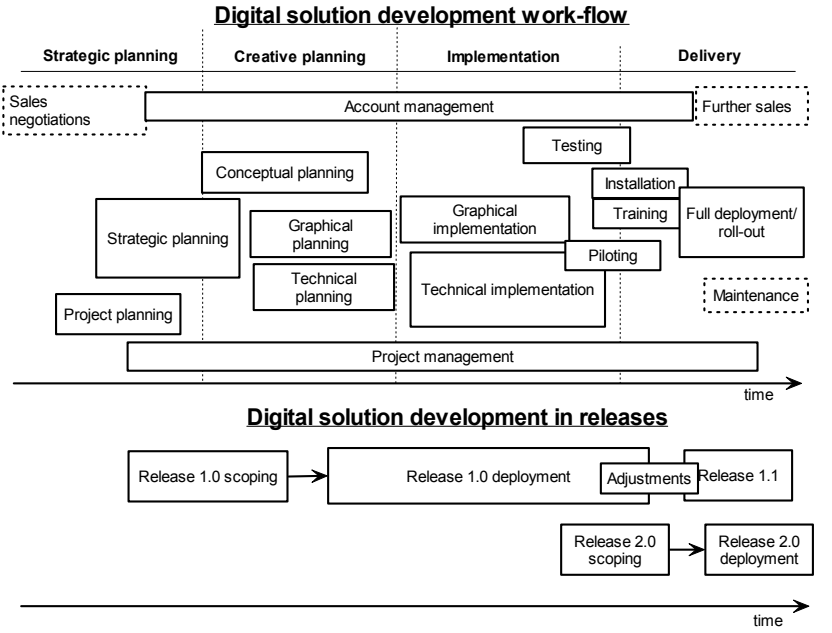

Fig. 6. Digital media solution development workflow and release planning (Source: Pelkonen 2003b)

The business model of a digital media company is thus very often based on selling the projected time of the professionals working in the company. This business is often supplemented with selling either content products (e.g. DVDs, CD-ROMs, mobile games) and/or obtaining licence fees for the products used in the customer projects (e.g. annual fees for the licence of a content management system).

Maister (1993) points out that a professional business service company can have three main competitive strategies: *excellency* (ability to solve very complex problems), *experience* (ability to provide tested solutions for varying needs) or *efficiency* (ability to provide the services in a more efficient manner than others). The companies creating digital solutions should carefully develop their offerings to match one of these three roles, instead of trying to simultaneously cope with all three.

In the digital media markets the specialisation of the companies is constantly increasing. Digital media companies used to be offering and delivering nearly all the possible kinds of services to their customers. Currently, more specialised agencies are emerging, e.g. for the areas of marketing communications, digital television and entertainment. In project deliveries it is also more common now that companies leverage sub-contracting to a growing extent. Larger digital media companies take the total responsibility of a client project/programme, but will not use their own resources (i.e. personnel) to create the services. Specialist companies are used to assist in certain areas as well as more efficient small companies do.

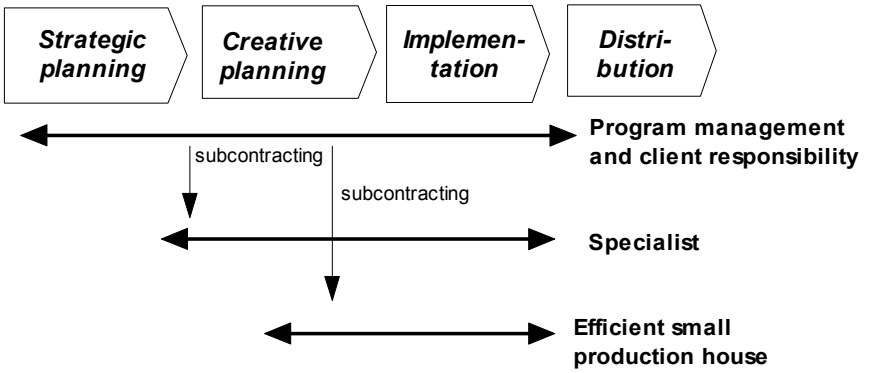

Fig. 7. Digital media specialisation and outsourcing (Source: Pelkonen et al. 2003)

In early 2004, the trend in outsourcing and sub-contracting seems to be tending towards *international sub-contracting of partners*, e.g. several Finnish IT-related companies are about to start outsourcing their basic programming and development work to either the Baltics, Russia or to India[5]. This development is also influencing the digital media industry. The

[5] One leading Swedish digital media-originated service company, Mandator (formerly Cell Network) has already been operating in the Baltics since 2000. The operation has proven to be very successful. For more details, see http://www.mandator.com

price of labour in those countries is much less compared to Finnish standards[6]. Beyond doubt, this basic labour transition process will intensify with the *expansion of the European Union.* In addition, the emerging economies are offering aggressive tax benefits to companies which start their operations in these counties. The Finnish electronics companies have already started to move their operations to the Baltics. Also, advertising agencies have taken their initial steps in this area.[7]

No matter what the actual impact is that the international outsourcing has on the European digital media industry, it is clear that the European – northern, eastern, central, western or southern – companies have to find their competitive edges based on e.g. Maister's definitions. They have to focus on 1) being *excellent* in a selected solution or technology area, to make unique offerings and products; 2) leveraging their *experience* in solving customers' problems and expanding this experience-driven business, or 3) being *efficient* in offering in-house or outsourced/subcontracted services to their customers. It is very rare that these three focus areas would exist within one organisation. Thus, it could be argued that several European digital media companies are currently faced with a major managerial challenge – on which business area to focus and with what kind of legitimation?

5 Technological Development Trends

The digital media industry is strongly influenced by technology development trends. The following sections highlight some of the key technology development areas that are of major importance for the future of the digital media industry.

5.1 Rich-Media Design Technologies

In the early years of multimedia design (i.e. CD-ROMs) digital solutions included an ideal combination of images, sound, video, and text in relation to the limited storage space provided by the medium. The Internet changed the mainstream digital design towards carrying much more textual elements than other digital design essentials. Yet, *richer digital content is making a strong come-back* in the next few years. More advanced design

[6] See e.g. Talouselämä 2003: Cost of labour (average EUR/hour) Latvia: 2.42; Lithuania: 2.71; Estonia: 3.03; Hungary: 3.83; Poland: 4.48; Finland: 22.13

[7] E.g. Finnish ad agengy Taivas is opening their offices in Tallinn and Riga.

tools (e.g. Flash MX) and distribution technologies in the networks (e.g. ADSL-lines) as well as a more powerful terminal are about to enable media-rich solutions to be used more aggressively also in the Internet[8]. For the digital service design companies the trend for richer-media experiences promises business. Yet, the skills required to provide high-quality rich-media solutions are much broader than those that are required for traditional HTML-based websites.

5.2 Broadband Networks

Nearly all major corporations and an increasing amount of SMEs have been leveraging broadband connections. In addition, household end-users throughout Europe are subscribing to broadband network services. The *increasing broadband penetration* will enable digital media companies to design *more bandwidth-demanding solutions*. If designed well, these solutions provide a broader user-experience. In addition, broadband connections enable new service formats to be created, e.g. streaming media is developing rapidly from a niche product into a full-scale consumer service area. Nevertheless, bandwidth will remain a constraint for some time. There will be consumer segments which will not or cannot afford to acquire broadband connections to access these services.

5.3 Digital Marketing Communications Solutions

Digital solutions have been used for marketing products and services ever since their invention. Digitality is currently expanding beyond the traditional stored (e.g. DVDs and CD-ROMs) and networked (i.e. web-based) solution areas. The *mobile channel* is used more and more in customer outreach activities. Direct marketing has undergone a shift towards using E-Mail as the key medium for contacting existing and prospective customers.

Digital solutions are also entering retail stores as well as the outdoor space. Various kinds of digital screens are being installed into department stores and large public squares. This business area could be called "*digital ambient media*". Furthermore, digital product presentations are handed out to consumers as USB-key rings or memory cards. The common denominator for these emerging digital solution areas is that the companies behind them are very often the same companies which designed the initial online services. Thus digital media service companies are expanding their busi-

[8] See e.g. http://www.vodafone.com/futures

ness impact while their domicile – online service design – is becoming more and more competitive and common knowledge.

5.4 "E-Business 3.0"

The first generation of electronic commerce in the 1980s and early 1990s was characterised by legacy systems. The web browser and online sales became the buzzword for the second generation, the "dotcom" boom. This period at the end of the 1990s was a real breakthrough for using digital channels in business transactions. The Internet enabled fast business usage of online B2B and B2C sales. The boom lasted only a few years. The global IT market crash brought even the wildest online sales scenarios back to business reality – there was no free lunch neither in E-Business nor in Non-E-Business.

In 2004, the third generation of doing business online is emerging. Companies are to an increasing extent using digital systems to sell their products and services online. They create internal "corporate portals" to integrate their business systems, internal & external communication and business intelligence systems into one view – a web-based window. Smart integration of various back-end systems and user interface design for the systems may become an important business area for the remaining digital media companies. Although traditional IT system consultancies operate strongly in the markets, digital media specialists still possess expertise related especially to user interface design. Thus, a specialisation on business systems may become one of the key areas for the digital media industry.

5.5 Content Management Systems

In the early phases of the Internet era HTML-programming was a premium skill that only few experts could master. However, it became very rapidly a basic skill and thus a commodity in the digital media markets. The emergence of *dynamic publishing systems* (such as Microsoft ISS, Vignette Application Portals, etc.) leads companies to automating most of their programming work. Digital media companies have developed their own smaller-scale content management and publishing systems. They base their business partly on the licence fees obtained from their customers using the system.

For personal website publishing various quick publishing software solutions have emerged. The original purpose of these "*blogging*"[9] software so-

[9] See e.g. http://www.blogger.com

lutions was to facilitate personal diary-like kinds of publishing. Yet, they are also used as online content publishing systems as journalists report immediately from the field.[10]. This kind of integration of easy publishing software solutions into content management systems is a clear trend in the digital media content business in 2004. Yet, it is no real threat for digital media companies. They focus on specialised and high-end design solutions for their customers.

5.6 Mobile Solutions

The *most rapidly developing technology area* within digital media business is the various kinds of mobile solutions. Although the mobile industry as a whole crashed dramatically due to 3G licence auctions in 2001, the industry is regaining its innovation momentum. Colour screens, WLANs, always-on and faster mobile data connections, increased mobile computing power and more mature mobile applications have boosted the business area. Modern mobile devices are close to mid-1990s desktop computers in their computing power – but they are constantly available, in miniature format, and connected to networks. Mobile technology solutions have provided a new specialisation area for multiple digital media companies.

Multimedia production technologies are also entering the mobile space, e.g. Macromedia has introduced its Flash Lite software to various mobile phone models[11]. Also images have entered the mobile landscape. *Camera phones* are changing dramatically the market for digital cameras[12]. In addition, *video recordin*g and streaming have entered the markets. Mobile videos are already used in professional business. E.g. the BBC has taken Nokia devices into active use for their reporters to send immediate video reports from the scene of news events[13] . Mobility remains definitely one of the key innovation areas for digital media companies in the near future.

5.7 Digital Television Platforms

As last – but not the least – technology development area described in this report, digital television (DTV) offers an interesting field for digital media companies in the near future. Since 1980, television has been expected to

[10] See e.g. http://www.paidcontent.org
[11] See http://www.macromedia.com/software/devices/products/flashlite/
[12] See e.g. http://www.nokia.com/imaging
[13] See http://www.forum.nokia.com/main/1,,040,00.html?fsrParam=33/main.html&fileID=4628

be one of the key channels for interactive solutions. Yet, the only real European breakthroughs for mass-market television interaction have occurred in the UK's digital television penetration[14] and in interactive solutions using mobile telephone as the return channel[15].

The open source-based standard MHP (Multimedia Home Platform, www.mhp.org) has been expected to become one of the key standards for digital television interactive solutions. Yet, most of the existing dtv solutions are operating on proprietary technology platforms (e.g. OpenTV or MediaHighway). The key issue for larger adaptation of dtv solutions becomes standardisation and wide enough penetration of interaction capable set-top-boxes. In 2004, the situation is still pretty heterogeneous. *For a feasible development of the digital television business environment, active standardisation efforts are required.*

Digital television solutions offer an interesting specialisation area for European digital media companies. Several actors are already operating in these markets[16]. The leading multimedia development platform, Flash, is also available for digital television set-top-boxes[17]. Beyond doubt, this will also attract newcomer digital media companies to the markets. An interesting additional development within the dtv landscape lies in its integration into mobile telephony. Several mobile phone manufacturers have introduced models that can receive terrestrial digital television signals[18]. Thus, "mobi-tv" may become an attractive area for interactive television applications in the future.

6 Recommendations and Conclusions

6.1 Market Outlook

The markets for digital media services now seem the most promising ever since the market crash in 2000–2001. The surviving digital media companies seem to have found their positions in the markets. In addition, digital media has established itself as a professional service business area.

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[14] See e.g. http://www.broadbandbananas.com for application examples

[15] See e.g. http://www.waterwar.tv or http//www.outer-rim.com for application examples

[16] See e.g. http://www.broadbandbananas.com/links.html

[17] See http://www.macromedia.com/devnet/devices/itv.html

[18] See e.g. http://www.nokia.com/phones/7700 and http://www.3g.co.uk/PR/July 2003/5622.htm

The market development could be illustrated with the figure below. It describes the Finnish digital media markets but could also illustrate with small variations any European market development in the IT sector. The figure is based on the author's qualitative estimates of the publicity in Finnish media around certain technology and business phenomena. Finnish markets experienced four main development trends: 1) digital service, 2) dotcom, 3) mobile, and 4) digital television hypes. All of these business areas crashed in 2001. Yet, the markets are re-evolving and regaining their positive development trends at the moment.

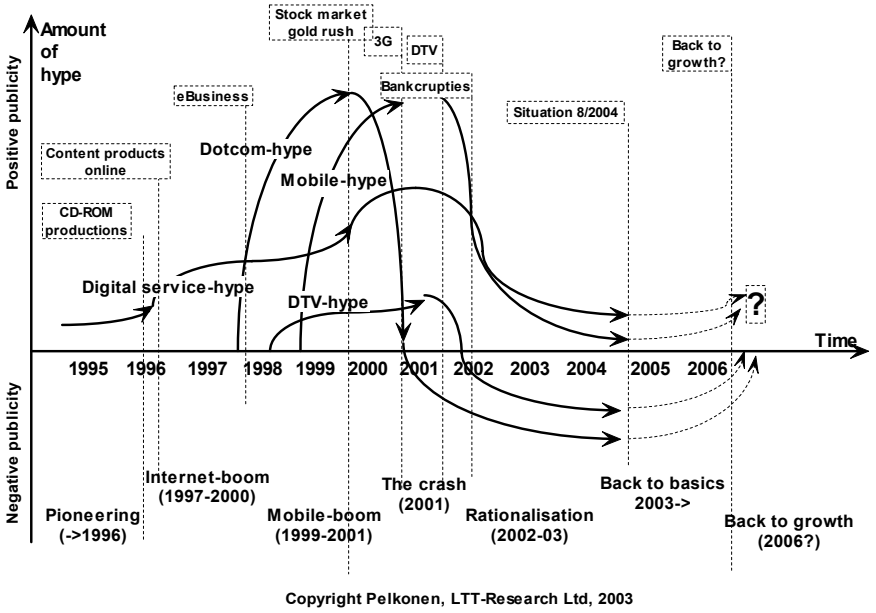

Fig. 8. The development of the Finnish digital media industry – four hypes and the crash (Source: Pelkonen et al. 2003).

As the digital media industry is a sub-set of multiple existing IT sector activities, few market analysts focus on providing forecasts of this service sectors' development. Yet, digital media investments follow closely generic marketing and IT investment trends. Thus it is possible to assume that the markets for digital media solutions develop according to the two mentioned markets. The table on the next page summarises some of the selected publicly available forecasts on the IT-service sector and the whole ICT sector development in Europe.

Table 1. ICT-market trends and estimates (Source: various)

Source	Findings
Ovum, http://www.ovum.com	• The ICT market has matured – its growth will equate to GDP growth. • If there is one theme which transcends all markets and all countries in Europe right now it's consolidation. • The ICT opportunities currently on offer in Europe are enormous as there are major structural changes occurring. But the risks of being exposed in declining markets are equally huge.
Gartner, http://www.gartner.com	• Revenues in the IT-service business will grow from US$ 169 billion in 2002 to US$ 230 billion in 2007. • Process management services will grow fastest, as demand for outsourcing rises.
Forrester, http://www.forrester.com	• Growth languishes at less than 10% for four of the next six years. • Outsourcing grabs 94% of total IT services spending growth in Europe between 2001 and 2006. • IT services spending in Europe will shake off its early-decade blues to recover to € 129 billion by 2008.
EITO, http://www.eito.com	• In 2005, a growth of 4% for Western European ICT is expected. • Yet, IT services still have to cope with tight budget constraints.

In order to bring the analysis onto a micro-level – closer to the digital media companies – the following table presents selected digital media industry trends. Although the markets are no longer in a hypergrowth phase, it is important to notice that *digital services have formed a sound position in the current business environment.* Companies and consumers use them still at an increasing pace, and the technological adaptation and development of digital solutions is still in the early phases of development. The economic downturn was bound to happen just as in any emerging industry. Growth will, with little doubt, continue in the near future, but with annual figures similar to any other established business area.

Table 2. Digital media industry development trends (Source: adapted from Pelkonen et al. 2003)

Increases, ”going up”	Decreases, ”going down”
• Organic growth • Cross-media solutions • Seeking domestic and international partners • Consolidation • Cautious personnel recruiting • Subcontracting production domestically and abroad (esp. to the new EU member states & South-East Asia) • Co-operation in R&D • Professionalism • Volume business with technology-focused projects • Focus on customer’s needs • Customers’ cost sensitivity in basic productions	• Exponential growth expectations • One-channel solutions • International acquisitions and greenfield operations • Aggressive recruiting of personnel • Mushrooming of new start-ups • Pure in-house R&D investments • ”Hobbyism” in digital media • Growth of pure marketing driven solutions • Customer’s purchases based on technology trial/learning interest

6.2 Implications for the European Digital Media Industry

This chapter only scratched the surface of the complexity of the digital media industry. There a multiple areas that require further exploration in this professional service area. *The key challenge in all of the analyses re-*

lated to this field is the creation of reliable forecasts of the industry development. Multiple scenarios will need to be prepared due to the dynamic change that still occurs in this area. Forecasts carried out at the end of the 1990s did not become a reality the way they should have. Thus, the key question in further research should be how to learn from the experiences of the non-fulfilling forecasts. Additional areas that could be a subject for further exploration include:

- *Client relationships, digital tools and their impact on relationship development*
  A digital media company is constantly developing its relationships with its clients. These relationships are a critical factor for the companies' long-term success. The customer relationship management is a well-explored research area. Yet, the digital media companies' customer relationships' development from e.g. a small initial website project vendor into a full-scale service solution provider for the same customer, has not been evaluated. The digital media company has – at best – been able to use digital tools, such as extranets, to speed up the information exchange between them and the customer representatives. An analysis of this leverage could bring additional value to the research area of customer relationships.

- *Production processes and their impact on business success*
  Some digital media companies have been very successful in standardising the ways they deliver digital media solutions to their customers. The standardisation was based on common software products, components, and documentation principles as well as well-planned and deployed working methods. The digital media production has proceeded long from the "hobby-like" production of the early multimedia companies. Yet, some companies still seem to have major problems with keeping their deadlines and service quality at an appropriate level. A deeper analysis of the production processes might help to find answers to why some digital media companies are more efficient and cost-sensitive than their competitors.

- *Internationalisation and its success and failure stories*
  There are only a few business areas where as dramatic changes have occurred as in the field of international digital media solution provision. International expansion was very rapid, but so was also the withdrawal from these operations. Digital media companies competed in the speed of opening new international offices and acquiring new companies to

their groups. And only few months later, the same companies were struggling for survival. This development requires further analysis.

- *Comparative study between different countries' development*
  Although digital media and the spread of Internet services has been a true global phenomena, each geographical market has its special characteristics. These originate from the economic structure of each country and region. The Finnish markets have been characterised by the strong dependence on mobile telecommunications. Other markets carry their own special features. A study comparing the development trends and linkages between different markets could create additional knowledge.

- *Educational needs and their impact on the digital media industry*
  Educational and governmental organisations have invested strongly into ICT-related education, training and R&D. Yet, only few studies exist that analyse the actual returns on these investments. Digital media companies have, for sure, a constant need to develop their competencies. Yet, it is unclear how well the training that the educational institutions provide match the needs the companies have. A study analysing these relationships could bring interesting additional understanding into the discussion.

- *Financial analysis of the digital media industry earnings and cost structures*
  At the peak of the hype, digital media companies obtained massive amounts of financial capital from venture capitalists. The capital was spent very rapidly into international expansion, brand building, personnel recruitments etc. Yet, little attention was put on the profitability of operations. An interesting dimension to digital media business analyses could be added through analysing the companies' finances in close detail. The focus of this analysis should lie on the identification of the cost items and factors influencing the profitability of a digital media company.

- *Efforts for standardisation of digital TV*
  The key issue for a larger adaptation of DTV solutions is standardisation. As there still exists a very heterogeneous situation a feasible development of the DTV business environment needs an active standardisation effort. This effort could be provided by the EU. Through such an effort the EU would take a more active role in the industry to help it develop and prosper.

As stated earlier in this chapter, there is an increasingly important trend of outsourcing and sub-contracting work of the digital media industry to low-cost countries that have just entered the EC economic area. These countries include the Baltic States, to which much work from the Scandinavian EC members has been outsourced already, e.g. several Finnish IT-related companies have begun to outsource their basic programming and development work. Facilitating this outsourcing to the new accession states, including the Baltic States, would greatly enable a more evenly distribution of high-tech know-how throughout the members of the EC and better position the media industry in the world market.

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Appendix 1: Digital Media Solution Areas

This appendix presents in more detail the digital media solution areas used to illustrate the activities digital media companies perform. The areas included in the digital service creation include:

Information Services: These services aim to provide media-content-like services for their target groups. Very often the information solutions should be analysed rather as content products, not as services. *Examples*: News, Financial, Sports etc. Information providers. *Key focus area*: *Information & Content.*

Entertainment Solutions: These services aim to provide the feeling of enjoyment, entertainment, and fun to their users. Very often the entertainment solutions should be analysed rather as content products, not as services. *Examples*: Games, Music, Videos. *Key focus area*: *Fun & Experience.*

Marketing Communications Solutions: These services aim to strengthen the brand recognition and experience among their consumers. When linked to traditional marketing campaigns they provide additional information of the products, brand, and the manufactures. *Examples*: online campaign site, E-Mail marketing campaign. *Key focus area*: *Marketing.*

Corporate Communications Solutions: These services aim to provide rather objective information of the service providers. The area can be divided into two segments: external and internal communications. *Examples*: Financial information service, company intranet. *Key focus area*: *Information distribution.*

Learning Solutions: These services facilitate the training, learning and teaching processes of their providers and end-users. The objective of a learning solution can be e.g. to communicate a totally new topic to the personnel of the company and test the knowledge status after the communication. *Examples*: online learning environments; simulation software for machinery and airplanes. *Key focus area*: *Learning.*

Loyalty and Community Solutions: These solutions strengthen the stickiness of the owners of a product for the manufacturer. The owners can be guided to communicate with each other or with the manufacturer. In addition, the product experience and offering can be expanded with the online offering of the product. *Examples*: loyal customer clubs; registration-based online communities. *Key focus area*: *Customer loyalty.*

Self-Service Solutions: These solutions aim to guide the consumers/end-users to helping themselves. The solutions aim to provide answers to the most typical questions related to the products. *Examples:* downloading software updates; support areas, online tutorials. *Key focus area*: *Support.*

Commerce Solutions: These solutions aim to function as a sales channel of products/services to the end-users. The transaction is performed within the solution and the good is transmitted at the exchange of the ownership of the good. *Examples*: online shops, business-to-business exchanges. *Key focus area*: *Sales.*

Paid Content: From Free to Fee

Jak Boumans

Electronic Media Reporting, Utrecht, The Netherlands

1 Introduction

Paid content has become a hotly debated issue since the dotcom crisis started in 2000. The predicted new economy did not become a lasting reality; Internet departments started to weigh heavily on the budgets of content creators; advertisements, whose volume had just started to grow, decreased dramatically. These developments were aggravated by the lack of proper micro-payment methods and technology to prevent illegal copying.

Yet it is rather remarkable that the issue of paid content is limited to the Internet. Before the Internet, paid content was not an issue for professional and consumer online services. For the providers of mobile content, there has never been a question of to pay or not to pay. It looks as if the Internet industry has created a ten year pause in paid content, before the pendulum now returns *from free to fee*. This chapter presents a short history of paid content, looks at the issue of what characterises valuable content, makes a categorisation, and shows developments in the field of content.

The issue of paid content will be limited to the discussion of content to be paid for and will not treat content supported by advertisements. Paid content will be treated along two lines: paid content on the Internet, and paid content for mobile services. This comparison is chosen intentionally as some content items – such as newspapers and magazines, music, or television broadcasts of sports – are fighting to get hold of the two platforms.

The reader should keep in mind that there has never been a discussion about paying for scientific, technical, and medical content as well as certain trade information. The issue of paid content concentrates now mainly on trade information and consumer content such as music, games, and movies. The figures presented in this report are concerned with new Internet sites and not with already existing information services such as Lexis-Nexis and Thomson Dialog.

Paid content has become an issue in the Internet world and concerns the payment for online forms of usually copyrighted content such as text, graphics (drawings, photographs, animations) as well as of downloads, streaming video, and audio.

2 Some History

The Internet originates from the military world, where the network Arpanet was developed as a means of communication. In time, university libraries and research institutes were allowed to link up to this network. When the military network finally turned into a mass medium, the Internet Service Providers (ISPs) blandly copied the network, its infrastructure and its habits. So no fees were paid for interconnection between networks; ISPs only had to put up a server, link it to the net, and get a rack of modems connected. They had a free ride. Then they started to compare themselves to media companies and set up editorial staffs. But this did not last long, as they discovered that creating content was expensive with no revenues coming in. So they started to accept the content offered by content providers for free or bought it at bulk prices; principally they did not care how the creation of content was paid for.

This Internet development was a break with the tradition of paid content. Since the beginning of online information distribution at the beginning of the 1970s, payment for professional, mostly textual content was normal. Besides access fees, depending on the speed of the modem, and fees for connected time levelled by vendors of ASCII databases such as Lexis-Nexis and Dialog, a copyright fee was collected by the information provider. The introduction of Videotext around 1980 gave rise to a mixed business model. Not only was it possible to call up text electronically, but also graphics, be it very crude ones. Thus, charging a fee for a frame/page was possible, while on the other hand it was also possible to have a page without a charge to be paid for by the advertiser. The French Minitel service with a lot of consumer content for example had free pages as well as pages bearing a fee, which was added to the telephone bill.

Therefore, when the Internet left the military barracks and the university libraries behind to become a mass medium, the problem of unpaid content started to show. For scientific and trade publishers like Elsevier this free content phenomenon became a dilemma. Besides having to adapt to a new technology, their Lexis-Nexis model of paid content came under pressure. In the end, neither Elsevier nor other professional information vendors gave any scientific information for free. By this they did not have to re-

educate their customers. The same path was followed by Thomson and Ovid Technologies, among others. The financial daily newspaper *Wall Street Journal*, which never gave the paper in electronic form away for free, decided for a subscription model from day one.

Until the year 2000, the Internet, however, basically worked according to the principle of the advertisement revenue model and with free content. But this started to change after the dotcom crash. In order to keep sites alive, money was needed and advertisements did not support these activities sufficiently. Publishers and other content providers started to valuate and monetise their content at last. Due to the harsh economic times, the movement *content from free to fee* has gained speed.

Compared to content on the Internet, content for mobile services has never been free. Mobile operators have asked money for all services to the extent that it is even hard to distribute content for mobile telephones for free.

> The issue of paid content, or rather the problem of unpaid content, arrived when the Internet, with its tradition of free circulation of content, left the military barracks and university libraries behind to become a mass medium.

3 Valuable Content

Before the rise of the Internet, content had a price, regardless whether it was text, graphics, music or video, in analogue or digital form. Content was bought by payment or by subscription, or content was paid for by advertisements. For print there was a value tier starting with scientific, technical and medical (STM) content as most expensive and without any advertisements, trade content as less expensive mixed with advertisements, consumer niche content and mixed with advertisements, but more expensive as consumer content. For movies there is the exploitation window: movie theatres first, then broadcast stations, and last the distribution to consumers on tape and DVD. Music does not have a value tier or exploitation window.

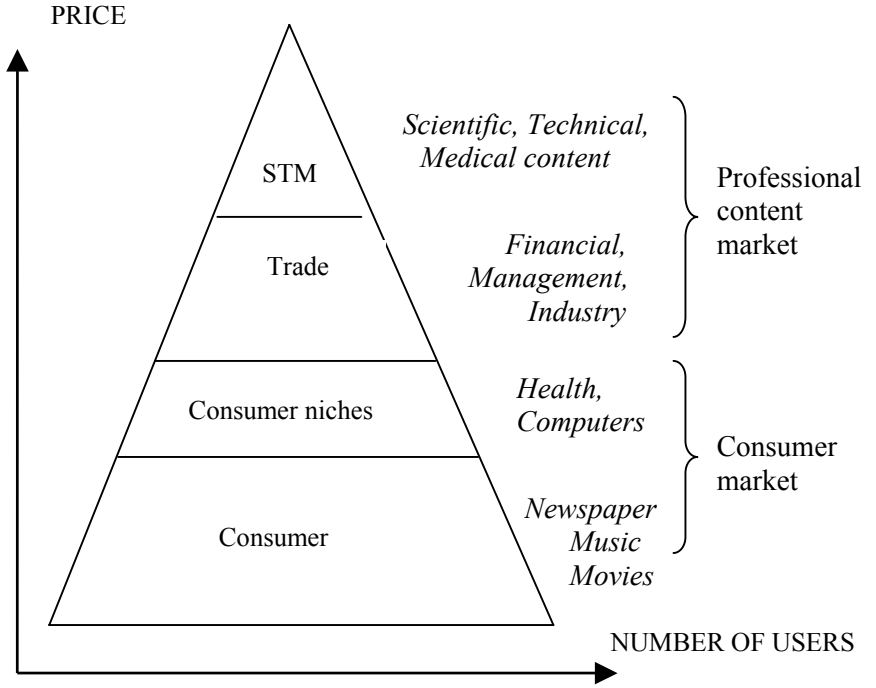

Fig. 1. Content value tier

With the introduction of the Internet, the notions of content "need to know" and "nice to know" disappeared as the users considered all content to be available on the Internet and for free. With the monetising of content three critical success factors for content return:

- *Uniqueness*: this factor rests on the example that the content service which can predict the price of gold, will be the champion;
- *Usability*: this factor is often overlooked by the content provider as they have been squeezed into technical concepts; the look and feel are important as well as the payment system processing payments;
- *Exclusiveness*: in order to sell content, an exclusive proposition has to be made.

4 Content Services Segmentation

The term "content" became popular in the 1990s. Until then, content was usually covered by the term 'information'. The term "content" was specifically used for digital content, online or offline

4.1 Content on the Internet

Content on the Internet started mainly as text information. However, the mono mode information changed rather speedily to multimedia content, rendering text, graphics, audio and video as well as combinations of these types. By now, content on the Internet has become the most favourite activity online, according to a monitor by OPA and Nielsen//NetRatings:

Table 1. Development of time spent on different online activities 2003-2004 (Source: OPA and Nielsen//NetRatings 2004)

Share of Time Spent Online (%)					
	Oct03	Jan04	Apr04	Jul04	Oct04
Commerce	16.5	17.0	16.4	15.2	15.8
Communications	45.2	44.2	43.1	41.6	39.8
Content	35.3	34.9	35.9	38.9	40.2
Search	3.0	3.8	4.6	4.2	4.3
% Change in Share of Time, Month-Over-Month					
	Oct03	Jan04	Apr04	Jul04	Oct04
Commerce	↑7.1	↓6.6	↓6.8	↓3.2	↑3.9
Communications	↓1.7	↑0.2	↓0.7	↓3.9	0.0
Content	↑2.0	↑2.6	↑0.8	↑6.6	↓2.0
Search	↓25.0	↑2.7	↑31.4	↓4.5	↑7.5

Note: Excludes .gov and .edu websites, as well as pornographic domains. *Percentage change* indicates the percentage increase or decrease from the previous month's value (September 2003 values not shown).

Recent surveys by the Online Publishers Association (OPA and ComScore 2004) and Jupiter Research (2004) show two completely incompatible categorisations of content. Only General News and Games in the categorisation of OPA/ComScore and General News and Archives as well as Online Games in Jupiter Research appear to come close.

Table 2. Categorisation of content (Sources: based on OPA and ComScore 2004, Jupiter Research 2003)

Category (OPA and ComScore)	Category (Jupiter Research)
Personals/Dating	General News and archives
Business/Investment	Audio/Video Entertainment
Entertainment/Lifestyle	Adult Entertainment
Research	Financial and Business News
Community-made Directories	Other Content (e.g. horoscope, sports, kids)
Personal Growth	Digital Music
General News	Online Games
Games	
Credit Help	
Greeting Cards	
Sports	

The categorisation of OPA and ComScore looks comprehensive as it also includes the category Research among others, but it has questionable categories such as Personals/Dating, Community-made Directories, and Personal Growth. The Jupiter Survey categorisation is too specific on the one hand with Adult Entertainment separated from Audio/Video Entertainment, while on the other hand using 'Other Content' as a waste paper basket including important categories such as Sports and Health.

The variety of these categorisations shows that a standard segmentation would make market research easier. It is clear that the segmentation should not be based on changing technology such as streaming audio, and video or PDF downloads. On the other hand, a more general category such as Community Content, including Personals/Dating, and personal weblogs should be included. Also, a category of Public Sector Content should be considered, as not all public sector information will be free.

4.2 Content for Mobile Services

Mobile services have two limitations in comparison to fixed line Internet, regardless whether it is dial-up, cable or ADSL. The speed of the mobile network is rather low, even in the GPRS mode; the speed might improve with UMTS/3G. The screen size is variable, ranging from a small screen to one for a PDA or one for a portable computer.

Portable computers can be considered as comparable to stand-alone computers. In case of Wi-Fi, the speed might be comparable or faster than

the fixed line connection. While the speed issue is similar to the portable computer, content destined for PDAs has to be adapted to the screen size.

For portable computers and PDAs, the same content services of fixed line Internet can apply. However, for mobile phones the services are different due to the size of the screen. Basically, frames can consist of maximally 160 characters. The new telephones ready for MMS can display a photograph plus some text.

Table 3. Mobile services (Source: Adapted from Pedersen 2003)

Communication services (pull)	**Transaction services**
Loyalty programmes	Discount tickets
Promotional campaigns	Payment via SMS
Marketing campaigns	Ordering via SMS
E-Mail	Ticketing systems
Information services (push)	**Entertainment services**
Personalised news	SMS quizzes and sweepstakes
Notification services	SMS games
Stock exchange information	Voting
Sport- and health information	Dating and chat services
Reminder services	Horoscopes and jokes
	MMS soap series
	Ringtones and logos

No workable segmentation of digital content for market research is available yet. This makes it difficult to distinguish pre-Internet segments, segments on the Internet, mobile segments, and new upcoming segments.

5 Content-Related Technology

Payment and digital rights management are two technology-related issues interlinked with online content. The easier money can be transferred from the buyer to the content provider, the more content will be sold. But payment systems as such are not enough. Providers will also want the guarantee by digital rights management that the content is not bought once and copied many times.

5.1 Payment Systems

Payment systems have held up the sales of content so far. Individual newspaper or magazine articles, songs or movies require small payments. But payment by credit card is expensive for such a small sum, while on the other hand micro-payment systems are not yet matured nor trusted enough.

a) Payment on the Internet

Billing and payment services have not been a strong feature of the Internet. So far only a few banks have become involved in the payment process on the Internet: a direct charge to the account is thus hardly made. The most successful means for payment is still the credit card. Of course, there is hesitation about the use of the credit card, and for a user the secure transaction methods are not always sufficient. Besides, regional habits of using plastic money is influencing payments online. Although one can subscribe to online content by credit card,. payments for an article from the archive or a music or video download are small. So micro-payments would fill the gap. This normally works with a debit account. The user transfers money from the bank to an account at the micro-payment service. Whenever the user buys an article, a song or a movie the sum of the account at the micro-payment service will decrease and the user will have to transfer money again when the amount has been used up. Another method of micro-payment uses a code and puts the charges on the telephone bill. A variation of this is the use of a scratch card; the user pays for the scratch card and enters the code when asked to pay for a song.

Up to the year 2000, micro-payments looked promising. In 1994, D. Chaum, an American working in the Netherlands, developed a trustworthy and non-reputable system for anonymous (micro-)payments, *DigiCash*, but it never got the confidence of the banks (Clark 1998). IBM developed the micro-payments system *MilliCent*, but this never became the standard system in the consumer market. It is only now that micro-payment systems hit the markets with *Switchpoint* from the telecom operator KPN in The Netherlands, *Firstgate* in Germany, *BT-Click&Buy* in the UK, and *PayPal* in the USA. In the USA, micro-payments under US$ 5 have steadily increased over the last 18 months; but they form a minority among all forms of payment, which mainly consist of subscription and mid-range payments (up to 50%). Other methods for small payments are reverse billing by mobile phones (you order a song through the Internet and pay by mobile phone), E-Wallets and scratch cards. In sum, one can say that the appliance of micro-payment systems is a matter of time. It is not only the user that has to get used to them, though, but also the content providers.

b) Payment for Mobile Content

Given the attitude towards paid content mobile companies have various ways of payment. One can pay through a pre-paid card or with the monthly bill of a subscription. But also the method of charging can differ: by item, by bundle (which is basically by the amount of KBs and not by the quality of the content) or by subscription, promising you regular updates.

Technically there are lots of developments. The Dutch KPN *Switchpoint* software, a payment system for content on the Internet, has been adapted for mobile usage, and is now used as *Switchpoint Mobile*. But whether this local system will be able to persist against the systems from big companies is questionable. The German market for mobile payment is already dominated by Vodafone and T-Mobile, and the foundation of a so-called Mobile Payment Services Association with members such as Telefonica Moviles, T-Mobile and Vodafone is already in sight. The objective of the new association will be an open solution for payment via mobile telephones across networks and across countries.

5.2 Digital Rights Management (DRM)

a) DRM on the Internet

Payment is not the only technical problem involved in the issue of paid content. Closely related is the issue of digital rights management. To the content provider, DRM is a means to protect the copyright of the content, and the opportunity to sell the content over and over again. To the buyer, DRM means that measures have been taken against piracy.

DRM is intended to secure rights during the production phase, as video and music clips get often stolen before the release and the distribution phase. The distribution phase is a complex problem as buyers might want to use the content on multiple platforms: buyers might want to read an article on PC as well as on PDA, or they might want to listen to a song on their PC, CD player or iPod.

DRM has thus proven to be difficult to apply. When in 2003 the music group BMG applied SunnCom's DRM software to audio CDs, the superficial technology solution was broken in a matter of days. More serious is the DRM work on watermarking and fingerprinting. Sony is developing a watermarking technology for video under the name Sony's Signet Screener. The German research institute Fraunhofer has developed the Light Weight Digital Rights Management (LWDRM) technology; content files (for example AAC or MP3-coded music files) protected by LWDRM are initially locked to the PC at the download stage, but users are then able

to transfer the tracks onto portable music players or to share them by digitally signing them, thus making LWDRM protected tracks traceable. Fingerprinting technology is currently of interest for broadcast monitoring.

But even if an agreement has been reached over DRM, different file formats used by the music companies will pose a problem. However, music companies and DRM developers have recognised this and are determined to solve this technical problem.

However, it is no longer only the article, the song or the movie which has to be protected. The next DRM challenge will be home networks. IBM has already presented xCP, a laboratory technology for authentication of device identities on home networks. Also Philips and Sony announced that their joint-venture InterTrust will provide a new DRM interoperable technology across PCs and consumer electronics devices.

Philips and Sony have an enormous influence in the consumer media electronics marketplace, and also have demonstrated their influence by bringing new media formats such as CD-ROM and DVD to the market successfully several times in the past. The release of this upcoming technology will likely trigger a platform war between Philips and Sony on the one hand and Microsoft on the other, with a handful of third parties, such as Apple and RealNetworks, also participating. Another group consisting of five electronics manufacturers, including Matsushita, has also announced to tackle this area.

b) DRM on Mobile Devices

The mobile sector has decided not to deal with content safety individually. Four members of the Open Mobile Alliance (OMA) have published technical guidelines. The technology, named *OMA DRM 2.0 Enabler Release*, will be embedded in the operating system of the new generation of mobile devices. Nokia, Intel, Matsushita and Samsung offer media companies to publish their content on mobile devices. A company has been set up to handle the licenses of the anti-copying technologies.

6 State-of-the-Art of Paid Content

6.1 Internet Content

The crucial question to start with is: which paid content is hot? In other words: which content is destined for economic exploitation? Several kinds of content are at the centre of attention: music, online newspapers and E-Magazines, games as well as movies.

a) Music

Music is the most heterogeneous section for paid content. There is a long struggle by the music industry to stem piracy, and it is far from over. The music industry had some judicial set backs recently as the peer-to-peer software of KaZaa was not ruled illegal; a view also supported by the Copyright Board of Canada, and concurring with the US decision in favour of Grokster and Morpheus. Therefore, the music industry and collecting societies will have to go after the uploaders personally, and/or opt for a levy on PC and other memory devices such as portable MP3 players.

Although legitimate online paid music services have been around since 2002, it was only with iTunes of Apple that people started to take these services seriously. Although the success might have come from trust in Apple on the one hand and fear for persecution by the music industry on the other it hand, it is more the usability of the service (pricing, method of payment – credit card or micro-payment-, use on more than one platform – Internet, CD-ROM, portable MP3 players) that impressed users.

The lesson to be learned from the music industry is that *a trustworthy and usable online content service must be offered in order to replace illegal copying*. Recently, the International Federation for the Phonographic Industry (IFPI) announced that the fight against online music piracy has "turned a corner" as a result of the increase in the number of legitimate online services now available and legal action against illicit downloading. New figures from the IFPI in June 2004 showed that 800 million illegally copied music files or tracks were available on the web, compared to 1.1 billion in June 2003 (IFPI 2004).

b) Online Newspapers and E-Magazines

For the print world it has taken a long time in order to figure out a paid content business model. Newspapers were given away for free, magazines hoped to be supported by advertisements, and E-Books struggled with proprietary software and single function devices. The position taken by the Wall Street Journal to ask money for its content was not followed by other publishers. Only after the dot-com crash newspaper owners started to realise that advertisements alone would never pay for the production costs and bring in extra revenues. From that point onwards, the newspapers turned their online versions into sites for which people have to register or to pay by subscription or per article, and started to distribute online newspapers themselves or through an electronic kiosk such as *NewsStand*.[1]

[1] See http://www.newsstand.com

The E-Magazines needed more time to find their way to paid content. But by now, magazine publishers have started to understand the game. Besides subscriptions by the publishers, third parties such as Zinio and Adobe offer E-Magazines in their digital version of the old-world kiosk.

E-Books have so far been a continuously promising phenomenon with proprietary hard- and software. The reading devices have not worked so far but electronic files might be a road into the future. For the time being, Adobe is making money out of this trend with its book and article shop.

c) Games

Online gaming is a promising content segment. Already with packaged broadband (CD-ROM), games were a favourite pastime. The second generation consoles such as the PlayStation II and X-box with their online connections will stimulate online services such as gaming portals. Another development in the gaming world is multi-player gaming, allowing a user to play against more than one user online. Also in this case, DRM will be essential as piracy by means of cables and chips will be an issue.

d) Movies

Movies have not been much of an issue yet. The long downloading times have scared off illegal copying at the scale of music so far. However, with ADSL and fibre optic cables, download times for movies have decreased dramatically. And as with music, peer-to-peer software for movies will come about, unless the film industry has found an answer to the demand in movie download services beforehand. At the moment, *MovieLink*, *CinemaNow*, and *MovieFlix* have licenses from the major studios, and offer movies in the formats of Microsoft Windows Media and RealNetworks.

e) Sports

Sports is a promising area, certainly even more so with the rise of broadband. Using the Internet to bridge time and space, certain international sports, e.g. cricket, hockey or American college football, draw already a loyal crowd of paying users.

f) Adult Entertainment

Adult entertainment has been part of the state-of-the-art and the misery of the Internet. The providers of adult entertainment have perfected the notion of sticky sites and pop-ups. They were also the first ones to accept credit cards and have now introduced micro-payments.

6.2 Mobile Services Content

Content for mobile services is developing slowly. Text-oriented content in the form of SMS is enjoying a certain degree of interest. Its successor WAP appears to be a failure as the service was presented as mobile Internet, but turned out to be a dressed down version of it. MMS has become a new feature for recording and distributing photographs with texts and short movies. With the new technologies of Wi-Fi and mobile WLAN connection with portable PCs, content hardly needs to be adapted for screen output. For PDAs and smart phones, however, screen outputs have to be adapted. PCs with cards for mobile services can download music, newspapers, and E-Magazines, games, (sports) broadcasts, and movies.

Internet content services are now on the trajectory from free to fee. The music business presently serves as a paradigm for copyrighted content.

7 Acceptance of Paid Content

Paid content is in the middle of the acceptance process. On the one hand, buyers of high quality STM and trade content are used to paying; usually the university or the company will pay. But on the other hand, Internet users have never had a tradition of paying for content. The process of accepting paying for content among this group can be measured by the resistance to paying, and by the amount of piracy of content. The resistance is most obvious in the music sector at the moment.

Three market research studies illustrate users' hesitation to pay for content services. AMR Interactive did research in Australia. It showed that 72% of the respondents have never paid for content on the Web, and 57% do not understand why they should (Lebihan 2002). This study is supported by the Pew Internet (2004) report carried out in the USA. This study comes up with 12% of the respondents willing to pay, while 36% will stop getting the information once they have to pay. An extensive German market survey (VDZ 2003) is, on the other hand, rather optimistic. It predicts that in 2005 the content sold in Germany will generate a total income of € 127 million. And more than 50% of the respondents are willing to pay for professional services such as financial content, databases, and news archives; unclear is whether the actual user pays or the company he/she works for.

Looking at content segments, some trends are prevalent. In the case of newspapers and magazines, many sites have experienced a dramatic drop

in unique visitors and page views when moving from an open site to a closed site i.e. paid services Installing payment for access to the site or for a download of the newspaper or magazine is thus similar to the example provided by the case of Ireland.com.

Ireland.com is the website of *The Irish Times of Dublin*. The newspaper started up its website in 1994 and has enjoyed much interest from all over the world, especially from Irish emigrants and their offspring. When the site converted to a paid access model in mid-2002, Ireland.com's monthly page views dropped from 30.4 million to under 7.1 million. As a free access site Ireland.com had 2.3 million unique visitors a month. But when articles were paid content, less than 10,000 users signed up, which is a conversion ratio of hardly 1%. Due to the drop in unique visitors and page views, the newspaper also lost revenues on its banner advertising.

Resistance to paid content is also evident with music and movies. Here, resistance translates into copying songs and films, mostly through peer-to-peer network services. Once bodies such as the Recording Industry Association of America (RIAA) and the collecting society BUMA/ STEMRA started court cases against downloading without payment, the amount of download started to decrease. In June 2003, still 35 million unique users downloaded music from the peer-to-peer music service KaZaA. By January 2004, with the RIAA having announced court cases against private downloaders, the number went down to 26 million. Contrary to this downturn, the legal music sites of *iTunes* Musicstore from Apple and Napster.com assembled 5.9 million downloaders in November 2003.

Another interesting aspect is the use of broadband. According to a survey by the Online Publishers Association together with ComScore (2003), it appears that broadband is a likely driver of increasing paid content revenues. Again the ISPs hope that broadband will offer them the opportunity to sell fast, faster and fastest Internet, and gain a share in content markets (e.g. Tiscali with OD2 in a music service). The following list highlights the relation of broadband and paid content (OPA and ComScore 2003):

- 59% of paid content purchasers have broadband access.
- Purchasers of paid content are 14% more likely to have broadband access to the Internet.
- 66.7% of Sports, Games & Entertainment category purchasers have broadband access.
- Paid content purchasers in all four major categories (Personals/Dating, Business Content/Investment, Entertainment/Lifestyle, Research) of this report exhibit greater broadband penetration than the total Internet audience.

Illegal downloading of digital content will not be stopped by court cases only. A legal service with a wide assortment, user friendly technology, and multiple platform use will need to be offered.

8 Revenues of Paid Content

Having demonstrated the problem of categorisation, it is difficult to compare revenue statistics and project them over years. For the Internet, the first statistics are being published right now. For content for mobile services, only a projection is available.

8.1 Internet Revenues

The available statistics present however only an indication of the global market. Since 2002, the OPA has published statistics about the US market. The OPA has ever since conducted quarterly surveys among its members. In 2003, the OPA has started a European chapter, which also is going to conduct quarterly surveys, most likely according to the same methodology developed in association with ComScore. So far, no report has been published on the European market by OPA-Europe.

Table 4. Content spending in the USA by category of content (x million) (Source: OPA and ComScore 2004)

Category	2001	2002	2003
Personals/Dating		302.1	449.5
Business/Investment		393.0	334.1
Entertainment/Lifestyle		227.5	214.0
Research		106,6	108,6
Community-made Directories		91.1	87.0
Personal Growth		44.3	90.7
General News		70.0	87.5
Games		72.0	73.0
Credit Help		40.4	36.6
Greeting Cards		36.2	40.6
Sports		30.3	38.2
Total	670 m	1.3 b	1.6 b

US consumers spent US$ 1.56 billion for online content in 2003. Online content spending in 2003 was up 18.8% in relation to the previous year. Table 4 breaks down the paid content spendings in the US by category. As pointed out before, the categories on which the statistics are based are dubious and limited by the participation of the OPA members. However, the report is more informative concerning the pricing models.

Table 5. Average subscription price in US$ by pricing model (Source: OPA and ComScore 2004).

	2001	2002	2003
Average Annual Subscription Amount	49.69	48.94	48.65
Average Monthly Subscription Amount	8.46	10.32	11.02
Average Single Payment Amount	17.89	22.64	21.67

An intriguing remark in the report is that micro-payments represent less than 1% of the total payments. A critical note is needed here: Either there were just few companies with micro-payments in the portfolio of screened companies or the analysed content was just not interesting enough. Other research from IDC indicates that 62% of individual content buyers worldwide produce only 8% of the content sales revenues, while companies and institutions generate 92%. Although the statistics do not corroborate each other, the trend is clear:

- Professional content still accounts for the majority of revenue;
- Subscriptions bring in the load of the content sales revenues, while companies and institutions bring up the money for content acquisition;
- Payment for consumer content is still at the beginning of its revenue stream.

Jupiter Research (2003) published a forecast for paid content revenues in Western Europe from 2002 to 2007 (see Table 6). When one compares Tables 4 and 6, it is clear that the revenues of paid content in Europe are far behind the USA. This is due to the amount of Internet users, but also to the attitude of Americans towards paying for information. Adult Entertainment is by far the leading category of paid content, receiving payments by credit cards and since 2003 also through micro-payments. However, the category adult entertainment will diminish in importance as audio/video entertainment, music, and video will overtake.

Table 6. Forecast for paid content (in € million) in Western Europe (Source: Jupiter Research 2003)

Content revenues	2002	2003	2004	2005	2006	2007
General news and archives	6	19	32	46	61	78
Audio/video entertainment	5	38	88	162	277	424
Adult entertainment	266	297	330	363	393	422
Financial and Business news	22	41	61	82	101	121
Other content (e.g. horoscope, sports, health, kids)	10	27	53	84	127	183
Digital music	9	26	65	136	285	550
Online games	43	96	176	285	418	589
Total content revenues	361	544	806	1158	1662	2366

8.2 Mobile Content Services

Many of the difficulties with paid content on the Internet do not exist for mobile services. From the beginning of mobile services onwards, people have learned to pay, whether this is for a SMS, WAP, I-mode, or MMS service.

Mobile services are also hampered by some features. One of the most important handicaps is that the development cycle of mobile technology is very fast. SMS has received competition from WAP, I-mode, MMS, Wi-Fi, and WLAN within the time span of less than five years. And 3G/UMTS has only just started. Despite this technology offensive, SMS might turn out to be the Teletext of the mobile world: primitive, easy to use, and effective, this while the new technologies do not get time to mature. And last but not least, a problem lies also in the lack of transparency in the mobile services sector with the multiplicity of content creators, content packagers, platform providers, transaction providers, and network providers.

What will be the share of mobile content for the mobile sector? In relative terms it will not be much. A study conducted by Andersen for the European Commission (EC 2002) indicates that network operators will

earn their money in 2005 by voice (€ 67.7 billion), personal data services such as SMS (€ 44.6 billion), and only € 5.4 billion from content. For the content provider, mobile content will yield some 6% of his total income. In a media forecast, the European market is still estimated at € 18.9 billion in 2006. Major categories are: News, Games, and Youth Fun (ringtones, logos). Even Financial info is relatively low on the scale, most likely because only stock prices are interesting to know when one is on the move.

This forecast is however only in the light of the present mobile services situation, but 3G/UMTS is about to get on the scene with the promises of content such as music, video, television, and games. Will people want to have it? A TNS market survey in Europe (2003) said that 42% of the present mobile users are interested in 3G, and more than 50% of this group is willing to pay more for 3G; for MMS, High-speed Internet, and E-Mails they were willing to pay € 6 to 10 more per month.

The crucial question remains whether personal communication such as SMS, MMS and E-Mails will prevail over content. In the same TNS survey, 77% of the respondents want to forward and receive E-Mails, and 77% want video phones. Regarding content, 47% of the respondents would like to download videos and music. These data point into the direction that personal communication will prevail over content.

9 Business Model

The term 'business model' is a much misused word. Quite often the term 'revenue model' would fit better, depending on the scope of the business. A business model for paid content concerns itself with payment for digital content. Such a business model has a set of components that is part of what people perceive as the business proposition.

1. *Content*: What type of content (text, audio or video or combinations); how unique is the content on the web; how valuable is the content.
2. *Infrastructure*: How is it presented on the web; can the user see a lead; is the content well-protected, but can it be transferred to other platforms (portable PCs, iPods, eBooks); how easy is the payment; how is the usability.
3. *Revenue*: Is it an acceptable price for the content; are there bundles possible; is there a subscription and a pay-as-you-go facility.
4. *Cooperation*: Are you listed in search engines; do other (usually unpaid) sites refer to your site; have a set of valuable links.

5. *Growth*: Do not show all content straight from the beginning; build up the introduction in steps.

A standard business model for paid content does not exist. What works for the Wall Street Journal does not necessarily work for the Financial Times. So whenever setting up a paid content site, one should look at comparable sites and the components in the model and formulate an own model with the five components in mind.

A good example of the struggle over the right business model can be found in the digital music business. With many illegal downloads of copyrighted music via peer-to-peer connections, music companies like Sony and EMI started their own download services. The business model restricted amongst others transfers of songs from the Internet to other media such as CD-ROM, and play-back devices like the iPOD; also their prices were hardly differentiated between a single song and an album of songs. When Apple marched in with the service iTunes in April 2003, another business model was presented. In conceiving and launching iTunes, Apple did two things right. First, it talked the major recording companies into licensing music to its service on less restrictive, more user-friendly terms than those that they offered other services. Thus users could create unencrypted MP3 versions of music tracks, for maximum portability, but they had to go through the trouble of burning a CD first. By putting up a speed bump for pirates, it avoided barriers that hampered legitimate users. Second, Apple turned the service iTunes into a traditional record store. By doing so, iTunes changed the paradigm, built by the music itself:

- no obligatory subscription to the service;
- availability of single songs or an album;
- acceptable price under US$1 a song;
- portability to other devices;
- a wide variety of songs, not limited by the offer of one company.

The business model is such a success that it is copied by many music services.

Newspapers have basically two business models. One model is to present headlines and have the user to register and to buy a subscription or to buy an article. Other newspapers like the *Washington Post* and the *Dutch Telegraaf* now have a digital edition – e.g. an E-Paper as a PDF – which can be bought by subscription or by the single issue.

Online games require other business models. Through several game portals, participation in a multi-player game can be bought. This can be on the

basis of time spent gaming, payment for a particular game or (micro-)-payment for downloading a game. In all three models the conditions differ.

There is no such thing as a standard business model in digital content.

10 Conclusions

Paid content is an issue for the Internet, but most likely a temporary issue. Before the introduction of the Internet, there was already a tradition of payment for online content. But when the Internet came out of the military barracks and university libraries, the ISPs were not paying for interconnection fees and hoped to compete with media companies. This led to a long phase of non-payment based on an advertisement business model. After the dotcom crash, ISPs scaled down their content services. However, paid content services are on the rise again due to the efforts of content providers; paid content services also seem to be helped by broadband, offering new opportunities.

Measuring the growth is rather difficult as there is no standard segmentation of online content requiring payment. But the few marketing research reports indicate that the resistance to paid content is decreasing. In fact, as the developments in the music recording industry show, payment for content will be accepted by the availability of a legal, user-friendly service in combination with legal action. However, legal action without a legal, user-friendly service is a waste of money.

Paid content is still growing ahead of economic indicators. This can be seen as a catching up phase. With the growth of services with proper payment and micro-payment facilities as well as digital rights management facilities, paid content will keep increasing ahead of the economic indicators.

Paid content has never been an issue in mobile content. From the first SMS services onwards, payment has always been required. In comparison to content on Internet, the opportunities for paid content on mobiles looks smaller than paid content on the Internet.

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Content Applications: Selected Cases

The Impact of E-Learning

Attila Nagy

ICT Business Consultancy, Budapest, Hungary

1 Introduction

The impact of the telecom boom on education and training is inevitable. The unprecedented developments in information and communication technologies (ICTs) are closely linked to several other significant changes in our economy and society. This also results in a higher demand for education and training in response to the challenges of our emerging "knowledge economy" and "knowledge society". A digitally literate citizen will be able to learn and take responsibility for continuous personal learning development and employability (eLearning Summit Task Force 2001).

Historically, distance education can be traced back to the 18th century, to the beginning of print-based correspondence study in the United States. In the mid-19th century correspondence education started to develop and spread in Europe (Great Britain, France, and Germany) and the United States. Isaac Pitman, the English inventor of shorthand, is generally recognised as the first person to use correspondence courses.

By the late 1960s and early 1970s significant changes in distance learning occurred due to the development of new media technologies and delivery systems. The Open University (OU) in Great Britain became the first autonomous institution to offer college degrees through distance education.[1] The OU now uses all possible forms of technology to deliver learning opportunities to students. As technology developed, the possibility for shifting from traditional one-way communication methods to two-way interactive distance learning programmes became more feasible.

ICT supported education quickly became the hot topic in the 1990s due to spreading use of the World Wide Web and its fast developing applications. These new technologies have opened up new opportunities for the non-traditional learner as well as for the traditional training institutions.

[1] See http://www.open.ac.uk

Nowadays, almost all available ICT developments are being used for distance education, or – with today's more popular term – for E-Learning.

2 What is E-Learning?

E-Learning means a lot of different things, and it is understood differently by players with very different roles. The term E-Learning covers a wide set of applications and processes.

E-Learning is an umbrella term describing any type of learning that depends on or is enhanced by online communication using the latest information and communication technologies. The scope of such learning is very broad. The globally available definitions may, however, create confusion. Not only that the topic is equally new to course producers, to technology providers, and to the end-users (i.e. the learners), it also has not found its common ground and market position yet.

In the past few years, E-Learning has been emphasised too much, especially by leading technology providers, and thus has been made a rather abused term. However, as technology and business evolve, so does terminology. While other equally valid terms are likely to persist, E-Learning seems to have finally captured the field.

2.1 Characteristics of E-Learning

The promise of E-Learning is that it brings powerful new tools for improving competency and capability, speed, and performance whether an organisation operates at one geographical location or at many. Just as the rise of ICTs fundamentally changed the nature of how work and communication gets done, the emergence of E-Learning technologies is fundamentally changing the nature of how people learn. People are more and more encouraged to learn by themselves and to only learn what they really need to know to perform their task optimally.

The major part of the effective E-Learning is interactive. Because one should also possess a good portion of self regulation skills, in most cases a coach is also provided to support the learners throughout their learning path. In terms of greater flexibility and timeliness, E-Learning can suit training needs 24 hours-a-day, 7 days-a-week, where traditional classroom-based training initiatives are quite disruptive. Rather than having to wait due to making up a class of students, E-Learning allows training to be conducted for individuals at their own convenience.

E-Learning, however, cannot happen without a supporting technology. Enabling applications and their related technologies play a very important role. However, they should never be in the front-line for the end users. E-Learning can successfully eliminate some of the major disadvantages of earlier distance learning solutions. These are typically the content update cycle, the lack of feedback mechanisms during the learning process, and the response time of the student support tutoring systems.

Some of the benefits of E-Learning include:

- Self paced learning process, flexibility, accessibility, convenience
- Savings on travel cost and time
- Highly customisable individual learning style
- Interactive and rich multimedia learning content
- Learner focused learning through more active participation
- Easier content management, simpler data management, ease of update
- Possibility of linking the content with other learning resources
- Use of distributed libraries, inexpensive worldwide delivery
- Integrated assessment and testing facilities
- Variety of measuring methods of the learning success
- Measuring return on investment (ROI) by monitoring and evaluating the learning progress

The aspects of E-Learning make a difference in comparison to the traditional instructor-led training by identifying different benchmarks for measuring the quality and the success of the learning process. These can be:

- The reliability of technology, tools, and enablers
- Course development guidelines for setting up standards
- Defining the right course structure in the view of course objectives
- Online tutoring, learner interaction, feedback, self test
- Learning process follow-up, evaluation, tracking,
- Measuring and analysing the learning progress for return on investment

Setting up success criteria helps to measure the progress and level of achievement of the goals. E-Learning should always deliver content which is current and relevant. Learning through E-Learning therefore must provide the learners with access to available experts, to the best sources, promptly responding tutors, and fast solutions providers.

Successful learning also requires effective and engaging learning content. Intensive collaboration is needed to share relevant information and the knowledge of colleagues, experts, and professional peers. The task of E-Learning is to bring a wide range of resources together. Also, the power of the latest technologies can lead to increased personalised services and an individualised approach for the learner. The learners should be able to select the various activities from a customised interface.

Various implementation projects have shown that E-Learners usually mention effective personal skills development through which they can raise their value on the labour market. One of the most surprising revelations is the appreciation of the "non-threatening" atmosphere of the learning process.[2]

> Originally called distance learning, E-Learning has evolved into an interactive activity which fully exploits the assets of today's information technology.

3 Is There a Market for E-Learning?

The demand for E-Learning is rising: business cycles are getting shorter, and there is an increasing time pressure on companies. E-Learning in this context can mean less time away from work and lower costs for the employer. At the same time companies are expanding globally, which increases the need to learn more about non-domestic markets.

The continuing growth of mergers and acquisitions often involving large organisations is accompanied by the need to train many employees at once on particular subjects. Also, broadband internet access is more and more enabling people to learn online from their homes.

The real market size is still unknown. Many analysts have produced data on the training market, at national and at global levels. In the United States it is fairly easy to get an overview of market developments, and a growing number of investment companies compile data on market size and growth expectations.

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[2] Based on the experiences of the author of this report.

Gathering and analysing data on the European learning market is still more difficult compared to the US market as it appears to be much more fragmented. The heterogeneity of information and data sources, and the often imprecise terminology compounds the problem. However, the picture is already clearer than it has been even two years ago. One of the most relevant and most quoted market studies was published in 2003 by the European Centre for the Development of Vocational Training (Cedefop 2003).

IDC (2004) has also published a European Corporate E-Learning Market Forecast and Analysis, 2003–2008. According to IDC estimates, the UK market for IT training was about € 900 million in 2002, which in fact is less than a year earlier, when it amounted to about € 1,075 million. It was expected to be even less in 2003, mainly due to the dramatic reduction of corporate IT budgets and to the lower demand for IT professionals. At the same time, the E-Learning sector of the IT training market has been steadily growing in recent years as it has developed into more stability and sophistication. However, it is also becoming a bit more difficult to distinguish between regular training methods and their E-Learning counterpart, as a result of the growing trend towards blended learning solutions, i.e. training that combines both instructor-led and E-Learning elements. The study notes, "Although the corporate E-Learning market has been affected by the economic downturn in Western Europe, the market is still enjoying growth rates that are becoming increasingly rare in technology markets" (IDC 2004).

E-Learning has thus become a stable industry that seems to be experiencing a healthy growth rate. It may, however, be a bit slower than the expectations expressed by previous forecasts. But it still remains more or less steady even in spite of the recent economic slowdown. There are minor fluctuations that are occurring, especially for the technology providers, but nothing so far that suggests a decline in the industry.

The wide adoption is occurring across all sectors, with corporate and government sectors still leading the adoption trend. The academic sectors are experiencing the fastest growth rates, with the other sectors following closely behind.

Convergence is perhaps the most significant trend occurring in industry. Convergence of technology, characterised by integration, automation, and personalisation, is enabling industry to glimpse the early outline of next-generation products. Also, industry is entering a consolidation and maturation phase. The early market creation phase is turning into a value creation phase characterised by a wider spectrum of adoption. Consolidation is occurring as vendors race to gain market share and brand recognition. Prominent mergers receive press attention, but consolidation in the greater

industry has been gradual, with relatively small increments of capital redistribution. There has not been a dramatic drop in the number of E-Learning companies. The mergers and acquisitions activity is relatively steady, and most companies are doing well.

There are clear signs of commoditisation in industry, with products becoming less differentiated. Prices are falling, and acceptable quality products are widely available. New features are still more important than the actual price to the corporate buyer, but there are patterns that indicate that these products are being sold as commodities in the general market.

This is good for customers. Features and quality are top priority when prices are high. As competition develops and basic quality-level features become common, the prices will drop. At that stage, customers will shop for price since they can acquire the basic quality from a range of vendors.

Customers are still confused about the proliferation of companies and products in the market. There are serious concerns as they have witnessed bad experiences of other customers on poor but expensive implementations, and low usage rates that characterised the early E-Learning deployments. From the customers' point of view today's market needs to have:

- clearly defined implementation timelines (the shorter the better)
- cheaper and clearly defined pricing
- functionality that meets the expectations set by vendors (faster, cheaper, better)
- measurable, significant, and rapid ROI
- products that will not be obsolete in less than a year
- freedom to choose from a variety of vendors

3.1 The US Market

The US training market size is significantly ahead of the rest of the world. Companies spend US$ 66 billion annually on corporate education, and this is only a subset of the gigantic educational market in the United States. In the US, the total training market was about US$ 735 billion in 2000. The online component is expected to grow by early estimates from US$ 9.4 billion in 1999 to US$ 53.3 billion by 2003 world wide (Merrill Lynch 2000; OECD 2001). Brandon-Hall forecasts the US E-Learning market to grow exponentially in the forthcoming year (Adkins 2001).

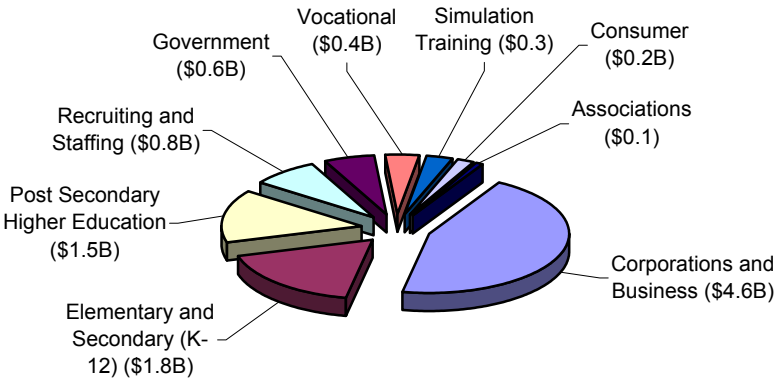

Fig. 1. 2002 US Conventional E-Learning Market (Total US E-Learning market US$ 10.3 billion) (Source: Adkins 2001)

Table 1. E-Learning Forecasts (in US$ billion) (Source: based on Adkins 2001).

Sector	2002	2006	2011
K-12 Academic	1.8	11.0	18.0
Higher Education	1.5	23.0	44.0
Recruiting and Staffing	0.8	4.6	11.7
Corporations and Business	4.6	16.4	42.6
Government	0.6	2.7	13.4
E-Learning Simulation	0.3	6.1	37.0
Vocational	0.4	8.6	19.2
Consumer	0.2	7.3	16.0
Associations	0.1	3.4	11.0
Totals	10.3	83.1	212.9

Almost half of the academic institutions in the US already offer online learning as part of their curriculum. Merrill Lynch also refers to the multiplication of corporate universities from 400 in 1988 to 1600 in 2000.

There are distinct emerging patterns that are taking shape in the industry. There are signs of wide adoption, convergence, consolidation, and commoditisation. Although there are some minor shakeouts that are occurring, nothing so far suggests a decline in the industry.

3.2 The European Market

In 2002, the European E-Learning market produced a surplus of one third over the requirements that in some areas, like in non-IT technical training, nearly doubled.

The only area where a close alignment was registered between the need and supply of E-Learning were ICT training. This clearly indicates that a fairly mature market is delivering ICT training. It already encompasses about 20% of the ICT training market.

In language training, the supply is a little ahead of the use, however, it seems to be more popular in the new EU member countries. This can create opportunities for the longer established E-Learning vendors providing high quality popular language courses.

The content industry is fast moving towards developing highly interactive and enriched multimedia learning content. There are a few global, mainly US based market players in the European content market (SkillSoft, NETg, HBS). However, they are still not gaining a dominant market share due to notable differences in learning culture and of course and languages. There is a great number of SME content developers and vendors providing goods for the local market in local languages.

So far, pure E-Learning solutions have not been very successful. E-Learning is such a broad concept that its essence has caused some confusion. Low adoption rates and consequent lack of familiarity with the technology are one of the most important factors. Also, not handling carefully the dramatic change in the way how learning takes place often created tangible resistance especially towards early implementations. Thus, the market shows a significant shift from the "early implementations" towards blended solutions, where traditional training is mixed with E-Learning features. Organisations that respond the slowest to changes are mainly large enterprises and public institutes, where ITC support for training is usually less provided. The lack of good content, however, still remains a significant barrier to market growth, and the lack of effective online learning materials and resources is one of the main reasons for early market failures.

The E-Learning market is the most developed in Finland, Sweden, and in Denmark. It is followed closely by the UK, the Netherlands, and Belgium. Germany and France line up in some segments, whereas they both show serious shortfall in other areas of E-Learning market developments. Spain, Italy, and Greece can not in the least represent a well developed and operating E-Learning market (Massy et al. 2002).

3.3 There is a Business Opportunity

E-Learning represents a strong business opportunity for the development of technology and learning content. IDC predicts E-Learning in the world-wide corporate environment to grow at 37% compounded yearly until 2006.

However, blended solutions seem to be more favourable in both real and virtual classrooms. The growth of blended approaches to deliver learning also makes the "off-the-shelf" content vendors move quickly to blended models (Barron 2001).

Accessible E-Learning will be a competitive edge during the current economic slowdown. The industry is evolving rapidly to meet the real needs of the customers. New customers and new vendors are entering the market previously dominated by "early adopters" and E-Learning is now becoming a mainstream. There are signs of wider adoption, convergence, and early signs of developing commodity products and services.

> The world-wide E-Learning market size is roughly estimated to account for some US$ 53 billion in 2003. The size of the US market lies far beyond that of Europe so far. The market shows a healthy growth rate. The industry is currently in a convergence phase. While very technology driven, the lack of good content is still a major issue in e-learning. Nordic countries have the most developed e-learning market. Corporate e-learning is the biggest growth market.

4 The Promise of E-Learning

The promise of ICTs in education can be described in brief as an opportunity to provide better education cost-effectively to more people. The question which is going to be addressed in the following is which parts of the teaching and learning processes can be most successfully supported by technology and digital media.

In order to build a successful E-Learning business scenario the cost for an E-Learning programme should be lower than an alternative classroom-based, instructor-led training. However, there is always the biggest stumbling block, i.e. the start-up cost for investment in the supporting technology. But the costs associated with delivery of the programme to the end-users are already much lower than for traditional methods.

Knowing about learning styles can help us determine if E-Learning is an asset. The interaction and delivery methods used in E-Learning courses are fundamentally different from traditional classroom-based methods. In an

online course, there is a lot of passive learning done through reading text, looking at graphics, listening to audio, watching video clips, animations. Also, the active, or responsive mode is no longer oral, it is done very much through writing (like email messages, forum discussions, blogs and chatting). Online learners are usually self-directed. For these reasons, most of them would then learn more effectively in terms of having better retention. Typical domains of the use of E-Learning are ICT related subjects, general business and financial studies, languages, fast and frequently changing content at the work place.

4.1 Drivers of Partnership

New categories of partnerships in E-Learning are shaping, which especially concern corporate education and knowledge management. These areas have been the most affected by the trend towards globalisation and the increasing close relationships between a wide range of educational and business organisations (ACTeN 2003b).

There is a visible convergence in the educational market driven by the emergence and rapid development of new learning and content publishing technologies. Also, clearly distinct even some years ago, the markets for entertainment, customer care, employee and adult learning are rapidly converging. The work-flow in a modern learning content publishing process provides brand new opportunities to form new strategic alliances and partnerships including different types of business and educational units.

- *Media-media alliances*
  The main driving forces are digitisation and the Internet. The media industry is showing a constant merger and acquisition process including new and old media company types, challenging the predominant role of publishers as intermediaries between content makers and consumers.

- *Education-education alliances*
  Especially European training and educational institutions show a clear trend in forming international networks and various interest groups. Most of the recent alliances have been established during the past few years under the influence of both new learning technologies and internationalisation.

- *Education-corporate universities alliances*
  It is reported that there is now a trend for corporate universities to establish links with even more reputable and more academically rigorous business schools.

- *Education- media alliances*
  It is now becoming a common practise that large media conglomerates are entering into alliances with institutions for higher education and business schools to develop strategic alliances and use technology effectively while protecting each of their intellectual property.

Most of the new market players at present are seeking to work with universities. Particularly in higher education, there are four reasons why media, education institutions and corporations are entering into alliances and develop closer partnerships. These are:

- *Convergence*
  There is a convergence in learning markets as a consequence of the development of new learning and publishing technologies. The domain of traditional education may historically have been most important, but the fields of employee learning and edutainment have grown much more during the last decade. These markets, clearly distinct even a few years ago, are now rapidly converging.

- *Structural gaps*
  The historical barriers between content makers and network providers are broken down; a "structural gap" has emerged waiting for a whole range of brokers to fill it in. It is an entrepreneurial driving force to establish a direct link between content providers and the end users, the learners.

- *Branding*
  Increased activity in this area is mainly due to the emergence of new technological possibilities usually provided by major IT firms, whereas the traditional academic educational institutions are associated with the quality of the training. This brings a growing need for "branding" of learning products and the supporting technology that follows along with the broadening of the customer base. Branding of major media corporations links up with top-ranked education institutions.

- *Globalisation*
  It is of great interest to focus on the emergence of new kinds of cross-national networks not only in business education. Globalisation of student flows and programmes leads to the establishment of transnational governance structures.

The key drivers for partnerships can be categorised in terms of investment, competence, and opportunity. With this, the key drivers for partnership are just like in any business alliance.

Outsourcing is now becoming a popular option. Companies increasingly focus on their core competences and partner with other companies where it is more appropriate to accomplish business objectives through the involvement of external expertise. More than 95% of the multinationals are outsourcing parts of their business. Figure 2 illustrates the areas which are usually outsourced.

Commercial organisations may provide managed services to support E-Learning targeted at the provision of ICT equipment or content or both. The measure of the effectiveness of such arrangements will be the quality of learning provision and support, which will remain the prime concern of learning providers themselves rather than of third-party suppliers.

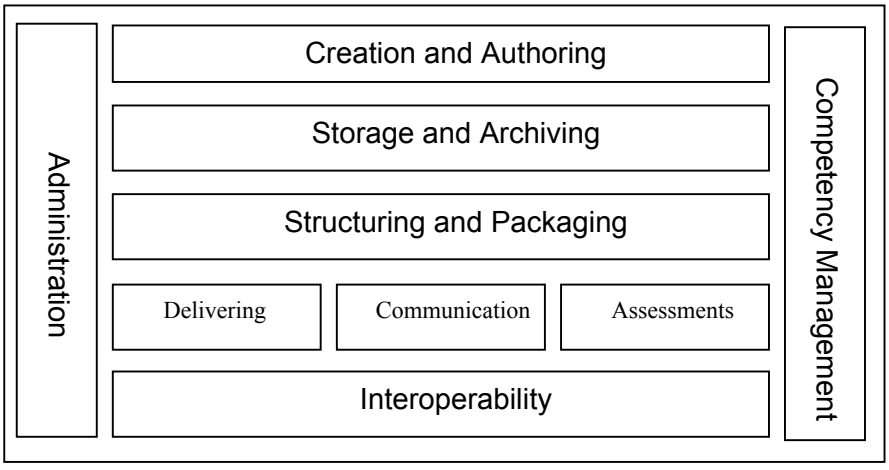

Fig. 2. Distinct areas of E-Learning business activities which are usually outsourced to third parties and to strategic partners.[3]

[3] The author would like to thank Peter Ariën, Erik Duval, Marc Ketels, Jan Raeymaekers and Patricia Vandevelde, with whom this model was jointly developed.

Considering public-private partnership developments, there are many ways in which costs and risks associated with E-Learning developments can be distributed between commercial and public sector organisations. Such arrangements have the potential to help maximise the use of public funds and enhance the quality of both learning opportunity and learner support. They can also ensure that public intervention is effectively directed to the support of minority needs that would not normally be met through commercial activity.

> E-Learning partnerships show an increasing globalisation and closer links between educational and business organisations, thus creating new services and models.

4.2 Major Technological Developments

Developments in Internet technologies are the basic enabler of E-Learning. Content, technology, and services are the three key segments of the E-Learning industry, where content still seems to receive the main attention.

Content in the media industry has three categories: entertainment, infotainment, and edutainment. The first one is consumed by users just to spend their spare time. The second contains some valuable information, but the communication is typically one-directional. The third is the most challenging, where the aim is to create interactive material for active support of the learning process, an exciting blend of classical game design and educational content.

As the market matures the demand for sophisticated simulations and edutainment will increase, it will be one of the most important aspects of E-Learning. Educators disagree on the educational value of most "edutainment" software. Consequently, media managers have a responsibility to maintain a fine balance between education and entertainment, whether it is in the form of educational programmes aiming to entertain as well, or of pure entertainment carrying a particular message.

As E-Learning is becoming more mainstream, learning practitioners are more and more positioning themselves for the next significant movement in the use of technology in learning, namely simulations. The four main industries competing for the E-Learning simulation market are the simulation industry, the E-Learning industry, the edutainment segment of the gaming media industry, and the educational publishing industry. Each industry brings its own core of expertise, competitive strengths, and customer relationships to the market.

Also, wireless networking may be expected to continue to grow in significance for learners. Thus, mobile E-Learning is a natural development in the product evolution of conventional E-Learning. In many ways it is recapitulating the evolutionary process that E-Learning experienced as it emerged from traditional classroom training. The progression towards mobile E-Learning is part of a general trend toward ubiquitous and pervasive computing.

Technology

This sector is dominated by Learning Management System (LMS) vendors. This is the most tangible and also one of the high cost elements associated with any E-Learning implementation. There is an endless number of choices, and it is especially valid for the "early industry" that E-Learning used to be identified as the purchasing and employment of an LMS.Major market players include Centra, Click2learn, Docent, IBM, Saba, and WBT Systems.

Content

Usually, the largest E-Learning content providers are generic publishing companies. Some content developers broaden their set of products and extend their business to related services, like curriculum and instructional design (ACTeN 2003a). Major market players include Harvard Business School, NETg, SkillSoft, and Smartforce.

Services

This segment is typical for Application Service Provider (ASP) companies. ASP is a third-party entity that manages and distributes software-based services and solutions to customers across a wide area network from a central data centre. There are many advantages in using third party hosted solutions, and it is often described as outsourcing. It is the least developed market segment and there are no global market players yet.

Simulation and edutainment as well as wireless, ubiquitous and pervasive computing are major technological trends affecting E-Learning.

5 Outlook

ICT brings rapid changes and continuous advancements to our everyday life which creates new opportunities for a next generation of widely shared applications.[4]

Practically non-existent in the past, ICT driven training opportunities are now at the centre of every domain of training and education. The Internet is empowering a new wave of training methods that custom fit work schedules, budget, and training preferences through innovative technologies, flexible delivery methods, and engaging multimedia content.

The process of learning is being transformed by the digitalisation of our society. Although E-Learning is in fact not more and not less than "actually learning", it still takes advantage of the multi-channel communication of multimedia contents. This makes technology the major driver of E-Learning developments. Technological and communication advances hold the promise for a new generation of network applications that can provide qualitative leaps beyond what is possible using today's Internet technology. The December 2000 Report of the Web-Based Education Commission in the US (Kerrey 2000) highlights a number of the more important trends in ICT, that all have a particular relevance for the education sector:

1. Consumer access to broadband Internet connections is showing an exponential growth and a dramatic drop in price, allowing for the transmission of large amounts of data, whether through wired or mobile channels, making a richer delivery of content other than simple text possible;
2. Pervasive computing is becoming common, where computing, connectivity, and communications technologies connect small, multi-purpose devices, linking them by wireless technologies. These solutions may enable underdeveloped and remote areas quickly to take advantage of the Web;
3. Digital convergence is progressing by merging capabilities of the ubiquitous infrastructure of telephone, radio, television, and other electronic devices. The ubiquitous infrastructure of television will be significantly enhanced by conversion to digital transmission. Stations will be able to

[4] The given outlook is based on the experience of the author in ICT supported training both in academic and in corporate environments in various countries throughout Europe. It also integrates the most relevant and up-to-date studies and reports, market and business analyses of the global market as well as of US and of European specific publications.

offer dramatically enhanced programming by "data casting", a wealth of supplementary information to accompany the regular broadcast. This may include course materials delivered via text, video, or audio formats;

4. Agreements are reached on technical standards for content development and sharing, which are expected to advance the development of web-based learning environments;
5. Adaptive technologies, that combine speech recognition, gesture recognition, text-to-speech conversion, language translation, and sensory immersion will change the very substance of network-enhanced human communication;
6. Equitably available and affordable technology brings down the barriers of social, economical, and geographical inequality.

With these trends in mind, it is also not surprising that the E-Learning sector is still a promising market. Although the table below shows some inconsistency in the way E-Learning business is projected by various consulting firms, these figures all demonstrate that the E-Learning industry is indeed experiencing a significant growth rate and that it remains steady even in the midst of the current economic slowdown.

Table 4. Comparative Estimates: Worldwide Corporate E-Learning Revenues, 2000–2010 (in US$ billions) (Source: Emarketer 2003)

	2000	2001	2002	2005	2006	2010
Cortona Consulting 2002	–	5.0	–	–	–	50.0
Gartner 2001	2.1	–	–	33.6	–	–
International Data Corporation (IDC) 2003	–	–	6.6	–	23.7	–

Note: * US and Europe only

The ultimate vision of lifelong learning and the knowledge society would in fact replace teaching with learning, enabling life-long, self-directed, and flexible learning. There has been a shift among providers of education and educational technologies towards a greater emphasis on life-long learning and entertainment/consumer learning. The largest potential demand for E-Learning is likely to lie in the consumption and entertainment sector, with employee learning as a good second, and students as the third largest markets. The opportunity for customer E-Learning is now estimated to be much greater than employee E-Learning.

The lead question is what would be the dominant business model for selling E-Learning in the coming years? This brings us to a rather slippery ground to say anything about the future of E-Learning. It highly depends on – referring to the basic problem of – defining what E-Learning is. Seeing it as a facilitator for producing and delivering rich multimedia up-to-date information, high interaction as well as opportunities for effective collaboration, then it is, with all the recent obstacles and the earlier mentioned drawbacks, a worthy business.

E-Learning somewhat does not seem to be just one of the many casualties of the big Internet "bubble". Instead, it is quickly emerging and increasingly becoming a mission-critical component of an enterprise's business infrastructure. Knowledge is now considered as a highly competitive advantage and companies' most important asset. It is now already making Wall Street and the investment community take a closer look.

It is hard to tell what exactly E-Learning can and will offer in the near future. However, it is very likely that today's major corporate market players will be shaping the future of E-Learning. They would work in alliance with mainstream academic institutions and public organisations involving local partners as argued before.

According to research from IDC (2004), E-Learning is set to take off in Europe. IDC predicts that the European E-Learning market will be worth nearly US$ 6 billion by 2005, and will account for 25% of the European IT training market.

Trends in e-learning, being very technology driven, heavily depend on ICT developments, including extended broadband access, wireless computing, and the convergence of digital devices. Ultimately, teaching could well be replaced by life-long, self-directed e-learning for the consumer market.

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Scientific Publishing: A European Strength

Zeger Karssen

Digital Dispatch, Paris, France

1 Introduction

This chapter discusses the industry of scientific or STM publishing, that is research publications in the field of Science, Technology and Medicine. After a short historic overview the current market for scientific publishing and the characteristics of its lifecycle will be described. Next, I will give an overview of the major influences the industry undergoes at this moment, including the impact of the Internet, market movements, and new developments and initiatives that put the traditional business cycle at stake. Then, an outlook over the industry's future will follow. Lastly, these changes and the outlook will be put into the perspective of investment and funding opportunities.

2 Some STM History

Scientific publishing, or Science, Technology and Medicine (STM) publishing, has its roots in the 17th century with an accelerated growth in the 18th century[1] during the time when the Enlightenment provoked the emergence of modern science. Since Descartes in the 17th century set out the first steps of what was to become the scientific analytical method, where research became rationalised and methods and theories could be shared between scientists from different backgrounds and countries, an increasingly international 'scientific community' was established where scientific methods and results could be compared and discussed. At the same time

[1] In fact, the first scientific publications date from 1665 when the first issues appeared of the French *Journal des Sçavans* and the Royal Academy's *Philosophical Transactions*. In 1700 there were already 30 scientific journals and in 1800 hundreds of journals existed. See Meadows (1980) for a detailed description of the history of scientific publishing.

the sophistication of printing techniques facilitated the publication of scientific books and allowed for the emergence of scientific journals. Scientific publishers popped up around the major European universities, in those times the centres of scientific activity, in more or less independent forms of organisation.

The prospering of scientific research since the 18th century went along with an increasing number of scientific publications. Notably the 20th century showed an accelerated pace of scientific research and an even faster growth of scientific publishing. At the same time, through its internationalisation, science nourished a truly world wide body of knowledge where effective communication became an essential tool.

3 The STM Market

In terms of scientific output the STM market shows a large domination by publications coming from countries hosting the major research centres in the world: the United States and the (western part of the) European Union are the biggest producers of scientific articles and books in the English language, both for their advanced research as for the fact that the language barrier is lower, if any. It is very difficult to estimate the size of the scientific market, but a rough estimate is that there are some 10 to 20 million scientists active world-wide, both in academic and in corporate institutions (Mabe 2003). Global article output destined at the international scientific community is estimated at about one to two million articles per year published in some 15,000 journals, of which some 8,000 are indexed by ISI. Publishers of these journals include commercial publishers and not-for-profit publishers like universities.

Looking at STM publishing from a commercial perspective shows that it is quite serious business. Estimates of the worth of the total market for STM vary from € 5 billion for strictly academic publishing to € 10 billion per year when one includes professional publishing like medical and educational publishing. With investments in research still growing worldwide, the total STM market shows a steady increase of some 5 to 7%.

The figure below shows the market shares for the major commercial players in the world.[3] Elsevier detains almost 24%, and the newly formed

[2] Note that these figures concern ISI listed journals only. ISI includes most of the major international journals. All ISI journals together make up for some 60% of the total scientific output.

combination of Springer and Kluwer Academic Publishers (KAP) almost about 12%. The picture shows us that some 43% of the market is in the hands of very few players. However, another particularity is that a big portion (57%) is highly fragmented with over 10,000 society publishers and small publishing houses covering for it.

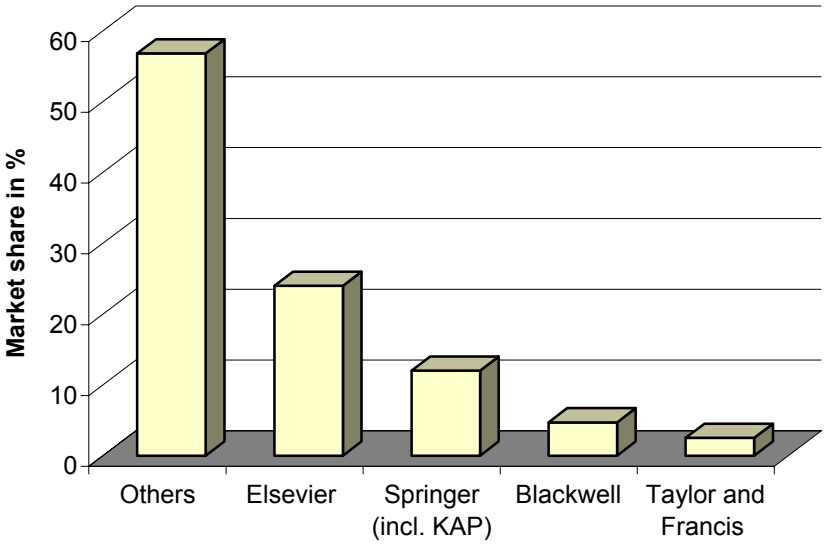

Fig. 1. Market share of ISI listed publishers (Source: based on Mabe 2003)

Of course, the size of the STM market is of no comparison to other media markets like television or other types of publishing, but it is a very interesting one, financially speaking, as the business of STM publishing can show very healthy profit margins, as some companies have already been able to prove. Also, during the past two decades STM publishing has been one of the fastest growing media sub-sectors. Due to still increasing funding for research and the high pressure on scientists to publish, the market still shows a steady increase in scientific output. Moreover, the STM market is quite insensible to the ups and downs of the economy and therefore a stable and reliable field for long-term investments. With the economy currently in an unstable situation it is therefore not surprising that venture capitalists have discovered STM publishing.

[3] Note that these figures concern ISI listed journals only. ISI includes most of the major international journals. All ISI journals together make up for some 60% of the total scientific output.

4 How Does STM Publishing Work?

The publication of scientific papers is an important means for measuring the quality of a scientist. Scientists are expected to produce papers regularly and possibly publish them in journals of the highest possible quality. This 'publish or perish' approach has pushed scientific output to the level as discussed before and led to the expansion of current journals and the creation of thousands of new ones. Nowadays, scientists conduct research, write an article about it, and submit it to a scientific journal they think suitable, both subject and quality wise. The scientific journal consists of a number of editors (typically some 40) who do this work on a complimentary basis as a perceived duty to the scientific community and who guarantee the quality of the journal and make sure the journal covers the scientific field adequately. The board of editors is headed by one to three editors in chief who bear the editorial responsibility for the articles published in the journal. In most cases the publisher of the journal appoints and pays them.

Once submitted an article is reviewed by typically two or three referees who are assigned by the editor in chief of the journal. These reviewers advise the editor in chief and, after acceptance, the latter sends the article to the publisher of the journal. The publisher typesets the article, sends a proof to the author, and publishes the article in the journal, which in most of the cases now exists both on paper and on the Internet. As the article is published, the author transfers the copyright of the article to the publisher.

The publisher handles the promotion of the journal and sells the journal either itself or through agents to the librarians. Librarians, the typical gatekeeper at the information entry of each university, make up for most of the customers of the publishers: they have a budget allocated by the university for buying scientific content and, after consulting the university staff, they decide which journals are to be bought. In recent years libraries, while aiming at an as exhaustive and high quality collection as possible, have come under severe pressure as their budgets have difficulties in coping financially with both the increase of scientific output and the rather important increase of journals prices during the past decades.

A few characteristics, specific to STM publishing therefore are:

- The authors of articles are scientists, who are employed by universities or research labs. The time they spend on conducting research and writing a paper is paid by the institution they work for. Typically, publishers do not pay for the articles they receive.
- When an article is accepted for publication publishers ask scientists to transfer the copyright of the article.

- University libraries wishing to make scientific journals available to the university staff and students pay the publisher for obtaining these journals.

5 STM Developments

During the past decade a number of developments have greatly influenced the current STM arena. Primary cause of these developments is the rise of the Internet. Particularly the scientific community, certainly due to its need for extensive international communication, was very quick in taking up this new medium and exploiting it to a maximum extent. This resulted in the situation that many scientists, and thus STM publishers too, started to rethink current STM publishing practices. Secondly, another less expected effect of the shift to Internet publication is the consolidation that is currently taking place in the STM industry.

Besides these changes that can be directly linked to the rise of Internet publishing, there is another development taking place which stems primarily from dissatisfaction about the functioning of the current publishing model among a growing number of scientists.

5.1 Internet and STM Publishing

The Internet and other developments in information technology have trivialised a number of tasks of the STM publisher. Formatting texts, typesetting them and making them available for a worldwide audience, tasks typically entrusted to the STM publisher, can now be done by the scientist him-/herself without too much of a hassle. The STM industry has only recently become aware of this 'danger' and is feverishly looking for new ways of adding value to the publication cycle. So far, two major new trends have emerged which could help maintain the STM industry its current place in STM publishing, or even improve its position. They will be discussed in the following.

a) Database Publishing

During the past two decades the STM industry came under heavy fire from the academic community, which reproached the STM industry to charge way too much for its journals to the librarians. Moreover, with the Internet seemingly bringing publishing to everyone's desktop, the major STM-industry players found themselves in the 1990s in a very delicate situation.

This scholarly publishing 'crisis' started to ring the alarm bells in many publishing houses, even more when editorial boards of a number of highly regarded journals threatened to leave the journal and start a new one on their own, which some actually did. After a little panic in the industry, the reply given by a few major players, notably Elsevier, was quite brilliant: with the new possibilities rendered by information technology and the Web there is no need to think about STM publishing in terms of individual, separated journals and articles anymore. The reasoning being that now for the first time ever STM publishers are able to offer the scientific community a collection of articles and journals through which scientists can navigate flawlessly, thus putting on the desktop of every scientist the full body of scientific knowledge with no boundaries existing anymore, not in time nor in space. STM publishers tend to call this the *database-publishing* model. Moreover, database-publishing will enable publishers to replace the old model based on subscriptions to individual print journals, with all their hassle of production, fulfilment and despatch, with a model where they sell licenses to their database.

So, seemingly, a win-win situation is appearing: on the one hand the scientists who adore the STM websites which offer a fully integrated network of hundreds of thousands or even millions of abstracts and articles, and on the other hand the STM publishers who got out of this nasty price discussion and succeeded in creating an even more profitable, if well carried out, business.

b) Article Downloads

So far, the assessment of the value of a journal is done by checking the 'prestige' of its editorial board and by counting the number of citations its articles generate, which is expressed in terms of an 'impact factor'. Yet, this impact factor is not always a very reliable indicator (not all journals are taken into account) and what is worse, it takes quite some time to obtain the final numbers.

Now, with the emergence of database publishing on the Internet, for the first time ever, authors, publishers and librarians are able to get a quite clear and instant picture of the way articles are used by their audience, i.e. how often they are read. Of course, the amount of reading of an article is difficult to measure, but what can be measured is the number of times it is downloaded. So suddenly, librarians can actually see how often the staff and students use the journals they buy, authors can see how many other scientists have seen their article and publishers now have an extra means to assess the value of their publications.

Notwithstanding ongoing discussion on the relation between the impact factor of an article and the number of times it has been downloaded, consensus is growing that the more an article is downloaded the more likely its impact factor will be high. Articles having a high exposure as they are published in journals appearing on popular STM websites are therefore more likely to be cited than those who are not. Accordingly, the pricing model for journals or bundles of them is increasingly determined by the number of downloads the buyer is likely to generate.

At this moment, the shift to data-base publishing is far from finished but this is clearly the direction the major players are taking and which market analysts consider the way to go.

5.2 Consolidation

One would expect that with the Internet rendering (self) publishing at the fingertips of every scientist the role of the traditional scientific publishing houses would diminish. However, it turns out that the opposite is actually taking place: the larger publishers are increasingly dominating the market as the 1990s have shown that serious and professional electronic STM publishing can only be successful if high investments in infrastructure and promotion are made. Very often, small publishers can simply not allow themselves these investments and are pushed out of the market.

Moreover, a number of mergers and takeovers of major publishers has taken place during the past few years. Elsevier, already number one in STM publishing, took over Harcourt (including the world's third STM publisher Academic Press) in 2002. One year later Bertelsmann sold Springer to Cinden and Candover (C&C), a VC company from the UK. C&C had already bought Kluwer Academic Publishers. In 2004, C&C merged both companies into one big one, called Springer, which is now the world's second largest STM publisher. Expectations are that the market will consolidate further.

So, the market now finds itself in the paradoxical situation where the Internet, which was initially regarded as lowering the barrier for STM publishing, has resulted in a situation where smaller publishers cannot follow the high pace of investments taken by some of the big players and are therefore pushed out of the market.

5.3 Journal Crisis

In the 1980s a growing number of scientists started to express their dissatisfaction with the current situation where major commercial publishers

control an important part of the scientific output. Moreover, with journal prices starting to increase at an accelerated pace many scientists and librarians questioned the publishing model: is it justifiable that journals, whose articles are written by scientists working in universities and who are paid through public funds, are sold at such a high price to the same universities? Does the 'scientific community' not have the right to be the owner of its own output, or at least, should the 'public' at large not have the ownership of the research it has funded? Recognising the essential role scientific publishing plays in the progress of scientific research, science should reclaim its articles and put them at the disposal of the whole community, for free or at least at very moderate prices.
Three main initiatives have resulted from this 'journal crisis':

a) Open Access

One of the newly proposed publishing models is the 'open access' model. Baseline is that science is a public enterprise whose articles should be freely available on the Internet, for anyone without any limits. When publishing an article, the copyright of the articles should not be transferred to the publisher, as all commercial (but also society) publishers demand, but should remain with the author or fall into the public domain. Nevertheless, the role a publisher plays in organising editorial boards and preparing articles for publication is recognised, and it is understood that running a journal costs money. Yet, the idea is that the necessary money should not come from the university library but should be taken from the research budgets scientists dispose of: for every submitted or accepted article the author pays a sum to the publisher for organising the reviews and preparing it for publication. The publisher puts the accepted articles on the Internet for publication, and anyone interested can access them for free. The Budapest Open Access Initiative, founded in February 2002 with money from Soros' Open Society foundation, supports and promotes this approach.

An example of such an open access publisher is BioMedCentral (BMC), a commercial UK company publishing some 70 scientific journals in the bio-medical field. In order to recuperate the refereeing and publication costs BMC charges authors for the submission and publication of their articles. Accepted papers are freely available in the journal, which is published electronically.

b) SPARC and PLoS

Other organisations that have emerged along the same lines include SPARC, which is a partnership programme of the Scholarly Publishing

and Academic Resources Coalition. SPARC supports non-profit scholarly communications initiatives. There exists also the Public Library of Science (PloS), a non-profit organisation aiming at making scientific and medical journals available over the Internet free of charge.

c) Open Archive Initiative

A last initiative closely related to the Open Access movement is the Open Archive Initiative (OAI), which focuses on developing and promoting interoperability standards. Given that anyone can put valuable scientific contents on the Internet the problem is that these contents remain scattered in numerous archives and homepages all over the network. The real added value of this publicly available material resides in the fact that it is somehow put together, physically or logically, so that the material becomes searchable and that its individual parts can link to each other flawlessly. OAI has therefore designed a protocol for collecting metadata about data files residing in separate archives. In this way, an aggregator can 'harvest' metadata about scientific articles from any other website compliant with the OAI protocols, so that all the contents of these websites become searchable from one entry point.

6 Outlook

Given the major trends that currently take place and which have been described above several significant observations concerning the future of scientific publishing can be made.

6.1 Articles and Databases

Firstly, the value of the individual article will remain scientifically very high, but commercially its value is decreasing rapidly. As a reaction to the increased communication within the scientific community resulting in an increased dependence of scientific research on other work carried out elsewhere, the value of an individual article depends very much on the 'context' in which its research has been carried out. References from the article to other research articles, and references from these articles to the first article have become important indicators of how well the research carried out is up to date and the impact it has in its community. Articles via which other work can be accessed in a fully integrated manner therefore largely facilitate the work of the scientist, thus putting large databases con-

taining thousands or even millions of fully linked articles in a very strong position. No wonder that the major scientific publishers increasingly offer scientific databases with sophisticated search facilities as well as services like forward and backward linking tools. The real added value of scientific publishing increasingly lies in not only publishing well-refereed articles but also by placing them in an environment offering an as exhaustive collection of related work as possible and which is suited for easy navigation.

6.2 Usage Figures and Exposure

Another consequence of the increasing integration of scientific publications is the importance of the usage figures these integrated databases have, both for selling them to the librarians, but also for the articles and journals they contain. A general rule is that the more integrated a database is, i.e. the better its articles are linked between each other or with articles outside this database (through e.g. Digital Object Identifiers and CrossRef), the more downloads the articles residing in the database will generate. This is a great selling argument to librarians as it offers 'real value for money' because the fact that its articles are downloaded millions of times means that it must be a valuable collection. Moreover, it also has a huge impact on authors as publishing in a journal that is part of such an on-line database gives an exposure which is immediate and open to millions of users worldwide. Database publishers that are able to offer this service like Elsevier and to a lesser extent Wiley therefore definitely have a competitive edge.

It is expected that the new Springer (including Kluwer Academic Publishers) will first invest in the upgrading of their on-line database. For other, smaller publishers it will be very difficult to keep pace with the huge investments needed, and they are expected to increasingly seek cooperations or mergers with other players. New aggregators may enter the market offering as exhaustive and as fully integrated collections of articles as possible through a central website harvesting tens or hundreds of other websites.

6.3 Funding and Investment in STM Publishing

It is striking that, although the grand majority of scientific research is carried out in the USA, Europe and the Far East, still the biggest STM publishers can be found in the North-West of Europe only. Springer, originally a German company and Kluwer Academic Publishers, a Dutch company, have been merged by the English VC Cinden and Candover (C&C). El-

sevier is part of the Anglo-Dutch company Reed-Elsevier. STM publishing has become an 'industry' now, and quite a profitable one if well run.[4] With many companies traded on international stock markets, chances are high that players from other countries and industries may move in (e.g. once C&C decides to sell the 'new Springer').

6.4 Future STM Developments

From the current situation in the STM market as described before a number of future developments can be predicted.

- *New Value Added Services*
  In the coming years, many investments from commercial publishers are expected in setting up and fully exploiting database-publishing models, including new added value services like intelligent tools for information disclosure and tools for turning data into information or even knowledge.
- *Open Access*
  Until now, for an SME to enter the traditional STM publishing arena is rather difficult, due to the needed high investments and the long return on investment inherent to scientific journals. Now, with the new Open Access business model, new perspectives for small and medium sized companies are opened up as the return on invest will be much shorter, thus allowing less robust companies to enter the scene.
- *A New Cyberinfrastructure*
  There is a growing understanding of the fact that the opportunities offered by the current and future Internet infrastructure will completely revamp the scientific landscape, including STM publishing, with an impact going far beyond the ones mentioned above. A recent and very interesting report made by the 'National Science Foundation Blue Ribbon Advisory Panel on Cyberinfrastructure' in the USA (2003) announces a new age in scientific research is dawning due to continuing progress in communication, information and communication technology and pulled by the expanding complexity and scope of today's challenges. The Panel pledges for the formation of a new 'cyberinfrastructure' on which new types of scientific and engineering environments and organisations will be built. The challenges, stakes and needed investments are huge (the report proposes that the NSF invests US$ 1 billion per year) and the

[4] Only recently Elsevier was mentioned as one of the world's biggest companies in on-line revenues, only second to Amazon and E-Bay.

Panel speaks of a 'once-in-a-generation opportunity to lead the revolution in science and engineering'.

7 Conclusion

Scientific research is essential for a European society and one of the major drivers of our economy. Scientists have only just begun to understand the impact the Internet will have on the way scientific research will be conducted and communicated in the next decades. Yet, it is already clear that fundamental changes of its practices will take place, and that science will be even more at the heart of a fully interconnected global knowledge network. In Europe, the EC is likely to act as a major driving force behind the definition and implementation of this new scientific workspace.

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Mobile Games: An Emerging Content Business Area

Tommi Pelkonen

Helsinki School of Economics, Helsinki, Finland

1 Introduction

Games have a very long history. Ever since the dawn of mankind, humans have played games – engaged into an activity that we nowadays call "game". People play games for several reasons, one of them being entertainment and relaxation. People's eagerness for competition and problems/puzzle solving further explains the popularity of games. As people learn by playing, it is also an action of gaining new knowledge: learning skills that are important elsewhere in life.

Computer gaming is a very young phenomenon in the history of games. Although computers were originally designed to increase efficiency in calculations and later in business, they always had their more creative uses – entertainment and games. Already in the 1960s, enthusiastic engineers designed productivity software – but also games – for the room-sized mainframe computers. Since then, computer games have evolved to their current popular status in modern society.

Computer games are currently one of the key drivers for personal computing, computer graphics and sounds. The market for games consists of two main areas: 1) games for personal computers (PCs), and 2) games for dedicated game consoles (such as X-Box or PlayStation). Though considered a leisure activity for teenagers, computer games have also become big business. In 2002, the estimated total turnover of the computer game market was US$ ~20 billion, out of which mobile games represented roughly US$~ 0.9 billion (Kirsi 2003).

Many games have always been mobile, e.g. people have carried their chessboards with them when travelling. The mobile computer games had their first popular coming in the 1980s with Nintendo's launch of its series of portable miniature computer games. These small games created a whole new environment for computer gaming, which has intensified ever since

with current Nintendo's GameBoy series of portable consoles. Nokia (FIN) introduced its Snake-game on its mobile phone in the mid-1990s. Rapidly after this, games became an essential part of mobile phones regardless of manufacturer. More recently, technological advancements have made it possible to purchase more games through the mobile telephone networks.

This chapter illustrates key trends in the mobile game[1] market. The key objective of the chapter is to analyse and discuss the challenges confronting the emerging European mobile game industry. In addition, the chapter aims to provide insight into the game industry's business logics and value creation processes. A recent EU-funded research project, M-Gain (2004), has published a very thorough analysis of the whole mobile entertainment market. The aim of this chapter is not to provide a thorough market analysis but rather a compact illustration of the key trends. The analysis is based on several secondary sources as well as the experience of the author in the mobile game market. The report is written from a Northern European perspective of the market and can therefore have limitations in the depth of its analysis regarding the other regions of Europe.

2 A Short History of Mobile Games

Mobile computer games have their roots in Nintendo's portable LCD game series "Games & Watch".[2] These games became very popular in the 1980s. The simple miniature consoles introduced the concept of keeping a small source of digitised entertainment in the pocket – constantly available. There were nearly 70 different kinds of LCD games.[3] In this series, Nintendo introduced its most well-known game character, Mario, and also made active use of licensing by creating games with Disney's characters.

In the 1990s, Nintendo's markets became more and more competitive with multiple competing LCD game manufactures, and thus it introduced a new kind of game console – the GameBoy with changeable game cartridges. The device became dominant in the market and is currently almost a synonym for portable game consoles. Nintendo with its partners has launched hundreds of game titles for the device and its more advanced successors.

Wireless gaming (games on mobile phones) emerged with Nokia's launch of the Snake game in 1997. The simple Snake game became sur-

[1] See e.g. Alcatel (2003) for a more detailed definition of a mobile game.
[2] See http://www.gameandwatch.com
[3] See http://www.planetnintendo.com/nindb/gw.shtml

prisingly popular, and Nokia brought additional titles to their devices. Simple mobile phone games, similar to the original Snake, are played during short breaks to provide relaxation and a small escape from routines. These games were originally permanently installed on the phones, but more and more they can be purchased through mobile networks nowadays.

At the end of the 1990s, the Japanese success of i-Mode network based games created a boom for WAP games – games that mobile phone users would play through their WAP-browsers in the phones. In Europe, Nokia's 7100-series of phones were the first ones capable of this activity. The slow connection speeds made these games a very disappointing experience, and thus they never conquered the mainstream market. Yet, some SMS-based games have gained popularity, especially when supported by television broadcasting[4].

In 2001, the introduction of downloadable games and colour screens on mobile devices has brought wireless games to the mass market. Suddenly, consumers were willing to purchase small chunks of entertainment to broaden the game selection on their mobile devices. In addition, mobile phones are constantly developing towards small microcomputers – smartphones and thus game play is nowadays much richer than the simple Snake-like-games used to be. 3D-graphics and realistic sounds are also entering wireless games.

Nokia has continued to pioneer in the field of wireless gaming. In 2003, it introduced its N-Gage game deck, and wireless online gaming with N-Gage Arena[5]. This device is a full-scale game console with changeable cartridges and smartphone functionalities. In addition, the N-Gage started a new era in online gaming – the device and some of its game titles are linked to a game server via GPRS networks, which thus enables group games in an online community. Furthermore, N-Gage has Bluetooth gaming functionalities for short-range (~10 m) group games. The N-Gage launch was carried out on a large scale. Yet, there is still no guarantee for a business success of the device. Nevertheless, the N-Gage has created an increasing interest in mobile games, and Nokia's competitors (e.g. Sony) are also planning similar activities in the handheld game device market.

[4] See e.g. http://www.waterwar.tv

[5] See http://www.n-gage.com

3 The Mobile Game Market

3.1 Two Original Business Areas

The emerging mobile game market is closely related to two existing business areas: 1) mobile telecommunications content business, and 2) computer game publishing business. In both of these content creation areas a similar value creation pattern exists. Any content business has four main operational phases: content creation, content aggregation, content marketing, and content distribution (Bruck et al. 1997). The key actors in the market are game developer companies and game publishers. In the traditional game publishing business, game distributors carry out marketing activities, and sales take place mainly in retail outlets. In the mobile game business, telecom operators and online/mobile portals generate most of the sales and implement to a great extent the marketing activities. In some cases (e.g. N-Gage cartridges), mobile games are also sold in retail stores. Consumers (the gamers) act as the key revenue source for the whole industry – and the money they generate with their game purchases is distributed to the rest of the industry value chain/web. Figure 1 presents the game industry value web and the main actor groups in the market.

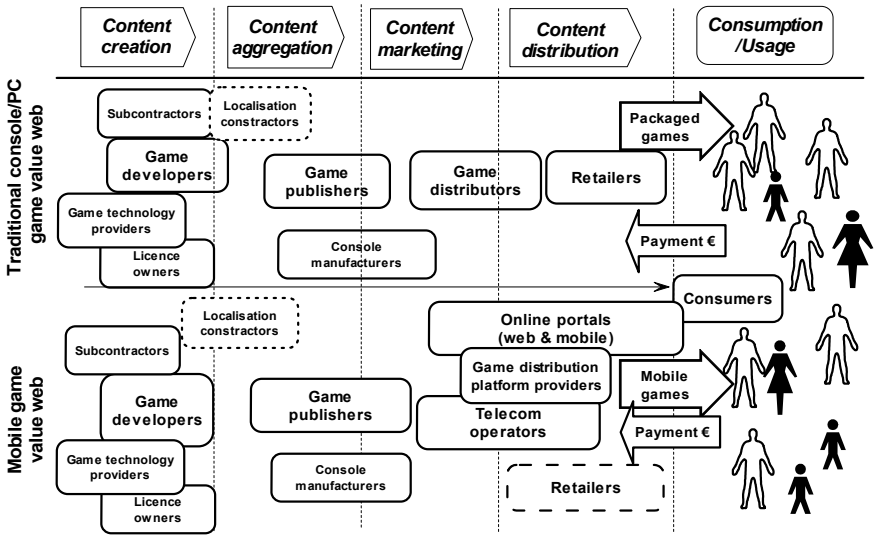

Fig. 1. The traditional game industry and the mobile game value webs (Source: Pelkonen 2004).

3.2 Growth Business, but Turbulent

The gaming business (including PC, console, and mobile games) is currently evaluated to total US$ ~20 billion (€ ~26 billion). Mobile game business comprises approximately € 0.9 billion, ~ 5% of the total game market (Kirsi 2003). Yet, the growth rates within this area are forecasted to be very strong. Analyst predictions of the total future volume of mobile game business vary from one analyst to another (see Figure 2).

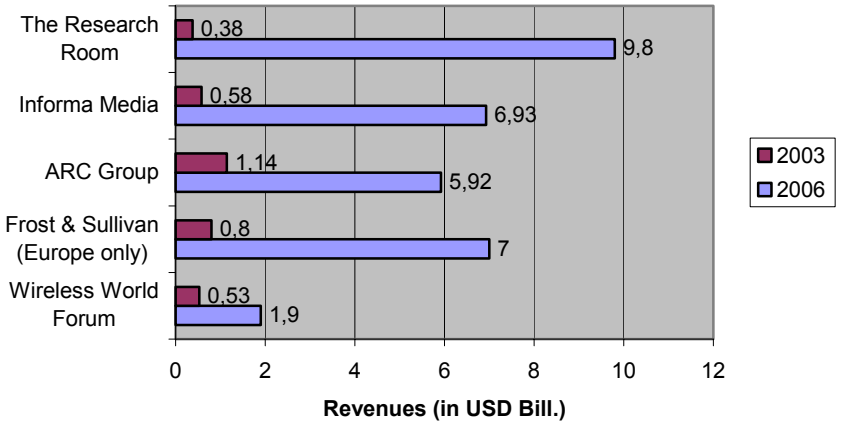

Fig. 2. Selected mobile games forecasts, 2003 & 2006 (Source: Baskerville Telecoms 2003)

Strategy Analytics (2003) predicted that the mobile game market would grow to US$ 7 billion by 2008. The ARC Group (2002) forecasted that the number of worldwide mobile game users will grow from 196 million in 2002 to 667 million in 2005. Informa Media Group (2003) has stated that the mobile games segment of the videogames industry would comprise 11.7% by 2006. Although there is no clear agreement on the total amount of the expected turnover, most of the industry players have indicated nonetheless that their business is growing faster than expected. E.g. the German mobile portal Jamba has reported 300,000 Java application downloads per month in 2003, out of which 80% are games (Begemann 2003).

The mobile game business is very short cyclic in its nature. A typical game title is valid for the market and sells well approximately 6–12 months dependant on its geographic distribution range. In addition, the mass market for mobile game titles is very global. A company aiming to gain major revenues in the market has to find methods and activities to

bring its products to the main markets such as Japan, USA, and Korea. This may become a major obstacle for a small company starting its operations in the mobile game business. A small company needs to find strong distribution partners to help it in its efforts. In addition, a game developer has to find means to localise its productions to the key markets in the most efficient manner.

3.3 USA and Japan Lead the Show

The leading traditional computer game markets have been in the USA and in Japan. Hence, the most significant game industry innovations very commonly emerge from these markets, not from Europe. Among the world leading top twenty game publishing companies only three have their headquarters in Europe (see Table 1). Yet, European companies are in a much stronger position in the mobile telecommunications content business. In Europe, the mobile game business has developed rapidly due to the strong support from the device manufacturers and the high penetration rate of mobile telephony.

Table 1. TOP 20 global game developer companies and their turnover in 2002 (Source: Adams 2003)

1. Electronic Arts (USA), US$ 2,482 M	11. Square Enix (J),US$ 526 M
2. Sony Computer (J), US$ 2,180 M	12. Unisoft (FRA), US$ 494 M
3. Nintendo (J), US$ 2,128 M	13. THQ (USA), US$ 480 M
4. Activision (J), US$ 864 M	14. Capcom (J), US$ 407 M
5. Vivendi Universal Games (USA), US$ 832 M	15. Bandai (J), US$ 372 M
6. Take-Two (USA), US$ 793 M	16. Namco (J), US$ 360 M
7. Atari (FRA), US$ 761 M	17. Acclaim (USA), US$ 269 M
8. Konami (J), US$ 740 M	18. Koei (JP), US$ 224 M
9. Microsoft Game Studios (USA), US$ 614 M	19. Eidos (UK), US$ 197 M
10. Sega (J), US$ 563 M	20. Midway Games (USA), US$ 190 M

It is expected that the large Japanese and US game developers and publishers will increase their market presence when the mobile game business really reaches mass markets. Actually, this trend is constantly increasing with e.g. Electronic Art's strong entrance into Nokia's N-Gage game cartridge market. The smaller European game development companies will have to co-operate increasingly with the game industry giants. Table 2 below presents some of the key European companies operating in the mobile gaming markets.

Table 2. Examples of gaming market actors in Europe (Source: own research).

Actor	Examples
Mobile Game developers	e.g. Sumea (FIN), Elkware (GER), Mr.Goodliving (FIN), It's Alive (SWE), Macrospace (UK), In-Fusio (FRA), CodeToys (FIN), Sulake Labs (FIN)
Mobile gaming technology providers	e.g. Fathammer (FIN), Nokia (FIN), Ideaworks (UK), Akumiitti (FIN), Synergenix (SWE), BitArts (UK)
Mobile game publishers	e.g. Eidos (UK), Nokia (FIN), Gameloft (UK)
Mobile game console manufacturers	e.g. Nokia (FIN), SonyEricsson (SWE/JP), Sendo (UK), Siemens (GER), MyOrigo (FIN)
Online/ Mobile portals	e.g. Jamba (GER), Sonera Zed (SWE/FIN)
Mobile operators	e.g. Vodafone (UK), TeliaSonera (SWE/FIN), Orange (UK), mm02 (UK), T-Mobile (GER)
Retailers	e.g. Carphone Warehouse (UK)

The geographical key mobile game markets in Europe (from the revenue generating perspective) are Germany, France, the UK, and Italy. Currently, the key development centres for the solutions and business areas are in the UK, Germany, Sweden, and Finland. There is a clear indication that mobile telecommunications companies such as Nokia, SonyEricsson, Siemens, mm02, Orange, and Vodafone benefit of having several innovative small companies at close distance to provide these giants with ideas and game titles to promote their own entertainment focused offerings.

3.4 Consumers Increasingly Demand Quality

The initial price for a mobile game used to be relatively low, around € 2–7 per game. Multiple early adaptors in the game business are testing and buying mobile games at this price. The only exception in game pricing have been the N-Gage cartridges priced at € 20–40 per title. Yet, these are much broader and more complex games than the compact downloadable games from the operators' networks.

It is clear that the demand for high-quality games will increase when consumers are getting used to purchasing mobile games. Players are expecting the service provider to guarantee that the value of the purchase matches the price paid for it. If there will be a lot of disappointment, the industry may be harmed by loosing its reputation. It is important to price games according to their perceived value. Older games should be cheaper than new titles, e.g. the launch of a new FIFA Football mobile game in 2005 would immediately decrease the price of a FIFA 2004 game at a mobile portal.

Currently, the most sold game genres[6] among the consumers have mostly been action driven games (space, shooting, sports, and especially racing). When mobile games increase in popularity among consumers, other kinds of game solutions will appear. An interesting development area here is location-based gaming, i.e. games that combine players locations (identified by mobile networks or GPS satellites) and actual game play.

4 The Business Model/Work Flow

4.1 Key Objective: To Make Profit

As with any other business, the key objective for a game business-focused company is to make profit out of its operations. Profits are simply created when a companies' revenues exceed the costs carried out to obtain these. Within the value web of the mobile gaming business (see Figure 1) the key revenue source for the industry as a whole are the consumers and their willingness to purchase mobile game products. Consumers either pay a flat fee for their product or they subscribe to a monthly scheme of payments. Additional revenue sources are various kinds of advertising and sponsorship deals.

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[6] Major game genres are: 1) action, 2) adventure, 3) strategy and 4) simulation, see e.g. http://www.game-research.com/history.asp

Advertising can take place either at the site of distribution (online, mobile, retail) or in the mobile game itself. This kind of sponsoring has similar features as product placements in television shows and movie. The game might take place in the preferred location of the brand or the brand may be brought to the attention of the game player in a way as it is already very commonly done in motion picture. Movies and game design do actually have very much in common regarding their production methods. It is more and more common that movies, PC/console games, websites, and mobile games consist of similar elements and promote the same sponsors/advertisers throughout the digital medium.

A key issue from the revenue perspective is what kind of share each actor group gets from the consumer payments. Currently, publishers get 50–60%, mobile operators 20–25%, licensors 15–20%, and the game developers get 10–15% of the total revenues (Pelkonen et al. 2003). Naturally, advertising and sponsorship deals may change the distribution ratios. Table 3 summarises the key revenue and cost items for industry actors.

Table 3. Key revenue sources and cost items in the mobile game business (Source: based on industry experience & ACTeN Business Round Table 11)

Actor in the value network	Key revenue sources	Key cost items
Game distribution and marketing business (20–25% of total revenues)	Direct sales to consumers (flat fee) Subscription-based fees (e.g. monthly) Additional feature sales (e.g. extra levels) Game rentals (pay-per-play) Advertising & Sponsoring Network access and transfer fees (for telco operators)	Personnel costs Marketing campaigns (planning + media) Infrastructure building and operation costs (distribution platforms, servers, mobile network operation) Licence fees to publishers
Publishers (50–60% of total revenues)	Wholesale game revenues (flat fees/ per usage/per sales) Subscription fees from consumers (e.g. to online communities) Advertising & sponsoring, e.g. (to include branded content in the game)	Personnel costs License fees to brand owners Licence fees to console manufactures Payments to developers

Mobile game developers (10–15% of total revenues)	Flat fee payments from publishers Commissions per mobile game usage/sales	Personnel costs Game development software licences and costs Game development hardware costs Licence fees to brand owners
Mobile game console manufacturers	Mobile console sales (Subscription fees to online communities)	Personnel R&D costs Marketing costs Distribution costs

4.2 Risky Business Area

Game development is a very risky business. Only one out of ten titles becomes profitable. Yet, the revenues generated by this ten percent or less can be very high and the reward of the risks may balance out the business risks taken (Kuittinen 2003). Key elements of the game industry risk are e.g. high production costs, timing of launch, and access to distribution networks/chains. Mobile game development has been less capital-intensive than traditional game publishing business. While it takes a minimum of one to three million euros and 12–24 months to develop a console game, it takes only a few hundred thousand Euros and two to four months to develop a simple mobile game, and four to six months for a more complex one. The mobile game development cycle is illustrated in Figure 3.

Game console manufacturers sell their devices at a deficit. As nearly all device manufacturers operate also as game publishers they make most of their revenues from game software sales. In mobile games, the console is in most cases a mobile phone and thus the case is slightly different. Games are sold as additional service from the mobile operator to broaden the phone usage. A mobile phone is still mainly a phone, though yet having game functionalities. The device subsidy, similar to the game console manufacturers' front-loss, is carried out by telecom operators in most of the European markets. They provide mobile phones to their customers at a deficit, but tie their customers to their networks with long-term (24–36 months) contracts. The revenues are thus generated later by phoning and data services usage, e.g. game downloads.

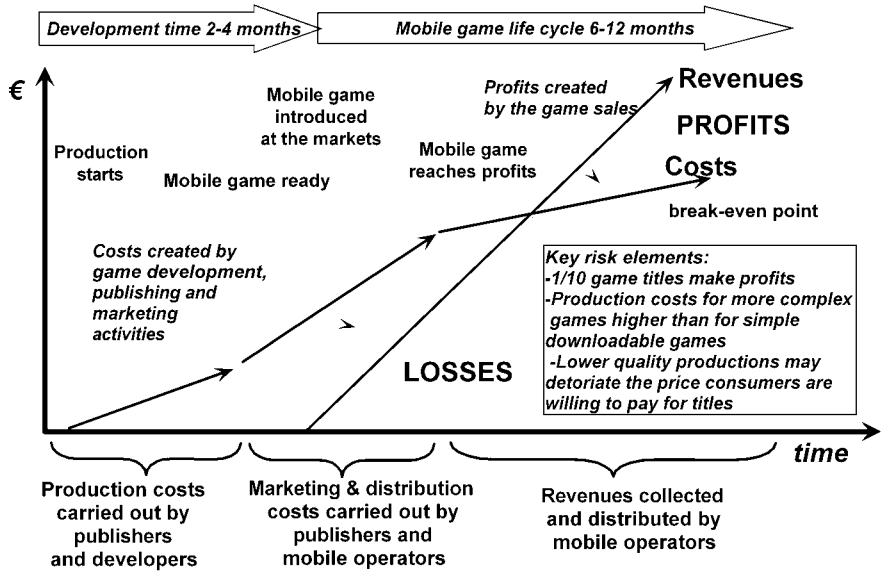

Fig. 3. Illustrative earnings cycle for a mobile game title (Source: Pelkonen 2004).

Mobile games are an excellent feature for mobile telcos to generate additional revenues. Due to this business rationale and – of course – thanks to real customer demand, this area has developed rapidly. Dedicated mobile game consoles (such as Nokia N-Gage) will increase public interest towards mobile games. With little doubt the business area will achieve its goals. Yet, as already mentioned, telcos should focus more clearly on providing value for their customers. WAP gaming was a major disappointment in its early years. Mobile games should not become yet another example of too much hype and of too little realised revenues. Taking risks may generate tremendous amount of revenues. Yet, too little risk taking will not generate any revenues for the industry as a whole.

4.3 The Mobile Game Production Process

To understand in more detail the challenges a game developing company faces in its operations, it is important to understand that mobile game design is an interdisciplinary, collaborative effort. People within the production process work with each other to keep budgets, schedules, and the feature and bug lists up-to-date. On the development side artists and designers collaborate across disciplines to bring the game to live. Finally, production

and development teams co-operate with each other in order to keep the project on track and run smoothly (Adams 2003). Meanwhile, various kinds of business personnel negotiate on game distribution, project management, sales and corporate management issues. The simplified operational and competence model is presented in Figure 4.

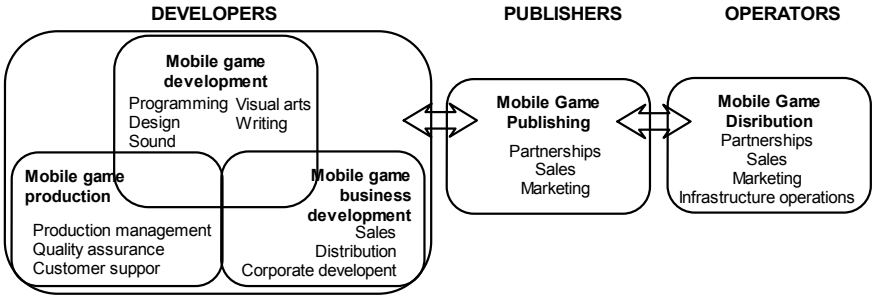

Fig. 4. Mobile game market competencies (Source: modified from Adams 2003)

As the illustration shows, it is not sufficient to only create a high quality mobile game title. They key to business success in the markets lies in mastering marketing and distribution operations as well. The business risks as well as possible revenues are spread between the development and sales partners.

5 Major Technological Development Trends

5.1 Standardisation Battle

From a technological perspective the mobile game market is very heterogeneous. Multiple game platforms, technologies, and game consoles exist and compete fiercely for market dominance. The standard battle has three dimensions: game console, operating system, and actual game programming technology. The three dimensions are illustrated in Figure 5.

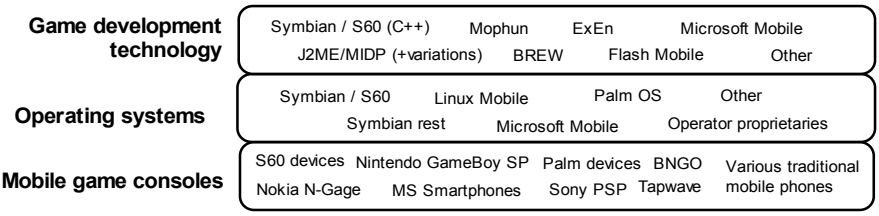

Fig. 5. Competing mobile game technology standards (Source: Pelkonen 2004)

One of the key battles is fought at the mobile device operating level: Microsoft-lead Windows Mobile vs. Nokia-lead Symbian Series 60 systems. Nokia is currently in a strong position, but the true mass market for smartphones is only emerging. In the mobile game business, there is also a very strong competition originating from the traditional game console manufacturers, such as Nintendo and Sony. These companies are adding communication features to their upcoming mobile game consoles. This will further intensify competition on the mobile game market.

One additional dimension at the level of technology is brought to the mobile battlefield that is similar to one seen in the early Internet years – the battle for the preferred mobile Internet browser. The Norwegian Opera Software (supported by Nokia and SonyEricsson) is taking major efforts to compete against Microsoft's Mobile Internet Explorer (pre-installed on e.g. Orange Smartphones: SPVs). This competition will have its impact at least on the browsing technology solutions of mobile game sites. The current trend seems to head into the direction that WAP-based sites are becoming more and more XHTL-based sites.

Multiple standards create major challenges for mobile game developers. A game created with one technology solution has to be re-created for another platform. Different screen sizes, varying sound solutions, operating system differences and memory shortages limit the possibilities of a rapid game software transfer from one platform to another. Additional challenges can also be created by game crackers – the mobile device is no exception in the struggle for intellectual property right protection. This influences directly the profitability of multi-platform game development. Several development companies have selected only a few technology solutions and game platforms they support.

5.2 Mobile Multiplayer Gaming

One of the most interesting technology development areas in mobile gaming relates to multiplayer games. Mobile game devices can be connected to a gaming server. The server enables gamers to play against each other regardless of their geographical location. Nokia has created a full-scale mobile online game environment, the N-Gage Arena.[7] This online service is an environment where N-Gage owners can compete, communicate, and obtain special benefits for their activities. In traditional game console markets similar online services have become very popular (e.g. X-Box Live[8]). Mobile online game services are expected to follow this trend.

An interesting dimension is brought to mobile multiplayer gaming by exploiting the location-identification features of the mobile networks. A Swedish company called *It's Alive*[9] has created a multiplayer game called "Botfighters". In it players chase each other to various cellular network locations. The experiences from "Botfighters" indicate that there are interesting opportunities for combining real-life action and virtual game play. The German company *Jamba* has created another interesting new mobile game concept. In their game "Attack of the Killer Virus" the player shoots viruses/monsters projected into a real-life environment shown through the lens of a camera phone (Palley 2004). The player has to move around with the camera to destroy the viruses. With little doubt, similar kinds of combinations of cellular network technology and real-life experience will increase in the future.

Another innovative perspective for multiplayer gaming is created by a combination of television broadcasting and mobile phones.[10] The players compete against each other by SMS commands in various kinds of games, e.g. in shooting, skill, sports etc. The users are charged by their moves, i.e. by SMS. These games have become surprisingly popular throughout Northern Europe – most probably due to the phenomenon of the 15 minutes (in mobile 15 seconds) of fame, attributed to Andy Warhol.

People love to see their messages and game actions to be displayed to the large audiences that game shows in television may gather. In the near future, similar kinds of gaming communities may also appear around digital television applications in terrestrial, satellite and cable television networks.

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[7] See http://arena.n-gage.com
[8] See http://www.xbox.com/en-us/live
[9] See http://www.itsalive.com
[10] See e.g. http://www.waterwar.tv or http://www.putti.tv

6 Conclusions and Recommendations

6.1 Market Outlook

Mobile game markets are evolving rapidly and becoming a true business for the industry actors. Mobile games are one of the key mobile content areas and create profits for telecom operators as well as for their publishers and developers. More powerful mobile devices have enabled the creation of better and richer games. Colour screens will increase the possibilities to use lucrative elements in mobile games, similar to the more advanced computer games. In addition, the distribution technology in the mobile networks is capable of delivering mobile games for consumers.

The entertainment business has been growing constantly in the past few years. Computer games have been one of the key sources for this growth. Within computer gaming, the importance of mobile games is expected to increase in the near future. The mobile channel will be used both to support existing games, but also to create totally new gaming experiences. The combination of location-based games, multiplayer-gaming and powerful mobile devices will most likely enable much richer entertainment experiences for the consumers. Though a very promising business area, there are still many open issues related to mobile games. These challenges include e.g. game transferability from one device to another, game piracy and intellectual property rights.

The competition for consumers' time expenditure is fierce – there are no real guarantees that computer games will become the favourite form of entertainment for all the segments. Currently, most of the game titles are designed for male gamers, and favourite genres are action driven. If the mobile game industry would like to reach other market segments, new kinds of concepts should be created. Consumers could e.g. obtain benefits if reaching certain high scores or levels, winning in tournaments etc. The combination of mobile games with television shows, e.g. with trivia and quiz shows, are an interesting opportunity for mass-market games. It is also important to understand that the more gamers join mobile game phenomena the more different from the current situation game segments will become. The mainstream mobile gamer is then no longer "young, male, tech-savvy" but rather a casual gamer "middle-aged, male/female, non-tech-person".

The value chain of the mobile game business has evolved to bond with two major business areas – the mobile content business, and game publishing. Mobile telecom operators are crucial for the whole industry's earning logic. Their marketing efforts in providing the games to their customers decide whether consumers will increase their interest in the area. The game

publishers' and game developers' responsibility should be to create game titles that are of high quality and well functioning in the scattered mobile technology environment.

Mobile game technology standards are still evolving, and their immaturity will, for quite some time, influence the profitability of the mobile game development business. Game developers are struggling with emerging technologies and will very often have to work hard to make their games available for most of the devices. Mobile phones' main functionality is still telephony. Thus, the game features are not yet the most crucial element in the mass consumer's choice of a new mobile device.

Europe was the leader in mobile telecommunications development at the end of the 1990s. Yet, recent developments, also in mobile games, have shown that the most innovative game concepts seem to be implemented in Asian markets. The challenge from Asia may have a major impact on the European mobile games industry. The computer game business is dominated by the USA and Japan. The future will show whether this will also be the case for the mobile game business.

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Cross-Media on the Advance

Jak Boumans

Electronic Media Reporting, Utrecht, The Netherlands

1 Introduction

The term cross-media is not unequivocal. It means different things in different disciplines. Yet, there is a common core. In printing and publishing it usually means the usage of multiple media for making the content more accessible. Publishers sometimes add a CD-ROM to a book production in order to make the full text searchable. In an Internet production cross-media refers to reaching efficiency on more than one technical platform or making the process scalable to large amounts of people or screens scalable to the size of the equipment. In marketing the term cross-media is confused with "cross-channel", the use of multiple distribution channels (bill boards, print advertisements, and television advertisements). But cross-media has also penetrated into E-Learning and tourism.

Although there is no straight forward definition of the term cross-media, it can best be described by five criteria:

- Cross-media involves more than one medium, ranging from analogue to digital media or digital media only, which all support each other with their specific strengths;
- Cross-media aims at an integrated production;
- Cross-media content is delivered/accessible on a range of devices such as PCs, mobiles, TV sets or set-top boxes;
- The use of more than one medium needs to support one theme/story/ purpose/ goal/ message, depending on the type of project;
- Cross-media does not just exist by the juxtaposition of different devices and platforms, but finds its relevance when the common message/story/goal is spread on different platforms, and when the supporting interaction takes place on these different platforms.

Essential to the concept of cross-media is that there are more than one media/distribution devices involved, which support the central theme of the project with their own strengths.

In this chapter we will present a short history, the impact on the content production chain, the application fields, the technology, business models, and finally discuss the future of cross-media. Before we do so, we will distinguish between cross-media and some competing terms that are often used as synonyms to cross-media:

- *Multimedia*: Digital information with integrated media types (text, image, sound) transferred by one carrier (CD-ROM/DVD, telephone, cable) and used interactively.
- *Interactive media*: Digital media asking for action on the user's side.
- *Multiple media*: The use of more than one medium.
- *Multi-platform*: The use of several technical platforms (transcoding, sending, accessibility, programming issues) to levy a message across several devices.
- *Integrated media*: Media that are integrated in one system for distribution to various platforms.
- *Converged media*: Media which are based on the same technical protocol, e.g. TCP/IP.
- *Hybrid media*: The distribution of the same content using a combination of analogue and digital media.

2 Short History

The term cross-media is fairly new. However, it was already around in the early days of electronic publishing. In the printing world cross-media was already known as *database publishing*. Towards the end of the 1970s encyclopedias such as the *All American Encyclopaedia* were stored in databases for print, for online (The Source) and offline (Laserdisc) versions. Later on, the term *multimedia* was, amongst others, misused by printers and publishers for *multiple media*. A book with a CD-ROM represented for them a multimedia project. By the mid-1990s, the term cross-media stood for content re-purposing in the publishing and printing industry. It was linked to the slogan "Create Once, Publish Everywhere" (COPE), a

term used by various people including Paul Zazzera, the CEO of Time, Inc. in 1996.

Towards the end of the 1990s, however, the term cross-media was spreading to the broadcast industry. The broadcast industry finally embraced the Internet from 1996 onwards, but usually this meant extra information about the programme on a PC screen. But in 1999 the content production company Endemol launched the reality television programme *Big Brother* in the Netherlands, and this was like a shockwave to the broadcast industry. The format of the programme centred on the theme of a group of young people locked up in a house, cut off from telecom and telephone communication. For the first time, the programme was combining analogue television, interactive cable, Internet, and mobile telephony and was supported by magazines and newspapers. The television programme *Big Brother* was a whole new way of conceiving a product/project, in this case a TV show, that changed. And this new way of "thinking", pushed most of the time by financial incentives (increasing the number of platforms and their accessibility means an increase of revenues) as well as the obvious interest of the audience, made the cross-media way of production attractive for many more industries. Besides the broadcasting industry, marketing, E-Learning and tourism latched on to the concept. In the broadcast industry the cross-media formula has penetrated into new formats, such as *Who Wants to be a Millionaire.*

3 Media and the Digital Content Chain

3.1 Differentiation of the Media Spectrum

The media world has changed a lot over the last years. Media such as radio, television, print, movie, and photographs were analogue oriented, using physical analogues such as electrical voltages. Reproduction meant a loss of quality. Digital media use numerical digits expressed in a scale of a notation to represent discretely all variables. In the process of copying a digital photograph, quality is not lost.

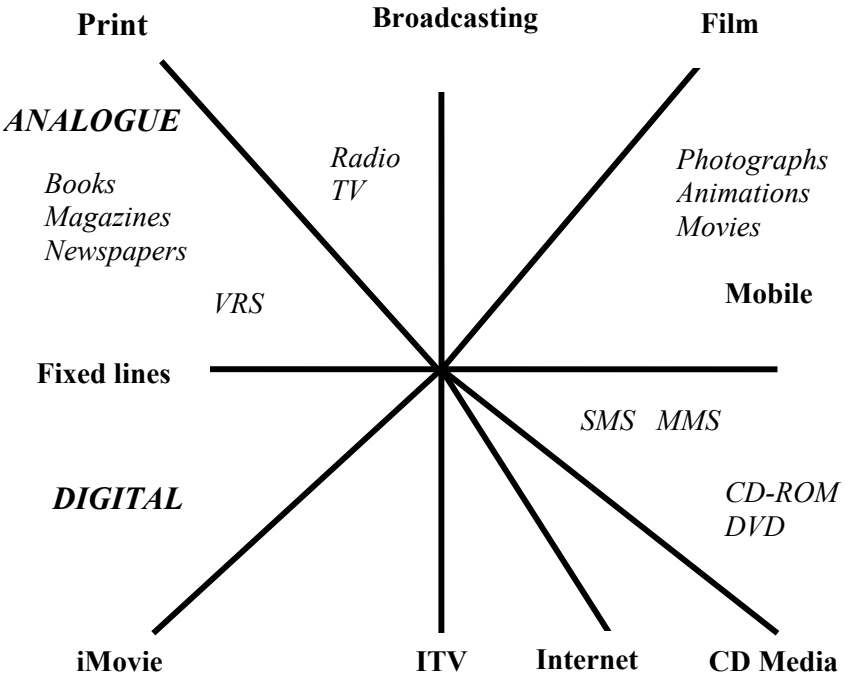

Fig. 1. Media spectrum

3.2 Digital Content

All the media mentioned above contain analogue and digital content (see also Figure 1). Cross-media has affected the content chain in several ways. Digitisation had already affected the chain. Content could be passed on without retyping, which led to a gain in efficiency. Multimedia led to interactivity. Now, cross-media has been affecting every link in the chain. In the content chain of the broadcast industry these changes have been noticeable in every link. In the printing and publishing industry, cross-media has been mostly centred on efficiency gain.

In book printing and book publishing cross-media has been limited to the technical platform. By adopting a standard mark-up language like XML it is relatively easy to produce a book and a CD-ROM in one go. For the consumer the only difference is that he or she can use the digital text of the book on a computer. The added value of a CD-ROM over a book is in

most cases also limited; the function of full-text searching has not often been used. In newspaper/magazine printing and newspaper/magazine publishing cross-media is applied to more effect, certainly when the Internet is used in combination with the newspaper/magazine.

For the broadcast content chain cross-media is having a bigger impact. Every link in the chain has been changed and even the link of the consumer has been turned around, as the part of the consumer has changed from receiver of a book with CD-ROM into a participant.

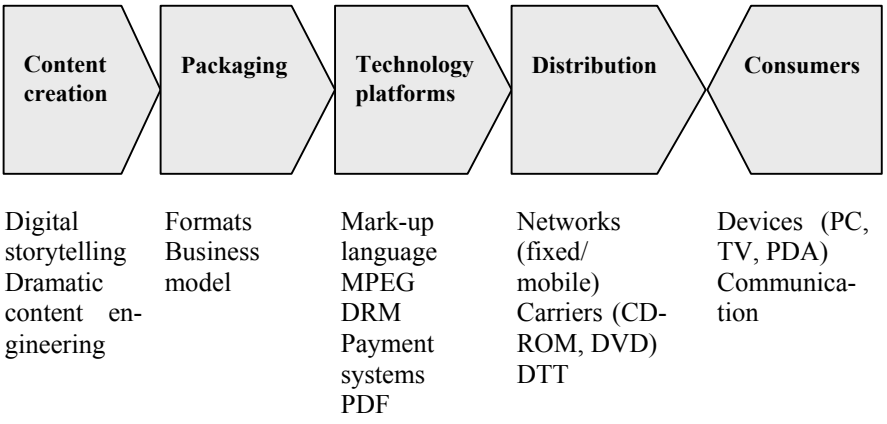

Fig. 2. The digital content chain

Figure 2 illustrates the digital content chain in a graphical manner. There are several relevant items:

- *Content creation*: Storytelling in the traditional broadcast industry was linear; digital storytelling offers more options for the users to choose their own path and/or their device.
- *Packaging:* A broadcast format is no longer just directed towards the broadcast schedule and perhaps to certain follow-up activities. These days a format is developed with the opportunities of the Internet and mobile telephony. The format is directly related to the business model, in which the exploitation opportunities will have to be defined such as charges for SMS and micro-payments for Internet previews.

- *Technology platforms*: In case of broadcasting the technology platform is involved in MPEG images for the Internet, but also in the Digital Rights Management, micro-payment systems, and SMS messaging.
- *Distribution:* The distribution of a cross-media project covers more than the terrestrial television network and involve cable, satellite, ADSL, and Digital Terrestrial Television (DTT), but also Interactive Voice Response systems on fixed line telephony and SMS on mobile.
- *Consumers*: Since the rise of print, consumers only received newspapers, magazines or books and could not immediately react to the publisher. In the digital content chain the consumer can directly react to questions from the programme maker by SMS, e.g. to vote or to partake in poll. It is one of the special possibilities offered by digital media. In cross-media these digital contact possibilities are used to stay in touch with users, allowing them to follow a story differently, feeling more engaged by having more ways to understand the story and participate in it. In fact these possibilities make users consume more. It increases, strengthens, and deepens the relationship with the end user.

The challenge for cross-media is how to mix (interactive) television, Internet, and mobile technologies to provide emotionally satisfying content. According to Christian Fonnesbech, a Danish producer, this requires developments in several areas "such as script-writing, production flow, business models, storytelling grammar for new media, and the distribution and penetration of the new product" (EC 2003, p 161).

3.3 Technology

Cross-media has been enabled by technology. Since the introduction of the Internet and the TCP/IP protocol, technologies are converging, networks are becoming ambient while the amount of devices is exploding. Content Management Systems (CMS) are being developed to deliver content through various outlets. Technical platforms are aiming at scalability in order to transmit data from main computers through various networks to different devices. Networks are becoming linked to each other so that a user can seamlessly move from his home network to a mobile network. Domestic, fixed line, satellite, and mobile networks establish an ambient or ubiquitous environment. Broadband is becoming a triple play network for television, Internet, and telephony. While this convergence and integration is going on, the amount of devices is exploding. PCs are becoming smaller as notebooks and PDAs. Mobile telephones are becoming 'smart', as they

become able to link to the Internet and to download songs and video clips. Also the change-over from TV to interactive digital television opens up new opportunities.

Therefore, cross-media is not based on a specific technology. It is rather based on the efficiency slogan COPE. This is rather easy to achieve in printing and publishing as mainly text production is involved, but gets more complicated with broadcast, market communication, and marketing where video, audio, and text is involved.

Cross-media has also another technological characteristic: scalability. Cross-media projects involve groups of people with various devices. In order to handle the traffic between provider and user, scalable software will have to be used, so as to react to a growing community of users with a particular device. Scalability will have to be achieved in the logistics of the platform and the distribution, but also in the content delivery to various devices.

3.4 Non-Technical Drivers

Cross media is not only driven by technology. With people moving about more often and further, cross-media projects have to deal with network technologies, which seamlessly let the user move from one network into another, from the domestic Wi-Fi network into the mobile network. The necessity does not grow out of the technological possibilities only, but also stems from the desire to move from one sphere to another, taking a book, music or video along.

Another driver is the community-oriented attitude. The Internet and mobile technology have been instrumental in establishing communities in an effective way. Where there are communities of stamp collectors in the non-virtual world, in the Internet world communities are becoming more pronounced. This is also the case in cross-media projects. Cross-media increases the VIP club feeling: users that will use all the media will feel closer to the story than the one only following the show on TV or just buying a book. The programme *Big Brother* has a fan club for people interested in everything that happened in the programme. With the new media this community could be served. At home the fans could watch television or the 24/7 cable broadcasts, and when going outside they could remain informed by SMS.

But there are also examples of communities which can create their own content to a certain level. The Finnish website for girls *Sooda* has its own games. On the site of *Outer Rim Putti minigolf TV*, users can design their own golf course projected on TV with their mobile.

This might be even more in the case with the blogging trend, whereby any Internet user can log his experiences and events on an Internet site. Any marketing campaign needs to include a blog now, allowing people to create and upload their own content. It is another way to deepen the relationship as well as increasing publicity in a viral manner.

4 Applications

Cross media can be implemented in various application areas in the media field such as print and publishing, broadcasting, gaming, market communication, marketing, and E-Learning. Below we will elaborate on these applications.

4.1 Print and Publishing

As said before, print and publishing have been using cross-media already for a long time. A driver was efficiency, but in newspaper and magazine publishing cross-media is used for marketing and market penetration as well.

Cross-media in book printing and publishing started out as media that were complementary to each other such as a book and a CD-ROM. An example is the book with the proceedings of the *Contessa* Conference on Cross-Media Service Delivery, held in 2003; together with the book a CD-ROM and an Internet site were published. In magazine and newspaper publishing, cross-media is used more extensively in order to bridge the time between publications by Internet services and in order to create a community.

In the most rudimentary form, the newspapers and magazines have an electronic counterpart. It does not really add to the content of the magazine or the newspaper, but reproduces the content of the magazine or the newspaper. Advantages of this include that a local newspaper can be read anywhere, e.g. when a subscriber is on the road. But more magazines and newspapers have complementary service on the Internet, on mobile devices such as PDAs, and on smart phones. These complementary services include a 24/7 news ticker, background information to a printed article or archive.

4.2 Broadcasting

In broadcasting the concept of cross-media has been picked up and worked out in productions. After *Big Brother* and *Who wants to be a Millionaire*, the programme *Weakest Link* was put on a disk with a virtual presenter, resembling the UK presenter. Cross-media does not remain limited to the traditional broadcasting companies. The French content company Push TVi set up CornerTV, a TV channel soon to be available in 6,000 bars and restaurants.

Combining ADSLTV with mobile, the company created a new entertainment format mixing a mobile game with video, advertisement, and information. These new hybrid formats are only possible because of the development and merging of technologies, as well as lowering of prices, which allows innovative business models to arise.

4.3 Gaming

In gaming portable devices such as the GameBoy and consoles have been in use. But by using mobile technology new cross-media concepts can be launched on television, ITV, and the Internet. In Finland Waterwar.tv has developed a multiplayer game in which waterguns are used to fight by sending text messages via interactive television and the Internet. In the UK an IST project *Can you see me now?* is using the Internet, while pursuers are using mobile phones, equipped with Global Positioning System software.

Another example comes from Nintendo, which launched the Game Boy Advance that was meant to be connected to the Game Cube. In this way a game could be played on TV with better graphics and a full story at home, but also when on the road, one could play a smaller side game based on the same storyline, but with less perfect graphics.

4.4 Market Communications

In market communications the cross-media concept has been used for reaching communities by multiple channels. In a study conducted by the Online Publishers Association/MBIQ (2002), an ad for the US Airforce was shown on TV and on the Internet and people were asked to recall it. When shown on TV 23% remembered to have seen it on TV. When shown on TV and Internet, 32% recalled to have seen it on TV. When people on the web were asked, 65% remembered, while 78% of people on Internet

and TV could recall the ad. Besides of reducing costs for creation, cross-media has thus a commercial impact, too.

4.5 Marketing

In marketing, cross-media has already proven its worth. In 2003 a financial company in Denmark used the soap story of *Anders and Henriette* on the Internet, a young couple that was going to live together, in order to promote their financial services. The series of 8 instalments attracted 30,000 visitors in sum; 90% of them re-visited the site. So the campaign resulted in making the name of the financial institute a brand name and delivering applications.

4.6 E-Learning

Cross-media in E-Learning has also been a promise right from the beginning. In the early days of cross-media the concept got no further than a book plus CD-ROM. But when the E-Learning concepts developed, it became clear that only a blend of E-Learning and "live learning" would result in effective learning. This way of blended learning is often aided by cross-media.

4.7 Tourism

In experiencing tourism, electronic devices are used to create synergies between local culture and commerce. One of the experiments in this area is *Visby Under* on the island of Gotland (Sweden). The experiment is a game which takes advantage of modern mobile technology for high level multi user gaming and location based services. In the first version (2002) the game consisted of mobile and live action gaming. The main narrative modus is live action, text, picture, and sound. In its full-fledged version (2003) the project integrates live digital-TV and more advanced audio-visual elements. Cross-media thus creates new opportunities for tourism.

5 Business Models

The question can be asked whether there is a business model for cross-media productions. Dealing with only the technology slogan COPE directed toward efficiency and a plethora of devices, it is difficult to develop

a general business model. Moreover, cross-media publishing products differ from cross-media broadcast productions in scale and exploitation opportunities.

Yet, one of the first principles of cross-media should be kept in mind. As a cross-media project is seen as *the use of content over several devices supporting a central theme* the cross-media exploitation should take this into account by differentiating revenues according to the devices. An example of this was given by Damien Marchi in an article on the cross-media television show *Star Academy 2* in France (Marchi 2002) In the article he stated that revenues were differentiated according to the devices, media types, and frequency and not according to content. The content was spread over various devices:

Table 1. Content and devices (Source: Marchi 2002)

Content	Devices	Media type	Frequency	Price
News	Web	Text+image+ video	18 times a day	Free
	SMS	Short text	6 times a day	€ 0.35 per message
	Interactive Voice Response	Audio transcription	3 times a day	€ 0.34 per minute
	i-Mode	Text+image	18 times a day	Free (except cost of download, charged € 0.01 per kb)
Live Feed	Web	Stamp format, not full screen	24/7	€ 0.56 per 15 minutes or € 15 subscription for the period of the programme
	CableTV	Regular TV quality	24/7	€ 12 for the period of the programme
Summary	TV	Analogue TV	1 hour a day	Free

Of course, this method of pricing has something to do with the maturity of the business models of these devices: everyone is willing to pay for cable TV or for sending an SMS, but will not automatically pay for accessing content on the web. In order to attract users and to easily promote these devices in an independent way, every device must display a special piece of content or service, which is not accessible on the other devices. And it will have to be real content, different from the one accessible for free. Still the integrity of the whole system should not be forgotten as it is through the web that most users will access content; besides it is a good way to extend the TV show's brand value.

Besides gaining revenues from the consumers, the cross-media producers were able to attract more sponsors. They also were able to attract some carriers and providers, who wanted to buy content exclusively or wanted to syndicate content from the show for their subscribers.

As can be seen from the frequency, this cross-media production was on a 24/7 basis with some devices being available a few times during the day. No specific scheduling of messages or broadcasts during the day, so-called day parting, has been sought after in this project. Yet six messages were sent during the day, when people were supposed to be at work or away from the TV or PC.

Day parting can be applied in business environments, too. Users of a business service such as the *Wall Street Journal* can indicate in their personal profile when they are home, in the office or in between. In this way, they can use the Internet on their portable computer at home, on their smart phone and through push media. By planning the use of various media at various moments in time, cross-media support the full service concept.

6 Marketing and Cross-Media

Cross-media projects are hard to promote. So far, only few lessons have been learned from cross-media projects. Damien Marchi, who was involved in the second season of *Big Brother* in France, dubbed *Loft Story*, formulated eight commandments (Marchi 2002).

1. *Give users access to exclusive content not seen on television.*
   During a TV or movie production usually more material is shot than can be shown. Users like this unused content exclusively, for example on the Internet through a club membership.

2. *Interact with the show – Give the power to the audience.*
   Involve the audience by having them vote, ask questions, and by polling them.
3. *Make the show even more known.*
   Use the other media besides television to keep the users in touch with the show.
4. *Increase users' loyalty.*
   Loyalty of fans can be stimulated by a fan club and viral games.
5. *Recreate the atmosphere.*
   Levy the atmosphere of the TV show to another medium.
6. *Continue the show on the web.*
   Use the TV show to drive the other devices.
7. *Enhance the watching experience.*
   Stimulate simultaneous use of media (browse the Internet when watching TV for example).
8. *Use multiple devices.*
   A multi-device system built around a TV show allows channels to increase the number of revenue streams.

But cross-media is more than only increasing the number of viewers. Having a cross-media system around a television programme goes beyond the simple fact of increasing the TV audience. The broadcaster wants to extend its brand to the largest number of platforms possible, starting with the brand of its famous programme.

With the development of cross-media formats we see already the way that television will change: the broadcasted television programme becomes one of the elements of the branding system. More and more programmes are created where the cross-media format is not *adapted* to the show but where the distribution through multiple platforms *is* the most important part of the programme. This can be illustrated with Big Brother/Loft Story. The show offers the audience the illusion that the contestants in the house can be followed on a 24/7 basis; this is what makes the show popular. Yet the only place where it is actually possible for anyone to watch the contestants at any time is on the website (or on the special TV channel) and definitely not during the TV show that only shows highlights of the life in the house. If you look at it this way, the TV show becomes a *promotion* show for the website or other interactive platforms.

7 Is There a Future for Cross-Media?

As stated in the introduction cross-media is not an unequivocal term. In the section on technology it has been made clear that cross-media is not linked to a particular technology platform. The question can even be posed whether cross-media will have a future.

Koopee Hiltunen (2004) of the Finnish cross-media company Haukion presents the thesis that intuitively many people know what the term means. In fact cross-media is hardly made explicit as a term. Cross-media is part of the media universe; it has become the default mode of making media. Users will be so accustomed to cross-media that they do not notice its presence, but they will notice its absence.

For professionals cross-media will place a burden on their skills. They will need a broad understanding of the whole media universe. Project management skills will become highly valued. Ideas will be valued greatly. Design (visual, structural, narrative, usability) will be the greatest challenges in cross-media productions.

Looking at the industry Koopee Hiltunen predicts that marketing communications and games will be the driving forces behind cross-media. There will be a small number of original cross-media formats, which will be copied in great numbers. He anticipates that small players have to cooperate in order to survive; big companies have more possibilities. It is even possible that there will be super developers, who can control the whole content production chain.

The critical notes of Koopee Hiltunen are counterbalanced by an optimism that lives within the European Union. Participants in the EC funded project MGAIN see the combination of mobile and cross-media as a new content generator for Europe. Technology is no longer an obstacle "in offering content to users in preferred media and rich-media formats, and the content can be personalised" (MGAIN 2004). In MGAIN, entertainment, entertaining communication, advertisements, education, and information delivery are areas where heavy growth is predicted.

Also at the IST Conference 2003 in Milan cross-media entertainment was seen "as the main driver for the future Information Society, providing a much richer experience than currently gained from pictures, voice and data on television, the Internet or third-generation handsets" (EC 2003).[1]

[1] The author likes to thank Damien Marchi for his comments and additions.

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User-Centric Content Production and Interaction

Interactive Digital Television in Europe

Janne Orava, Mika Perttula

LTT Research, Helsinki, Finland

1 Introduction

During its short history, television (TV) has gained a very significant role in information sharing and generally in people's daily life. Nowadays, TV is one of the most consumed media forms all around the world. On average, TV is viewed in Europe 3 hours and 33 minutes per person daily (Eurodata TV 2004). There are several reasons for its popularity. TV is a compelling medium due to its *media and information richness*. It requires little from the viewer (*ease of use and follow*) and provides possibilities for *social interaction* among viewers both during and after watching. It can be used both for entertainment purposes and information absorption.

The single most important change process in TV's near history – digitalisation – has started during the 1990s. The process began with the digitalisation of the production and distribution infrastructure. The development has by now reached the viewer level. The transition period will last at least until the end of this decade (see Table 1). This development has a wide-ranging affect on all players in the TV industry from content owners to viewers. These changes are for example better *picture and sound quality*, more *channels*, more *attractive content,* and the possibility to use *interactive services* (e.g. information services, t-commerce etc.).

1.1 The Importance of IDTV

Today, the subject of interactive digital television (IDTV) is a highly relevant and heavily discussed topic because the digitalisation is now in its final phase and has become a reality for almost the whole TV audience and industry. Broadcasters have launched their digital services, set-top-boxes are available, and several countries have decided on a switch-off date for their analogue signal.

This chapter aims to describe the development, current situation, and future trends of IDTV in the European Union (EU). The main objective of the chapter is to give the reader an insight into the IDTV industry's current

market situation, business models and technical developments. We will describe the markets at a general level and highlight some key markets as an illustrative example. The chapter is written from a Northern European perspective and may therefore have limitations in comprehensiveness of other regions in Europe.

1.2 Definition of Terms

In order to make sure both readers and writers have a consistent understanding of the terms used in this document we want to highlight the following three terms: *interactive television* (ITV), *digital television* (DTV), and *interactive digital television* (IDTV).[1]

ITV – Television that allows the viewer to interact with the television set in ways other than simply controlling the channel and the volume and handling videotapes.

DTV – Transmission of television signals using digital rather than conventional analogue methods. Analogue transmission takes place in the form of a constantly variable wave; digital transmission consists of an electrical pulse, which has two possibilities: on and off (or positive and negative), which are represented by a one and a zero.

IDTV – Digital TV signal transmission, which includes interactivity enabling elements. Interactivity can be achieved either by using a service locally (remote control – set-top-box) or by connecting to a return channel (internet or mobile). In this way the *passive viewer* increasingly becomes an *active user*.

2 History of IDTV

The history of IDTV has its roots in the 1950s when the first interactive children's programme called *Winky Dink* was introduced. In this programme, children could draw on a special transparent sheet placed over the TV screen using ordinary crayons (Dodson 2001).

The 1970s were a decade of emerging teletext and first commercial interactive TV services in Ohio offering 30 channels divided into broadcast TV, pay-per-view, and interactive programming. In the 1980s, the BBC introduced the first TV programme (*What´s your Story?*), which viewers could direct via telephone.

[1] Definitions from http://www.whatis.com

The 1990s were a decade of major changes for the TV industry. In the early 1990s both production facilities and distribution networks began their digitalisation process. The end of the 1990ss were a time for launches of IDTV broadcasters and services. The development took mainly place in UK while the rest of Europe was following suit. Sky Digital[2] was first to launch its services in October 1998. NTL[3], Cable & Wireless[4] and ONdigital[5] launched their services in 1999 and 2000.

In 2000, first short message service (SMS) based games for TV were introduced in Finland. Now there are dozens of different TV games and shows played by using SMS as a return channel. These services also include SMS chat and voting. The user sends programme or activity specific SMS messages to the broadcaster. The game or show acts are based on the message, and for example in a chat the message is displayed on the TV screen.

Currently, IDTV enables a wide variety of interactivity for users. For example, in the "Who wants to be a millionaire"–show, the user is able to play the game as a standalone version in his or her home and send the results to the broadcaster if he or she likes. By doing this, he or she is able to win prizes and compare his or her own results to others.

Sports programmes may offer online betting services during games and races where the end user is able to make instant bets as the events evolve.

ITV advertising provides various ways for interaction between user and advertiser. These are for example ordering additional information and product samples via the return channel, participation in competitions or giving feedback to the advertiser. For more examples of interactive services see Table 1.

From the early days of TV onwards, the role of the viewer has changed quite considerably. This evolution can be seen as a development from a leaning backwards (passive) viewer to a more leaning forward (active) user.

[2] See http://www.sky.com
[3] See http://www.ntl.co.uk
[4] See http://www.cw.com
[5] See https://www.ondigital.co.uk

Table 1. History of IDTV (1953–2004)

Decade	ITV	DTV
1950	Winky Dink (1953) Telephone call-ins (1959)	
1960		
1970	Launch of teletext (1974) 1st commercial ITV service Qube (1977) Link Between TV and telephone – Prestel (1979)	
1980	Viewer directed TV programme via telephone (1988)	
1990	Chat messages on TV, interactive ad (1994)	Digitalisation of production process & distribution networks (1990s)
1990	Sky Digital launched (satellite) (1998) Ondigital launched (terrestrial) (1998) Several ITV service launches in the UK (1999)	
2000	SMS based TV games & chats (2000)	

3 IDTV Transmission Channels

TV signals can be transmitted to the viewers via three different channels. These are terrestrial digital video broadcasting (DVB-T), satellite (DVB-S), and cable (DVB-C). The terrestrial signal is transmitted via air and it requires an aerial for receiving the signal. The satellite signal is also transmitted via air, and it requires a satellite receiver (meaning a dish). The cable signal is distributed via a fixed cable, and receiving the cable signal requires a specific cable receiver box.

In order to use interactive services, the user needs also a return channel. The need for a return channel and the type of channel depends on the service used. Examples of the return channels are the mobile phone (SMS/MMS) and an Internet connection via modem or asymmetric digital subscriber line (ADSL). The cable connection is a two-way connection already by its nature, and therefore it is able to provide a built-in return channel for the user.

Internet protocol TV (IPTV) is also an emerging distribution model for TV content. IPTV utilises an Internet connection for both distributing the content and for return channel purposes.

4 IDTV Platforms

Some broadcasters own the whole vertical value chain and provide IDTV services on their proprietary platform. These broadcasters have control throughout the whole value chain from content production to customer relationship. Digitalisation started from these proprietary platforms. These broadcasters were able to develop their platform and services earlier than others, which enabled a faster digitalisation pace compared to government led digitalisation. The most successful proprietary platform standards and providers currently are Sky Digital with OpenTV[6], and Canal Plus[7] with Mediahighway[8].

Besides proprietary platforms there is a development going on with the publicly led free-to-air (FTA) model, which is mainly focused on digital terrestrial television (DTT). This standardisation has started in the early 1990s and is managed by the Digital Video Broadcasting Project (DVB Project[9]). The standard for enabling interactive services is called Multimedia Home Platform (MHP) and is now widely adopted among European countries. Many countries have already set their schedules and plans for both digital TV and radio broadcasting. Despite the Europe-wide uniform standard of broadcasting the deployment of digital broadcasting is highly country dependent as can be seen in Table 2.

The transition period from analogue to digital broadcasting is quite long for many countries starting from three years in Italy up to 12 years in Spain. Finland and Italy are the first countries to shut down their analogue transmission but even their switch-off date is far in the future (2007). Many other countries have doubts about their schedule and no exact dates for switch-off have been published.

[6] See http://www.opentv.com
[7] See http://www.canalplus.fr
[8] See http://mediahighway.nds.com
[9] See http://www.dvb.org

Table 2. Development of digital television in Europe (DVB) (Source: based on www.dvb.org)

Country	Legislation in place	Digital television launch	Analog switch-off
Austria	2001	2006	2012
Belgium	2002	2004	2010 (latest)
Cyprus		No data available	
Czech Republic	2004	2004	2010–2012 (estimated)
Denmark	2002	2005	Not decided
Estonia	No data available	2004	No date given
Finland	1996	2002	2007
France	2000	2005	2008+
Germany	2002	2003	Started – 2010
Greece		Planning started 2003	
Hungary	2004	2004	2010–2012
Italy	2001	2004	2007
Ireland	2001	2004	2015
Latvia	2000	2003	2006
Lithuania	No data available	2004	No date given
Malta		No data available	
Netherlands	1999	2003	Starts 2004
Poland	2003	2001	No date released
Portugal	2000	2004	2010
Slovakia	2001–2004	2005	2015
Slovenia	2004 planned	Depends on legislation	2015
Spain	1998	2000	2012
Sweden	1997	1999	2008
UK	1996	1998	2010

The long transition period alongside an incoherent European wide schedule will have various effects on stakeholder groups around IDTV. These are:

- Development of EU wide markets for IDTV related products and services will take years;
- Immature markets create challenges for the companies who have already invested into the industry;
- Broadcasters need to maintain two transmission networks and therefore investments into new services may be only of secondary importance;
- The slow transition period will not create interest towards IDTV among end users and set-top-box penetration may lag behind;

- End users will receive new services slowly and they are in an unequal position to each other compared on a EU level.

5 The Business Model

The evolution of IDTV is changing the business and working models of traditional TV content creation quite heavily. IDTV gives the industry much *more choices and flexibility* compared to traditional content creation, *enables it to utilise a wider range of technologies*, *involves new stakeholder groups* (e.g. interactive agencies, software vendors), and *enables innovative business models*.

IDTV related content can be divided into two main components – TV programmes & formats and value added services (VAS). There are several types of VAS and two ways to use those: either as a programme related or a standalone VAS (see Table 3.). The most common types of VAS are information (incl. electronic programme guide (EPG)), communication, entertainment, transaction services and in general interactive TV programmes. The table below provides examples of various value added services.

Table 3. Value added service types and usage in IDTV

Service type	Programme related VAS	Standalone VAS
Electronic programme guides (EPG)		▪ National / channel / set-top-box based
Information	▪ Enhanced news, traffic & weather information ▪ Sports events related up to date information	▪ Travel destination presentations in digital teletext
Interactive TV programmes	▪ See Communication, Entertainment & Transaction	
Communication	▪ Chat (via set-top-box, mobile, internet)	▪ Email ▪ Instant messaging
Entertainment	▪ "Who wants to be a millionaire"-show (interactive: participation in game show from home) ▪ Voting, ring tones, logos etc.	▪ Games, quizzes etc.
Transaction	▪ TV-shopping ▪ Betting	▪ Concert & travel tickets ▪ Banking services

The traditional TV content production and distribution model is illustrated in Table 4 (column 1). Interactive value added services are more complex by nature and therefore require a wider range of competences to be produced (columns 1–6.). Key actors for delivering these competences are *IDTV software vendors, VAS hosting providers, return channel providers, advertising and interactive agencies, consulting agencies*. These actors together with traditional TV content production actors are able to develop and distribute fully-fledged IDTV programmes and services. The rest of the actors in the IDTV value chain provide other important but not critical services for the industry.

Table 4. TV content production and distribution model (Source: Pelkonen et al. 2002)

Core activities	Support activities	Infrastructure related components	R&D projects	Infrastructure supporting activities	Industry rules
Content creation	Advertising services	DTV set-top-box manufacturing	Inhouse	Negotiations of:	Regulation of competition
Content aggregation	Consulting services	DTV distribution equipment manufacturing	Co-operation projects	Finance	Legislative work
Content sales and marketing	Training & education	DTV software creation		R&D co-operation	Creation of standards
Content distribution	Return channel services	Development & maintenance of distribution network		Subcontracting	
Content usage	CRM	VAS hosting		Co-operation projects	
	Research activities				

Business models of service developers and the added value of IDTV are described briefly in the following.

IDTV software vendors

- Develops software components which enable interactive value added services (e.g. platforms, middlewares, content creation tools, specific applications);
- Revenue from software licenses, revenue sharing, and services.

VAS hosting

- Provides hosting environments and services for broadcasters, content providers, and aggregators;
- Revenue from service fees.

Return channel services (internet service provider (ISP), mobile operator)

- Provides connections from the end user's set-top-box to the broadcaster and service provider;
- Revenue from setup fees and premium priced service usage.

Advertising & interactive agencies

- Creative design services for content related actors (e.g. content providers, DTV software vendors, advertisers etc.);
- Revenue from service fees.

Consulting services

- Provides business and technological solutions for broadcasters;
- Revenue from service fees.

However, the most important factor in this value chain lies in the hands of the end user and his/her acceptance towards new programmes and value added services. Depending on the end user's choices only the best and most interesting services will become successful and bring revenue to the whole IDTV value chain. Revenue from the end user can be collected either directly (time/quantity based fee, one time fee or subscription fee) or indirectly (sponsored usage).

6 The Market

The development of an IDTV market in the EU countries has started in the late 1990s. Digitalisation started first with cable and satellite platforms. By now, the attention has turned towards the success of digital terrestrial television (DTT) development. Nearly 44 million households out of 144 million households in the EU countries (pre-May 2004) have IDTV via satellite (30.3 M), cable (7.7 M) or terrestrial (6.0 M) channels.[10] This equals 31% of the total number of TV households. According to Strategy Analytics (2002), the number of IDTV households in Western Europe is expected to grow to over 100 million households by the year 2007. Major IDTV markets in the EU can be found in Germany, UK, France, Italy, and Spain totalling almost two-thirds of the TV households.

6.1 Size of the Business

Revenues from Digital TV in Western Europe (EU's 15 member countries plus Norway and Switzerland) are estimated to be approximately US$ 40 billion in 2004 and expected to grow to over US$ 72 billion by 2006.

Table 5. Digital TV revenues 2000–2006 (US$ billion) (Source: Paul Budde Communication 2004)

Year	Europe	USA
2000	6.15	5.76
2001	10.69	9.61
2002	17.68	14.31
2003	27.42	21.19
2004	39.53	28.96
2005	54.60	41.91
2006	72.22	60.76

Revenues from ITV applications and services are estimated by Strategy Analytics to be almost US$ 1.5 billion in 2008. This figure excludes revenues from pay-tv subscriptions, t-commerce[12], and interactive advertising[13].

[10] The number of TV households grew to 170 million in May 2004 when new member countries joined the EU. Data on digital television penetration in those ten new member countries is not available.

[11] See http://www.dvb.org

[12] Electronic product and service trading and ordering via TV.

Table 6. Revenues from interactive TV applications and services in Western Europe 2002 and 2008 (US$ million) (Source: Strategy Analytics 2002)

Consumer Revenues	2002	2008
TV Messaging/Email	10	234
TV Betting/Gambling	10	64
Interactive TV games	36	448
Enhanced TV	35	712
Other ITV revenue	1	26
Total	92	1484

Forrester Research (2003) estimates that in 2007 revenues from t-commerce will be € 8 billion, and from i-advertising € 2 billion. By combining figures from Strategy Analytics and Forrester we can see that IDTV revenues excluding subscription fees would equal over € 11 billion during 2007–2008.

6.2 Market Players

Currently, the whole IDTV industry is in a phase of rapid development. Value chains, business models, and roles of the companies are becoming clearer every day. Besides traditional TV content production actors, the key IDTV industry actors can be divided into two different categories:

1. Companies focusing solely on IDTV
   - Platform & middleware
   - Content creation & management tools
   - Specific applications
     - MTV´s Doubles Week Tennis game during advertising breaks
     - Image capturing with Infocast Systems' ITV Capture[14]

2. Companies offering services for IDTV industry
   - Advertising & interactive services (ad agencies)
   - Consulting services (information and communication technology (ICT) consulting companies)

[13] Marketing communication planned and executed to actively engage viewer in advertising process through interactivity.

[14] See http://www.infocast.fi/CaptureE.html

- Return channel services (ISP, mobile operators)
- VAS hosting services (information technology (IT) hosting companies)

Examples of the companies focusing solely on the IDTV business are listed in a table below.

Table 7. Solely IDTV focused software companies

Platforms, middleware, tools (e.g.)	Specific applications (e.g.)
Alticast	Endemol
Cardinal Systems	Fresh Interactive Technologies
CoreMedia	Gist Communication
ditg	Icareus
Emuse Technologies	Infocast Systems
Espial	MassMarketMedia
IRT	Pixtel
Ortikon Interactive	Softel
Sofia Digital	Technidata
SysMedia	TeleIDEA
Tamblin	TSS

6.3 Market examples

The development of the IDTV market is highly country dependent. Therefore we have taken three different EU markets for closer examination. The United Kingdom (UK) has the most advanced IDTV market in Europe. Finland has been a pioneer in adopting the MHP standard. Italy is adopting IDTV rapidly and has several interesting special characteristics as described below.

a) United Kingdom

The UK is currently the most developed IDTV market in Europe. The launch of the first IDTV services occurred already in October 1998. Since then, IDTV has reached over 55% of UK households totalling some 13.8 million homes (Ofcom 2004). As penetration is now halfway completed the annual growth rates start to diminish. The government's target date of 2010 for the analogue switch-off looks challenging, especially because 20% of the homes remain firmly uninterested in what IDTV has to offer (ITC 2003). The market has witnessed fast growth but also already some failures (collapse of ITV Digital).

Table 8. IDTV subscribers in UK/platform (Source: Ofcom 2004)

Platform	Pay TV	Free-to-air
Cable	2,502,451	
Satellite	7,085,000	345,000
Terrestrial		5,016,200
Total		13,858,901[15]

During the last six years the UK's TV industry has had time to develop and launch lots of IDTV related content and value added services. This has served also as a learning and reference point for other European countries. The services broadcasted in the UK cover the whole range of IDTV VAS as described in Table 3.

The IDTV industry in the UK is also well developed. There are several companies offering value added products and services for the broadcasters. Examples of the companies in IDTV content business are ditg, Emuse Technologies, Flextech Television, MassMarketMedia and Mindhouse. Major IDTV broadcasters are Freeview, NTL Home, Sky Digital and Telewest.

The IDTV penetration and industry continue to grow steadily. People get used to IDTV, and also advertisers start seeing IDTV as a potential medium. Time will show whether UK will switch-off analog network in 2010. Competition between platforms will continue as the free-to-air DTT model is the fastest growing platform currently. Also VAS companies will face increased competition as more players enter the market also from outside the UK.

b) Finland

Finland has been among the first countries to launch IDTV services in Europe. The "national launch date" for IDTV was August 27th, 2001. So far, penetration of IDTV has reached approximately 400,000 households which equals 18.7% of all Finnish households. The penetration growth rate is strong, and an optimistic estimate for selling IDTV set-top-boxes is 50,000 units per month in the near future. The penetration growth rate should stay very firm during coming years, as the Finnish government has set its analogue switch-off date to August 31st, 2007.

[15] Adjustment to remove double counting for households equipped to receive digital on more than one set (–1,101,280).

Table 9. IDTV households in Finland (05/2004) (Source: Various industry sources)

Platform	Households
Terrestrial	370,000
Satellite	30,000
Cable	Few thousands

Most of the terrestrial TV services are free-to-air, which is a traditional model for TV broadcasting in Finland. On the contrary, satellite services are usually operated in pay-TV mode.

Finnish broadcasters have started to introduce value-added services for Finnish viewers in the forms of interactive services and pay-TV. There are several companies developing and offering IDTV solutions and services. These include Cardinal Systems, Icareus, Infocast Systems, Ortikon Interactive, and Sofia Digital, to name few. Major IDTV broadcasters are YLE (Finnish public broadcaster), MTV3, Nelonen, VIISI, and Canal+.

Penetration continues to grow rapidly and in general IDTV is getting more and more popular among the Finnish people. Broadcasters are also launching new services actively developed by DTV software vendors. The interest of the advertisers for IDTV is still a question mark. The analogue switch-off date is very challenging, and it remains to be seen how well Finland has adapted to IDTV before that date.

c) Italy

Italy officially launched its terrestrial IDTV services on the 1st of January 2004. Services reach initially some 50% of the population. The coverage will be extended to 70% of the provincial capitals during 2005[16]. All major broadcasters (RAI, Mediaset, and Telecom Italia) have started their IDTV services by launching and piloting interactive programmes and value added services. The initial market response has been encouraging, and currently set-top-boxes are sold at the rate of 2,000 a day. If the positive trend should continue up to one million set-top-boxes will be sold by the end of 2004 (DTG 2004).

An interesting feature of the market is that Italy's government allocated funds for subsidising set-top-boxes. € 120–150 million are available to ensure the demand of 900,000 MHP enabled set-top-boxes. On the other hand a fast start is needed as the government has set the analogue switch-off date to the year 2007.

[16] See http://www.dvb.org

Table 10. IDTV households in Italy (Source: www.dvb.org)

Platform	Households
Terrestrial	70,000
Satellite	5,000,000
Cable	300,000

The Italian market will start to wake up for interactive content as well as value added services. Currently, there are not that many IDTV software vendors developing interactive applications for the Italian market but this will change soon due to the increasing penetration.

The market and its development are at the very beginning. It remains to be seen how effective subsidies are, how quickly IDTV will cover the whole country, and how well the market develops in general.

7 Major Technological Developments

Europe has several technical standards that enable interactivity in IDTV. First, the developments occurred in form of proprietary platforms among actors who own the whole vertical value chain (see section on the history of IDTV). The best known companies and platforms are Sky Digital with OpenTV and Canal+ with Mediahighway. Besides the proprietary platforms the Digital Video Broadcasting Project (DVB Project) started to define specification for DTV in the early 1990s, and later in that decade an open and distribution channel independent specification for interactivity enabling middleware, nowadays known as MHP[17]. Many European countries' governments have adopted this standard for their primary platform in free-to-air model. However, proprietary platforms still lead the competition in IDTV (see Table 11). It is important to keep in mind that these platforms and standards define also the functionality of the set-top-box. Currently, end users are able to buy either a very basic set-top-box (that receives digital signals and has no interactivity) or more sophisticated ones with interactivity and conditional access.

[17] For more information of MHP standard see section on IDTV platforms.

Table 11. Middleware standards in Europe (2003)
(Source: www.broadbandbananas.com)

Middleware standard	Households (thousands)
Betanova	1,800
Liberate	2,527
Mediahighway	5,198
MHEG5	2,100
MHP	1,020
OpenTV	12,135

The technical development around IDTV is continuous. Standards evolve, new technical innovations are created, and new end user solutions are coming to the markets constantly. These developments create many new opportunities for industry actors but also as many challenges – for example standardisation, time shifted viewing, new delivery channels, and device convergence. In the sections below we will elaborate these challenges.

7.1 Standardisation

Currently there are several standards for IDTV in Europe. OpenTV keeps its leading position with over 12 million users, Mediahighway follows with over five million users while other standards have one to two million users each. MHP has only a little bit over one million users and has clearly the role of an industry challenger. Compared to other industries (e.g. GSM in mobile telephony) there are too many standards and the IDTV industry will face most definitely *a battle of the standards and a consolidation.* One of the first examples of this development process is Mediahighway´s MHP compliancy.

7.2 Time-Shifted Viewing

Technical development occurs also in the way how people can use TV. A natural evolution of VCRs goes towards personal video recorders (PVR). With these hard drive based systems end users are able to record their favourite programmes, watch it when they want, and very easily skip the advertisements. Also video on demand (VOD) services start developing gradually along new delivery channels (e.g. Internet protocol television –

IPTV[18]). This model enables even *more flexible TV usage* and the possibility to skip advertisements totally. This type of technological development will have wide ranging effects among the industry.

7.3 New Delivery Channels

Technical development in other digital media industries has created possibilities to offer TV content also on other devices than traditional TV sets. Especially handheld devices like mobile phones and PDAs provide *new delivery channels* for TV content and introduce new ways to use TV. These new delivery channels are based on handheld digital video broadcasting (DVB-H)[19] and internet protocol datacasting (IPDC[20]) technologies. With handheld devices end users can choose time, place, and way to access TV. IPTV on the other hand brings TV via Internet to both PCs and set-top-boxes that are connected to the Internet while using the traditional TV as a monitor. This again gives the end user more choice in terms of additional content, communication, and VAS.

7.4 Device Convergence

Just like new delivery channels provided by other digital industries there are also new end user devices that bring new ways to utilise media content in the living room. At some point this development will lead to *media convergence,* i.e. one or a few devices handle all needs related to using media content. The devices competing over this role are set-top-boxes (e.g. ADB, Nokia), media centres (e.g. Microsoft, Sony), and game consoles (e.g. Sony, Microsoft, Nintendo). However, it will take some time before these integrated networked multimedia home terminals are available for mass markets.

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[18] A system to deliver television programming using the Internet protocol (language) over computer networks. See also http://assetmanagement.broadcastengineering.com/ar/broadcasting_iptv

[19] A terrestrial digital TV standard that uses less power in the receiving client than DVB-T, and allows the receiving device to move freely while receiving the transmission, thus making it ideal for mobile phones and handheld computers to receive digital TV broadcasting over the digital TV network (without using mobile phone networks at all). See http://www.afterdawn.com/glossary/terms/dvb-h.cfm

[20] A service where digital content formats, software applications, programming interfaces and multimedia services are combined through IP (Internet Protocol) with digital broadcasting. See http://www.ipdc-forum.org/about/index.html

8 Outlook

The IDTV industry is in a very challenging phase currently. Penetration levels are still rather low, and this has diverse effects for the industry. The industry is in a *treadmill* that is very common for many new emerging technologies. If there are no set-top-boxes and services there are no users and vice versa. Slowly progressing penetration has a negative industry-wide effect in the form of hard market conditions for interactive content and application developers, advertising sales and increased broadcaster operating expenses in form of two simultaneous broadcasting networks.

However, if there are no delays in penetration and growth rates develop as expected this will lead the industry to *high market growth figures* in the coming years. Demand for interactive content, application and advertising production would create activity and healthy competition among industry players, broadcasters could plan new investments after the analog network shutdown and end users could enjoy high quality content services.

The size of the whole IDTV business is anyhow limited, yet the market has many local actors and only a few international ones. This is especially the case with content and IDTV software developers. The software business is also by its very nature an international business so the market environment is immediately all of Europe. There is a danger that many companies will not gain market share, and that they will face either consolidation or market exit.

On the other hand *some trends support small and innovative companies* in their internationalisation activities. These trends include content formats, media convergence, and universality of software development. Creative and innovative companies may well break through on a European level.

Standardisation is still in an early phase. OpenTV has got a head start in platform business and they have got time to further develop the platform based on real customer experiences. MHP and other minor standards are in a challenger's position and it remains to be seen who will win the *battle of the standards*. However, it is quite obvious that there will be only one or a few future standards in Europe as it has been demonstrated already in home computer (Windows vs. Mac) and mobile markets (Symbian vs. Microsoft).

Standards have wide ranging effects for the markets. Only the biggest companies are able to support multiple standards and smaller companies are constrained to one platform. Depending on the decisions on standards companies may be either *winners or losers* unless various standards become compatible.

New delivery channels create again pros and cons for the IDTV industry. First, these channels (i.e. DVB-H for handheld and IPTV) provide *new ways to deliver content* for end users. Content may be richer (IPTV), the end user has enhanced possibilities to access the content (DVB-H), and it enables new ways to serve and charge the user. Secondly, these channels create potentially *bigger markets* as time and location free usage reaches a wider audience. New channels and bigger audience mean also *increased competition*. The development of distribution models makes the IDTV market tempting for new market entrants from other industry segments. Entry to market opportunities may occur at the broadcaster, content provider (e.g. mobile content) and IDTV software development level (e.g. mobile software companies).

Device convergence creates also challenges for the IDTV industry actors. Media convergence in home terminals is a *widely accepted future vision* among markets. It is not clear yet in what form the competition will emerge and who will be the winner. Set-top-box manufacturers and middleware developers have basically two options: develop set-top-boxes more towards media centres or licence middleware for media centre and game console manufacturers. Media centres enable more innovative content and service creation and therefore provide new business opportunities for IDTV software vendors and content providers.

The philosophy of media convergence raises ever-increasing *competition over the end user's time consumption*. If in the near future most of the home entertainment is served from only one source, which will then be the preferred entertainment type, and how will the end user make his/her choice? Currently, TV viewing takes on average a big share of the end users' time but other media are gaining share rapidly. How IDTV can secure its place in the end users' life and differentiate positively against radio, game consoles, Internet, and other media is still an open question.

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The Usability Factor: Improving the Quality of E-Content

Ansgar Zerfass, Bernd Hartmann

MFG Baden-Württemberg, Stuttgart, Germany

E-Business and E-Content continue to be one of the key drivers for innovation throughout Europe. According to EITO (2004, p 3), the ICT market in Western Europe will grow by 4% in 2005. Providers of software and content are willing to make huge investments that will have to pay off in terms of market share and revenues. However, the basic lessons have been learned: Nowadays everyone can get connectivity, publish on the web and start a new online shop with a few mouse clicks. Software and programming skills no longer make a difference, and coding continues to be outsourced to countries with lower labour costs. Moreover, the wealth of information available means that there is a shift of power within the communication process. Recipients may choose between a huge range of broadcast channels, corporate publishing products, websites, E-Mail newsletters, and mobile services. As a consequence, attention tends to become a rare commodity in the information society (Goldhaber 1997; Franck 1998). And this is not only a question of attractive content and packaging, but also of accessibility and ease of use.

Therefore, the "ability to build practical, useful, useable, and satisfying applications and websites" (Schaffer 2004, p xvii) remains one of the key differentiators in the E-Content business. Usability, defined as "the effectiveness, efficiency and satisfaction with which specified users achieve specified goals in particular environments" (ISO 9241) has to be a key part of any strategy dealing with websites, mobile applications and online games. Successful media ventures need both a philosophy and a management system that rather place the user and his or her needs in the centre than the engineer or the designer.

This chapter explores the state of the emerging discussion within academia and practice. We will look into economic and social drivers, discuss methods of usability engineering, and outline the most important areas of application.

1 Rationales of Usability Enhancement

While usability has been somewhat of a buzzword in recent years, its importance is still underestimated in many cases. This is often due to some common misconceptions. Especially decision-makers tend to think that usability is just a nice-to-have but not mandatory. Even those who catch the importance of the issue may believe that there is no need for usability experts in the process since any designer can take care of it. And creative people fear that usability guidelines lead to a streamlined and boring look of the final product, preventing innovation to take place (Heinsen and Vogt 2003, p 14). These views, however, are very limited and ignore the multitude of positive effects gained by full-scale usability testing and engineering.[1] Everyone looking for success in the E-Content business has to work on usability enhancement. It pays off in economic terms, and it is necessary to fulfil stakeholder expectations in the social field.

1.1 Economic Drivers

From a business point of view, usability is a major aspect of customer satisfaction and therefore one of the most important things any company should look for. Industries producing durable consumer goods have recognized this a long time ago. Nowadays, usability engineering is an integral part of any excellent product development process, no matter whether the product is car armatures, washing machines, DVD recorders or even door knobs. And what is true for washing machines is also true for E-Content applications: those that are easy to use will satisfy the user and will make him or her stick to it rather than switching to products by competitors. No product, website, mobile service, or online game can be successful in the long run if its customers face problems using it.

Usability testing and engineering contributes to the bottom line in several dimensions (Zerfass and Zimmermann 2004, p 6):

- The website, mobile application, or online game will be used more often and more efficiently;
- Uncertainty and frustration on the user's side decline as well as the feeling of being left alone;

[1] A number of websites offer up-to-date insights, information and case-studies about the usability and accessibility of digital media; e.g. http://www.usabilityfirst.com, http://www.usabilityviews.com, http://www.upassoc.org, http://www.usability-competence.de, and http://www.useit.com/alertbox

- Satisfaction rises significantly;
- This in turn stimulates the willingness to consume content and to use services offered by the application;
- The application is thus able to fulfil its role within the communication strategy or the creation of customer value;
- This leads to a higher return on investment (ROI) and makes sure that the investments into E-Content pay off in the long run.

Therefore, it makes sense to think of consumer needs and usability issues as early as possible within the innovation process. Any investment in usability testing before the release will pay off later. As a general rule, one can claim that every euro invested in usability will lead to savings between €10 and €100 later on (IBM 2003). However, it can be difficult to convince decision makers that money spent on usability engineering is not wasted. But there are ways to illustrate that the investment will pay off (Heinsen and Vogt 2003, p 19–40; Schaffer 2004, p 18–22):

- Changes before the release of any E-Content application are much cheaper to implement than modifications of the finished product – and there is always the chance to lose customers when changing an existing application;
- Usability significantly reduces the costs for customer services once the product is released; people will have less problems dealing with it and will not call the hotline or complain to the customer services department;
- Consumer loyalty rises: firstly, the atmosphere and the service are better, and secondly, users are more willing to trust a website or mobile application which is easy to use than one that is of poor quality. If the website reacts in just the same way as the user expects it to, the satisfied customer will come back. Irritated users, however, normally do not have the patience to find out how the site actually works but rather turn to similar sites with a higher usability;
- Creating websites with a high usability will make it easier to use E-Content for multiple devices. This is an increasingly important asset in the world of cross-media, where many business models comprise the

spread and adaptation of information for many different channels and devices.[2]

Usability thus becomes the added value of any application trying to make money in the field of E-Content. Nevertheless, there are also strong arguments that limit the value of usability from an economic point of view. This is especially true if it is not the user who pays for the content but if the revenues are gained from advertisers or sponsors. So clicking through a lot of single pages before reaching the full version of an article linked on an online magazine's homepage may be frustrating for the user, but pay off for the publisher because it multiplies the number of page impressions and thus increases the marketing income. This means that major advancements in usability reflect a high respect for the customer; but usability may be limited by business models that build upon other revenue streams.

1.2 Social Drivers

There is also an obligation to enhance usability because of demands from important stakeholders or even state legislation. This resembles a social change: As long as the Internet and E-Content applications were only used by a small percentage of the population there was not really a need to pay respect to the needs of minorities. Due to the incredible success of new media and the inclusion of ever larger amounts of users, social responsibility makes it necessary to make the Internet accessible to everybody. This is evident e.g. in the Web Accessibility Initiative by the World Wide Web Consortium (W3C). On its homepage, the inventor of the World Wide Web, Tim Berners-Lee, is quoted with the following words: "The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect."[3]

Accessibility here means that people with disabilities are offered the opportunity to access web content easily. In order to achieve this, information must be available for different devices and platforms. This means that the coding has to follow some basic rules, and that any information must be accompanied by metadata. So e.g. websites that follow the guidelines of accessibility must be prepared in such a way that they are compatible with machines for Braille, the writing system for blind people, or that they can be machine-read and transformed into audio output (Mueller 2003).

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[2] For further consideration on cross-media see the chapter "Cross-Media on the Advance" by Jak Boumans in this book.

[3] See http://www.w3.org/WAI

In some countries like Germany, accessibility of websites has already become a legal requirement for online services published by public authorities. Neglecting the interests of stakeholders may lead to public criticism and a loss of reputation. For example, in 2003 the German Federal Employment Agency invested €15 million into a website that should help people to find a new job with just a few mouse clicks. But soon it turned out that the website was neither able to match queries and offerings nor did it fulfil the mandatory accessibility guidelines (Zerfass and Zimmermann 2004, p 5-6). This lead to a major scandal; both the project manager and the head of the institution had to quit their job later on.

2 Methods of Usability Engineering

In an ideal E-Content world, every application would be adapting itself to the needs of any individual user. However, as this is still far from becoming a reality, some effort must be spent on finding out how usability works with different recipients.

Usability researchers and practitioners have taken a systematic approach not only to define usability, but also to develop formal processes and methods to improve it. This field is usually called *usability engineering:* Usability engineering builds on research in cognition science, psychology, computer science, and ergonomics, among others. It is embedded within the larger field of Human-Computer-Interaction (see e.g. Carroll 2002). Usability engineering concentrates on developing and applying tools and concepts for evaluating specific tasks in using digital media applications.

According to a widespread understanding of usability as proposed by Jakob Nielsen (1993), usability is not a single one-dimensional property of a software product but rather consists of multiple components: learnability, efficiency, memorability, less errors, and satisfaction. Usability engineering can then be understood as any method that enhances any of these factors (Lindroth et al. 2001).

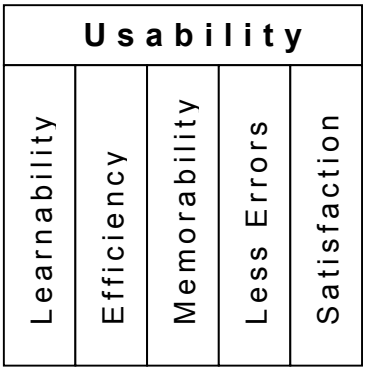

Fig. 1. Five components of Usability (Source: Nielsen 1993)

Successful usability engineering relies to a major degree on the evaluation of prototypes. Basically, one can distinguish two different approaches: user-based (or empirical) evaluation, and expert-based (or analytical) evaluation (Schweibenz and Thissen 2002, p 74). In the first approach, actual users participate in the testing, whereas in the second approach, experts take the place of the users. Normally, empirical testing involving actual users is far more complex and harder to do than involving just experts, but the results are also more reliable.

User-based evaluation methods include:

- *Usability testing with thinking-aloud-protocols:* While using the application (sometimes solving given problems like finding a piece of information or ordering a product), participants in the test will articulate their thoughts aloud. There are no formal requirements as to what they can say, they can rather freely express their opinions and associations.
- *User interviews with or without questionnaires*: Interviews can be included in several formats in various stages in the evaluation process, e.g. after testing an application or also online during the test itself.
- *Focus groups*: Guided group discussions of actual users; the specific gain lies in the reactions of the individual users to the comments of the other participants; they express their opinion on specific problems shown to them.
- *Field studies:* Observing users in the actual contexts of usage.

Expert-based evaluation methods include:

- *Cognitive walkthrough*: Experts analyse a specific feature of the application step by step and evaluate whether the potential users will have the necessary knowledge to handle the task successfully, whether the interface is self-explanatory to first-time users; the focus lies on single features rather than on the overall product.
- *Expert evaluation via heuristics or guidelines*: Experts compare the E-Content application with existing usability guidelines and state the differences; the focus lies on the overall product appearance.
- *Usability audit with design-guidelines:* Analysis of an E-Content application prototype by checking for compliance with design best-practices.

Out of this variety of approaches, *usability testing with thinking-aloud-protocols* is probably the method used most often. Thinking aloud protocols were introduced by Ericsson and Simon (1983) and modified since then for the purpose of evaluating digital applications. Usability testing with thinking-aloud-protocols takes place in so-called *usability labs* where the participants of the test – normally no less than five people – will use the prototype of an application under the observation of usability experts. Through this method, data about cognitive and motivational processes can be assembled as the participants articulate their thoughts all the way through the test. Their articulations are normally recorded. Tests of this kind can be either free or scenario-based, i.e. either the user can do what he or she wants or has to master certain tasks.

Nielsen points out the relevance of this method for usability testing: "Thinking aloud may be the single most valuable usability engineering method. Basically, a thinking-aloud test involves having a test subject use the system while continuously thinking out loud (...). By verbalizing their thoughts, the test users enable us to understand how they view the computer system, and this again makes it easy to identify the users' major misconceptions. One gets a very direct understanding of what parts of the dialogue cause the most problems, because the thinking-aloud method shows how users interpret each individual interface item" (Nielsen 1993, p 195).

However, thinking aloud protocols also have their downsides: in real life, users normally do not articulate aloud what they are thinking when using an application. Thus, this method needs experienced observers that know how to stimulate the participants in order to talk. There are also several variations of this methods now in place that are attempts at overcoming this drawback, e.g. the *Write-Along-Method, Constructive Interaction* or the *Coaching Method* (Yom and Wilhelm 2004, p 27).

In a thorough usability evaluation, there will usually be a mix of methods involved. Usability testing with thinking-aloud-protocols will normally be applied in combination with videotaping the session, but additional components can be added, e.g. devices for *eye-tracking* that record the order in which the user looks at the different parts of the page. This is closely related to tools such as *mouse-tracking* where the movements of the mouse are recorded, following the assumption that mouse movement and attention of the user are interconnected.

Alternative (or additional) to recording the user's behaviour via videocam, one can also involve *logfiles* that are generated by the computer and record the user behaviour. Or one could let the user answer short *online questionnaires* that pop up every now and then during the testing phase. This normally takes place at critical points in the reception process, however, it is also a significant interruption (Yom and Wilhelm 2004, p 28).

Even if the process of usability testing shows whether the product is easy to use or not, this is not the end of usability engineering. Advancements have to be planned and implemented. And usability engineering is a permanent process, not just a singular event. Therefore, it should be implemented into all stages of the E-Content production process (Schaffer 2004) and does not end once the product is released. With changing user behaviour, new technological developments and increasing amounts of content, there is a continuous need to re-evaluate the usability of E-Content applications in given intervals. To name one example: the Internet portal run by the German federal state of Baden-Württemberg[4] received the first-ever national communication award for a public authority website in Germany (Zerfass and Saehrend 2002). Nevertheless, evaluation tests showed that the website slowly lost acceptance because users changed their behaviour, new visual standards emerged, and technical restrictions vanished. Therefore, a major relaunch including extensive usability testing of the new portal was necessary after 48 months (Pfendert and Zerfass 2004).

3 Areas of Application

Usability makes a difference in every area of the E-Content market. Nevertheless, as general conditions differ there are some specific challenges for web usability, mobile usability, and the playability of online games.

[4] See http://www.baden-wuerttemberg.de

3.1 Web Usability

The time for experiments in the World Wide Web is over for the most part. No serious provider of a website can allow himself to create a "fancy" website while at the same time ignoring what the user really wants. Internet business has grown up and is now a mature market.

Some questions need to be dealt with by everybody who designs a new website (Zimmermann 2004, p 9), among them being:

- Are "critical tasks" easy to solve?
- Does the website offer the right functionality?
- Are the layout of the page and the navigation effective?
- Is the navigational wording clear and easy to understand?
- Is the time necessary for downloading files acceptable?

However, nowadays many designers do not consider those aspects. This leads to frustrating experiences for the user. The logfiles of many websites are an evidence for that (Zimmermann 2004, p 10). When the visitor of a website gets irritated by something he or she finds there, the logical consequence is normally leaving the website right away and often never coming back. Few people waste their energy trying to find out how a site works.

Some of the *most common mistakes* include (Zimmermann 2004, p 14):

- Users do not get any motivation to continue clicking through the site;
- The navigational wording is not intuitive;
- The navigation is not visible at once and is also not continued consistently throughout the whole site;
- The user does not get any hint on his or her current position in the site structure;
- The content is not presented adequately to the medium, e.g. texts are far too long and too little structured;
- The site ignores the needs of the target group;
- The user is left alone during critical tasks such as payment procedures or registering for a service.

These problems are especially relevant to online shops. If customers who want to buy a product online encounter either technical problems or cryptical directions during the shopping procedure, they usually abort the

ordering process. In fact, 75% of users shopping online leave the website shortly before paying, even if they already selected the products they want, and only three to five percent of the visitors of a the website of an online shop will turn into customers (Zimmermann 2004, p 17). A lack of usability leads to a lost of revenues.

Because of this, it makes sense to stick to some *usability standards* in order to guarantee a minimum level of user satisfaction. Curiously, most of those rules are well-known, but they are sometimes ignored because providers of websites think that an exotic navigation, colourful effects or obscure wording would make the website more interesting. This is almost never the case. It is no wonder that the most successful sites – such as Amazon, Google, Yahoo or Ebay – are actually quite simple and avoid using anything more than is necessary. For any newcomer website, a quite promising strategy is thus to imitate the leading website of the sector (Bucher and Jäckel 2002). However, this leads to the dilemma that all sites might eventually look the same and none makes a difference from the other. But there are other ways to distinguish oneself, e.g. through the quality of the content and the branding of the site.

In any case, the following guidelines are crucial in achieving a high usability (Zimmermann 2004, p 11–12):

1. *Standardised navigation*
   The navigation is the backbone of every website. Making it as transparent and easy-to-use as possible is mandatory. Intuitively, users expect the site navigation to be either at the left or the top of a website (Zimmermann 2004, p 14).

   There should also be limitations regarding the number of navigational elements such as bullet points or pictures. In any case, there should be less than ten elements in one section. Ideally, the number of elements should be in the range of five to seven items. This is also in accordance with the capabilities of the human brain – we can keep in mind only a very limited number of different elements at the same time.

2. *Consistent visual look-and-feel*
   Regarding the fonts used on a website it is normally the right decision to use as few fonts as possible. It is also recommended to use both upper and lower case instead of just capital letters.

   Different elements of the website such as text and graphics should be clearly separated in order to allow for an easy and intuitive grasping of all the information presented on the page. Texts should in general be short and instructive. Normally, online texts are rather scanned than read from beginning to end. Thus, it is necessary to omit needless words, highlight the important messages, and structure the whole text – e.g. by

using paragraphs and bullet points – so that it fits the needs of online reading.

3. *Simple and clear navigational wording*
   The terms used for navigational purposes are of utmost importance. As they guide the user through the website, anyone has to be able to understand them intuitively. From the user's point of view, obscure terms are a major reason for frustration. If one or two clicks on a navigation button do not lead to the intended result, most users will not give it a third try. Creative ambitions at this point do not pay off for E-Content providers. Wording should be kept as simple and clear as possible. But as even this is a difficult task, some time and usability testing should be spend here.

So while any website should apply these usability standards and design components, the challenge lies obviously in adding an emotional component. Successful websites rely on valuable E-Content and an user-friendly structure, but they also have to be brought to life (Zimmermann 2004, p 13). This is where the innovative part of web design starts.

A major yet unsolved challenge is the implementation of *usability and creativity within new formats and modes of online communication*, especially social software applications like wikis and weblogs (Gillmor 2004; Zerfass 2005). New ways to track user behaviour and optimise communication processes within those applications have to be researched in the near future.

3.2 Mobile Usability

Usability Testing has for a long time been only concerned with the interface of applications for desktop computers, e.g. websites displayed in common Internet browsers. However, with the emergence of a wide number of portable digital devices – from the mobile phone to PDAs and digital cameras – new kinds of usability problems show up. There are no guidelines for mobile usability to the extent that they exist for web usability, just indicators for what works and what does not. Also, usability testing faces a set of new problems.

Mobile devices differ greatly in their *technological setup* from desktop computers. They normally have no keyboard, no mouse, and no large display (Weiss 2002, pp 1-20). Websites, on the other hand, are usually optimised for big screens; thus, navigation becomes more difficult on a mobile device.

Another major difference lies in the *limited energy resources* of mobile devices. Illuminating even a PDA screen for a longer time consumes a lot of battery power. Therefore, E-content applications for mobile devices have to find a middle ground between what usability demands and what technology allows.

From the user's point of view, the focus of attention shifts slightly. For mobile services, the *immediate access to information* is even more important than for websites. In fact, one could claim that a crucial success factor in designing applications for mobile devices is to allow the user to be able to access E-Content quickly and easily. Thus, mobile usability is to a major extent defined by the simplicity of usage, or, in the words of Nielsen, mobile applications "must provide what's required, but no more" (Nielsen 2003).

Regarding the *interface design* of mobile applications there are currently two differing philosophies at battle: the one claims that the current interface design of Personal Computers (PCs) cannot be directly applied to mobile devices as they have their own specific functions and requirements. The other school of thought states that an extended application of PC metaphors to mobile products can have advantages because the users' PC experience can reduce the learning efforts and thus contribute to an intuitive understanding of mobile products. Those two philosophies are represented in the rivalling handheld operating systems Windows CE and Palm OS. Windows follows the philosophy of creating an interface that is very similar to desktop computers, whereas Palm rather tries to separate from the look-and-feel of the desktop computer (Weiss 2002, p 14). While no final answer can be given yet as to which philosophy is more efficient, usability tests indicate that familiarity with the metaphors used does indeed improve the usability of a mobile application (Jeong and Lee 2003).

However, the biggest challenge in improving mobile usability lies in finding a suitable solution for dealing with the *situational context* of mobile usage. While context was obviously only a minor factor influencing the usability of stationary desktop applications, it does matter heavily in the use of mobile technologies.

This problem is especially relevant for *usability testing.* Usability tests designed for evaluating web usability are normally based on an office-like situation or a usability lab where the changing context of mobile applications is left out (Lindroth et al. 2001). Therefore, usability tests need to be developed where the environmental context is included, e.g. where more light would be needed or where there is too much noise in the environment. Lindroth et al. (2001) suggest that there is no real need to develop a whole new method for testing mobile devices, but that rather a combination of different existing methods would do. They propose introducing a

contextual component and a touch of ethnography into mobile usability testing, e.g. with role-playing games.

Some general recommendations for mobile usability based on actual tests are as follows (Duda et al. 2002):

1. *Focus on mobile action*
   Mobile services must allow quick problem solving in a given context, e.g. providing the user with the time and track for the departure of a train when just arriving at the station. So, usability should be optimised according to the context.
2. *Reduce to the max*
   Mobile services should provide just the most important functionality and options; it is quality more than quantity that counts.
3. *KISS – "Keep it simple and stupid!"*
   Every possibility to reduce complexity has to be used.
4. *Personalisation*
   Bookmarks and personalised services can help the user to achieve his or her goals faster and more comfortable.
5. *Localisation*
   The functionality of any localised service already includes the context of usage. However, the user should be able to decide for him- or herself if this is wanted.
6. *Naming to the point*
   Due to the limited size of mobile displays, even more emphasis should be put on the wording of E-Content.
7. *Transparent navigation*
   Navigation wording is of utmost importance because mobile applications still have reduced functionality. Choosing the wrong button an a mobile device is time-consuming and – if there is a UMTS or GPRS internet connection – also costly.
8. *Scrolling instead of clicking*
   When using E-Content on mobile phones, scrolling down a list seems to be more favourable compared to clicking through several serial lists.
9. *Minimise textual input*
   Entering text into mobile devices is very tiresome and should be avoided as much as possible. Radio buttons and other means of letting the user choose with a simple click or by moving the device's scroll wheel are good alternatives.

10. Consistency

Within a mobile application, the same words should mean always the same, e.g. the term "home" should always lead to the initial page. This is difficult to achieve because there is no standard operation system for mobile phones or digital cameras nowadays, and both network operators and hardware manufacturers alter their frameworks continuously.

3.3 Playability

One of the most successful areas of E-Content business is the market for online computer games. A study by PriceWaterhouseCoopers on the US video games market notes that "online and wireless games will be the fastest-growing segments of the market, increasing from a combined US$ 562 million in 2003 to US$ 6.2 billion in 2008" (PwC 2004). Although the market size is lower in Europe, the growth numbers are comparable. In such a fast growing market, also competition is high. Therefore, including usability into the design of the interface of online games may lead to a competitive advantage. In fact, there is even a special term signifying the concept of usability for computer games: *Playability*. This term was already used in the 1980s with regards to computer games, but nowadays one can notice some effort in bringing the insights gained about usability and playability into a unified framework (Ye and Ye 2004).

However, there are also some *barriers* that hinder the application of usability theory to game design. Most of all, there is a culture of disliking anything that comes from academia in the game industry. There is the notion that game designers already know best what is good for a game and what is not, and that people from academia who do not design games themselves cannot possibly offer any helpful insights (Ye and Ye 2004). Nonetheless, those barriers are slowly breaking down as the insight grows that usability and playability are actually two different terms for the same thing. In fact, usability research has a lot to offer to game design, as the concept of playability has the problem of having never really been clear-defined. Thus, useful tools to evaluate and improve playability are missing. Usability research can offer those tools, they just need to be adapted.

Järvinen et al. (2002) make a case for the similarities of playability and usability, and describe playability as "a collection of criteria with which to evaluate a product's gameplay or interaction" (Järvinen et al. 2002, p 17). According to the authors, one can distinguish at least four different components of playability (Järvinen et al. 2002, p 28):

1. *Functional Playability*
   This involves the controls of the game, i.e. the interface that the player is confronted with. Games with a high playability will have simple controls that are easy to master.
2. *Structural Playability*
   This involves the number of options that are offered to the player. In some games it is necessary to give the player a wide range of options in order for him or her to interact meaningfully with the game. This inevitably leads to more complicated and less intuitive controls.
3. *Audiovisual Playability*
   This involves the perspective from which the game world is perceived, e.g. from a first-person point of view or from above.
4. *Social Playability*
   This involves how the game controls allow for usage in different contexts and on different devices.

This list of playability dimensions, however, illustrates that there cannot be simple usability guidelines that hold true for every possible game. Different games ask for different approaches to playability. But especially the first dimension, functional playability, has a lot in common with the interface of a website or a mobile device. In the process of game design, this dimension is being taken care of by the task called *User Interface (UI) Design* (Ye and Ye 2004). UI Design determines how the player controls the game and what he or she actually sees. This significantly influences the player's impression of the game. However, UI Design is much neglected in game design, and even bestselling games will have serious flaws in this respect. This is strongly connected to the fact that only little usability testing is conducted before shipping the game. Thus, applying the tools of usability will probably have a strong effect here.

Up to now, there is still very little evidence which *methods of usability testing* can be applied to game design. Ye and Ye (2004) make some suggestions how methods like heuristics can be applied to usability testing of games. The problem in general, however, is that it is hard to develop prototypes for games.

Nonetheless, the online games industry as a very promising part of the E-Content business will have to put more emphasis on usability. Games will need to be designed from the player's point of view. So far, only very few producers follow this guideline. Rather, games are either created from the engineer's or the designer's point of view and the players just have to accept what they are offered. This position is likely to vanish very soon as it is evident from the developments in web and mobile usability. It also

holds true for game design what can be said about usability in general: once the markets have matured, usability really makes a difference.

4 Towards a New Balance of Commerce and Creativity

Just like any other new market the E-Content business went through an initial phase of experiments, where different formats were tried out and a lot of time was spent on discussing the possibilities that are yet to be discovered. Thus, the interfaces of new digital media applications were seen as a potential form of art in the early phase. In one very prominent book out of this line of thought – "Interface Culture" (1997) – the author Steven R. Johnson notes, "The interface came into the world under the cloak of efficiency, and it is now emerging – chrysalis-style – as a genuine art form" (Johnson 1997, p 242). However, these visions from the beginning of the Internet hype eventually also came down to reality. Users' real demands showed that they are not looking for a piece of art when using any kind of E-Content application, they are rather looking for a service that is easy to use. So if art and engineering can be identified as two different approaches in designing an interface, one can conclude that usability demands for the engineering approach, not the artistic ambition. The engineering approach is also in the best interest of the commercial intentions of E-Content applications. Any interface should be defined in terms of user needs, whereas the intentions of designers often directly conflict with these needs. Most artistic interface experiments have rather failed by now, and it is down to simpler models.

However, although the business rationale asks for the engineering approach that does not mean that creativity is totally banned from E-Content applications. In fact, a lot of creativity is needed to give any website, mobile application, or online game an emotional quality. So while engineering has to secure a stable and strong grounding, there is enough room for creativity in E-Content applications. We have only seen the tip of the iceberg so far.

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Experience Machines: Capturing and Retrieving Personal Content

Peter Werkhoven

TNO, Delft, The Netherlands

1 Introduction

Fundamental to human existence is the ability to capture, memorise and retrieve personal experiences and to share them with others. Can systems help us to capture and retrieve experiences? After motors have supplemented our muscles and sensors have supplemented our senses, emerging computer systems are on the verge of becoming intimate supplements to our memory. New generations of sensor technology, interaction methods and semantic computers enable the capturing and interpretation of a person's daily activities and the pro-active assistance of these activities. Semantic computers are the engines of rich digital autobiographic archives that are intuitively accessible for retrieval of personal content. New interaction methods turn computers into experience machines that allow a new and deeper sensory awareness of environmental, bodily and cognitive processes. We will see entirely new ways of experiencing information through combinations of sensory modalities (multimedia) and translations between sensory modalities (synaesthetic media).

This chapter describes the value and exponential growth of personal content, the urgent need of consumer applications to manage and utilise this content and challenging dilemmas related to capturing and sharing personal content.

2 Early Visionaries

The visionary road towards experience machines was laid out by Vannevar Bush in 1945. Bush was head of the US Office of Scientific Research and Development and coordinated the activities of some six thousand leading American scientists in the application of science to warfare (Nyce and

Kahn 1991). He wrote down his vision in an essay "As we may think" for the Atlantic Monthly in 1945. Bush foresaw the development of the Memex. The Memex was to serve as an aid to memory. Like the brain, the Memex would file material by association and could be consulted with exceeding speed and flexibility. With a keystroke it would run through a "trail of thoughts". Obviously his ideas of "associative indexing of information" are closely related to the concept of "hyperlinks" on the Internet as we know it today. Furthermore, Bush foresaw Cyclop cameras that are worn on the forehead and can photograph anything you see and want to record. To record all this he foresaw the microfilm that could reduce the Encyclopaedia Britannica to the volume of a matchbox. He based his visions on electro-mechanical devices, which is not surprising because the world's first electronic calculator (the ENIAC) was yet to be built and the transistor had yet to be invented.

According to Bush the Memex would lead to a total experience of observations, opinions and decisions of ourselves, friends and authorities. The Memex would be an intimate supplement to our memory. It was not until 1966 when Douglas Engelbart realised the first step of Bush's vision of man-machine interaction by demonstrating a desk-top personal computer with innovative interaction tools (basically the current PC, including videoconferencing) and entirely new ways of organising information (basically hypertext).

3 Why Would We Want a Memex?

Our natural human memory enables us to store, retrieve and associate information in a miraculous way. Memory access is direct, without the interference of interfaces that characterise digital memories such as keyboards, spoken commands or gestures.

However, the very brain mechanisms that make us so good at creativity and aesthetics are also responsible for our poor capability for the memory of details. In the course of time information becomes "inaccessible". Firstly, this may be due to the blending of pieces of old and new information into more general and abstract schemes. Secondly, our association methods may change when we grow older. Memory is at the service of expectations. In fact, people record experiences for the person they will be in the future. Thirdly, fatigue, stress and emotions can hinder the access to our memory.

This is where an intimate supplement to our memory would step in to support us in accurately retrieving information. It could illustrate topics

discussed with others, structure and order information for us in time, or recognise patterns and people. By this, personal digital archives would naturally become interwoven with our daily activities and communication.

4 The Growth of Digital Personal Content

Nowadays, we see that sensors and computing devices are miniaturised, that text, sound and images are represented digitally, and that people are connected through wired as well as wireless networks. We are gradually embedded in Body Area Networks consisting of sensor, actuator and communication devices that form extensions of our natural sensing and motor systems.

We have started using personal digital assistants (PDAs) to manage address books, calendars and "things to do" while we are on the move. Nowadays, PDAs are organisers and storage devices for sound, music, images and personal notes. They connect us to the information world on the Internet and form communication channels to colleagues and friends.

To bridge the traditional and the digital world, consumers have started to digitise experiences captured on traditional media such as paper, plastic and magnetic media. Until now, our autobiographic archives consist of drawings, photos, videos, notes, tapes, financial and medical files, stored in various corners of our houses and offices. These archives are often incomplete, inaccessible, without labels and fragmented. Some of them even gradually decay. In the digital era all these media are digitised and stored in electronic networks, which are accessible through hand-held devices. Digitisation may save our memories. New experiences are directly captured with digital photo and video cameras, with mobile phones, body sensors for heart rate and blood pressure, etc.

Collections of personal content on PCs grow exponentially because people share their collections. When we experience an event, we rely on the aggregations of other experiences and experiences of others to shape the experience.

The digital archive of even one person in 2020 is likely to consist of Petabytes of linked images, documents and audio; the potential for extracting useful knowledge from this archive is stupendous, and only limited by our imagination.

5 Management of Personal Content?

Interestingly, tools for managing personal content have not come much further than media players, image browsers and calendars. Even digital information about an activity or a person exists in many different information worlds such as email folders, document folders, address books, calendars, audio-visual databases, websites, and phone conversations. All too often, these worlds have unrelated structures and varying or non-existing indexing rules. Moreover, the storage systems have no semantic understanding of their content and interconnections. It is therefore impossible to integrate these information worlds into a sufficiently complete "story" or "experience".

There is a great need for tools to analyse and filter personal content at a semantic level and tools for organising personal content conform to the mental representations of their users. Last but not least, we are desperate for tools that help us integrate, organise, retrieve and experience previously captured content. Nowadays, Virtual Reality is commonly used to experience computer generated synthetic worlds for the purpose of design, training, and entertainment. However, tools for experiencing our own personal content or "real reality" are still in their infancy and often limited to only a few scientific areas. The average consumer is left with an intimate but inaccessible digital supplement to his autobiographic memory.

Companies such as Microsoft do recognise this problem. The software in the *MyLifeBits* project is designed to support people with the annotation, clustering and rating of personal content and with quickly retrieving the right information at the right time. Although these efforts are presented under names like "surrogate brain" the focus is more on storage and retrieval than on cognition and experience.

Remarkable progress with respect to experiencing "real reality" has been made by Steve Mann (University of Toronto) who, for the last thirty years, has worn a headset (wearable wireless webcam) as if it were a part of his own body. This vision system not only records daily experiences, but also provides intelligent feedback based on these recordings. It acts as a personal visual assistant and allows him to record, interpret and "augment" his everyday experiences.

6 Towards Experience Machines

Combining these two developments, that of growing personal content and that of new means to organise content, we may expect to witness the evo-

lution of wearable digital autobiographic archives. Nowadays personal digital assistants help us with planning, address information, communication and making notes. Soon they will be able to capture our environment audio-visually and store our perceptual experiences. They turn into personal content managers. Personal content managers will be able to capture, filter, store, analyze and retrieve continuous streams of audio and video. They will be able to understand sensory information at a semantic level and proactively support us in our navigation and conversation by presenting personal content at the right time and the right place. They will help us recognise people and places. In the end personal content managers will turn into experience machines and will provide experience on demand.

Experience machines will let us share multimedia experiences across networks, pass experiences on to others and to next generations. This development is in line with Waterworth's observation that most computer artifacts that are currently in interactive use function not as 'cognitive' tools (tools that help the user process information better) but as sensual enhancers, as essentially perceptual artifacts (Waterworth 1997).

Virtual reality techniques make it possible to experience synthetic worlds based on computer models of geometric objects and visualisations of abstract data. This gives us the opportunity to experience working on the bridge of a ship before it is built. If computers were able to analyze and model the structure of the real world fast enough we would be able to remotely experience real world scenes in real time. This would allow telepresence. For example, this would upgrade watching the world cup finals on television to experiencing running around between the players – real time – without really being there. The next step is not to model the actual real world, but to model the past based on a person's digital memory of autobiographic multimedia data. We will then be able to re-experience the first time we kissed a girlfriend, including multimodal feedback about what we saw, heard and said, and various forms of bodily and contextual information.

Furthermore, we can share and integrate archived personal experiences from many persons into a "collective experience" yielding fascinating applications in the field of crisis management and rescue teams.

Confidence in the further realisation of Bush's vision is reinforced by recent advances in areas such as search technology, computer vision and graphics, and natural language processing. Real world modelling techniques are being developed in the robot vision world. Recent successes in machine analysis and machine learning have indicated that many of the problems that were previously considered hard enough to require cognition are in fact solvable in a purely data-driven manner.

7 Recent Developments

Experience machines are fed by the personal content of their users. Users or consumers become producers and distributors of their personal content and experiences. The amount of personal content stored on hard disks is already huge and will grow exponentially because also information flows such as telephone calls and email are expected to be systematically archived in the near future. The market for adequate tools to adequately manage, share and experience this content is huge.

7.1 How Much Content Is There World-Wide?

The School of Information Management and Systems at the University of California at Berkeley (Lyman and Varian 2003) analysed information storage and information flows world wide for the year 2002. They estimated the annual size of new information recorded in storage media, and heard or seen each year in information flows. The following conclusions were drawn:

Recorded information (print, film, magnetic, and optical storage media)

- Print, film, magnetic, and optical storage media produced about 5 Exabytes of new information in 2002 (1 Exabyte = 1,073,741,824 Gigabytes). 5 Exabyte are equivalent to 37,000 times the content of the Library of Congress collection. It should be noted that the lower bound of this estimation is 3.4 Exabytes (after correction for compression and duplication of content).
- The category “magnetic” (representing 92% of the total) includes videotapes, audiotapes, digital tapes, miniDVs, floppy disks, zip, audio MDs, flash, and hard disks. After correction for compression and duplication, videotapes make up for 39% of this category, MiniDV for 37%, and hard disks for 12%.
- The category “film” (representing 7% of the total) includes photographs, cinema, films made for TV, TV series, direct to video, X-rays. Photographs make up for more than 50% of this category.
- The category “paper” represents only 0.01% of the total.
- Newly stored information grew about 30% a year between 1999 and 2002.

Non-recorded information (information flows such as telephone, radio, TV, and the Internet)

- Information flows contained almost 18 Exabytes of new information in 2002.
- Telephone calls make up 97% of the total information flow, including both voice and data on both fixed lines and wireless. Most of the calls are person-to-person. Only 13% of the calls are wireless.
- The second largest component of the information flow is the Internet (3% of the total information flow). Email is good for 83% of this component. Email generates 400,000 Terabytes of new information each year with 31 billion emails sent daily. One third of email traffic is personal.
- The World Wide Web contains about 170 Terabytes of information with 2.1 billion static web pages.
- These information flows are expected to be systematically archived in the near future.

7.2 How Much Personal Content Is Produced per Person per Year?

Based on a world population of 6.3×10^9 people, almost 800 Megabytes of recorded information are produced per person per year. Videotapes and miniDVs are dominant magnetic media, mostly containing personal content. The storage on hard disks is expected to grow due the use of digital cameras. In 2002, about 28 million digital still cameras were purchased worldwide, compared to 63 million analogue cameras. Consequently, the total number of digital images created annually in the US is expected to rise from about 14 billion in 2000 to 47 billion in 2004. Interestingly, owners of digital cameras take three times as many pictures (700 a year, see PMA meeting 2000) as owners of traditional cameras.

The most dominant information flow is telephony, which accounts for three times as much digital information per person per year than recorded information. With the advance of Voice over IP (VoIP) and the integration of VoIP with PC applications, we may expect most of the digital information flow to be stored, adding to a total growth of 2,900 Megabytes of content per person per year.

7.3 The Evolution of "Personal Content Management" Products

Already now digital personal content surpasses professional content by far, and this trend is expected to be ever-increasing. It started with multimedia documents, digital communication (Internet), the digital acquisition of photos, video and music and the use of PDAs for basic office applications. In the next decade, we will see a more systematic and automated acquisition and storage of sensory data and information flows, feeding into what may be called our "prosthetic memories". During this evolutionary process we will see a need for products like:

- *Personal archive manager*: This manager relates the structures and metadata of digital information from various sources into a coherently accessible personal archive. It integrates sources at a semantic level, e.g. email folders, document folders, address books, calendars, audio-visual databases, websites, and telephone conversations.

- *Briefing assistant*: Automated updates or briefings before going into a meeting or conversation. The mental workload of a person is usually determined by three factors: the level of knowledge based working, the time left to finish a task, and the frequency of task switching. The last factor causes the person to switch between mental models and task context, which can be considered an "expensive" operation. The briefing assistant could reduce the work load by making us quickly familiar again with the status, context, and action points of a task as captured at the moment of switching to another task. First prototypes of wearable briefing assistants were produced at the MIT and named Remembrance Agent (Rhodes 1997). They display one-line summaries of note-files, old email, papers, and other text information that might be relevant to the user's current context. These summaries are listed in the bottom lines of a wearable head-display, so the wearer can grasp the information with a quick glance. Briefing assistants can also improve conversational skills for patients with Alzheimer's disease as showed clinically by Bourgeois (Bourgeois 1990).

- *Intelligent illustrator*: Nowadays, people have only limited freedom of illustrating their actual arguments due to fixed Powerpoint presentations or photo-albums. In the near future, we will see forerunners of experience machines in the form of content management systems that support us during conversations or presentations by providing the right illustra-

tion at the right time based on dialog based topic detection and agenda based context extraction.

- *Prosthetic memory*: A real time visual recogniser based on a camera built in your sun glasses. It recognises people, traffic signs and buildings based on personal experiences and external databases. First prototypes of visual prosthetic memories have been constructed and used by Steve Mann[1], including wearable face recognition and "déjà vu" functions.

- *Collective experiential system*: A synthesised global perspective of multiple ongoing and archived personal experiences. First prototypes have been developed and tested for rescue workers and crisis managers in the Informedia project "Experience on demand" at Carnegie Mellon University (Wactlar 2000).

- *Knowledge extractor*: Extracting useful patterns and knowledge from unlimited personal archives with application areas such as medical informatics and criminal investigation.

8 Challenges Ahead

The evolution of experience machines is driven by tremendous scientific and engineering challenges in the area of non-intrusive multimedia event capturing, real-time storage, semantic analysis, and intuitive interaction techniques with wearable devices. Further, we have to tackle numerous questions related to the protection and sharing of digital experiences.

- *Experience capturing: Multiple sensor and multiple perspective acquisition techniques for capturing the environment, actions, and context of an event.*

  Capturing techniques include traditional sensors for 3D sound and 3D sight that are well developed and even surpass human capabilities, and sensors for touch, taste and smell that will be developed relatively soon. This also encompasses the registration of bodily information such as body movement (including gestures), heart rate, blood pressure, or transpiration as indices of emotional behaviour. Capturing techniques also include the registration of environmental parameters such as position and height (GPS), temperature, humidity, wind force, and sun power.

[1] See http://eyetap.org

Wearable sensors are part of the personal area network and can be embedded in hand-held devices (PDAs, phones), in head-mounted devices (eye glasses, ear pieces), or in clothes (smart clothes). For first prototypes of visual capturing devices see Mann and Niedzviecki (2002) and Sawahata and Aizawa (2003).

Moreover, event capturing can make use of fixed sensors in the environment that give you a different perspective and / or public information sources such as radio, TV and internet. Finally, it should integrate the information of wearable sensors of other persons that are actors in the scene captured.

- *Real time storage and semantic analysis of experiences: Sensor information must be analysed at a semantic level, filtered, combined and stored in a multimedia system.*

  Database systems: Storage should be for a lifetime and longer, adaptable to new hardware and software, allowing new types of questions to be asked such as age, context and society changes.

  Storage: How can we store high volume multimedia data streams in combination with local, remote, and distributed storage devices? To what extent do users trust the usage of remote storage devices for their valuable personal memories?

  Operating systems: A person's memory will contain Petabytes of data and last for decades. How should these data be stored in a way that maximises accessibility and reliability?

  Artificial intelligence: How can we interpret audio and visual data at a useful semantic level, with a minimal amount of annotation and guidance from the person? This includes the automatic recognition of relevant persons, objects, signs etc. How do we transcode semantics across different types of information channels? How do we classify, relate and summarise events and activities, learn useful generalisations from the interpreted data and generate ontologies? What are the relevant data dimensions for future retrieval? What metadata and models are needed for personalised story telling (Davenport 2004)?

- *Intuitive interaction techniques for remembering: A proactive natural interaction environment that lets users experience specific content at the right time.*

  User models: How can we use personal archives to create personal profiles that represent people's knowledge, experiences, intents, abilities in a coherent and useful way? How can we adapt interfaces, web pages and documentation so that they are well matched to a person's profile and cognitive maps (Newby 2001)?

  Experiential systems: How can we use different types of sources of information and knowledge about a person's experience to build a coherent and consistent multimodal Virtual Reality model of that experience? What are useful generative models of an experience? We need formal models for interactivity and immersion in such experiential systems (multimedia grammars, feedback). We need formal mechanisms of evaluation of experiential systems (models, user study methodologies).

  Display technology: We need innovative wearable display techniques for non-intrusive mobile experience feedback (miniature head-mounted audiovisual displays, foldable displays, retinal projections, etc). For first products in this field see DeVaul et al.(2003) How can we use environmental displays for feedback on personal experiences (ambient intelligence)?

  Augmented experiences: How can we map senses that people lack naturally (e.g. ultrasound, infrared) to our natural senses with the purpose of augmenting experiences? How can we map sensory information of one modality to another (e.g. sound to vision or vice versa) for the purpose of adaptation of presentation modes to communication context or sensory disabilities.[2]

  Proactive recall: How can we use a user's speech (subject), location, time, company and context to support him proactively in his activities based on previous experiences? Human memory does not naturally operate in a vacuum of query-response pairs. On the contrary, the context of a captured event – such as the physical location, who was there, what happened simultaneously, before and after – provides valuable cues for

[2] For developments in this field see http://www.visualprosthesis.com/sensub.htm; http://www.informatik.umu.se/~jwworth/sensedoc.html

recall and association with past experiences (Rhodes 1997; Tulving 1983).

- *Privacy and security: Protection and sharing of experiences.*

  Privacy: Personal digital archives generally contain information about other people (correspondence, pictures). How can we protect people's privacy? Should other people have control over information in other people's memories and how can this be realised? To what extent do we want to share digital experiences with friends or inherit the memories from our parents?

  Security: How can we prove both to the scientific community and to the general public that memories are secure from attackers (Fitzgibbon and Reiter 2003)?

  "Eternal" memory: What is the psychological and social impact of "eternal" personal memories that people inherit from their parents and pass on to their children?

9 First Steps Towards Experience Machines

a) Informedia Programme (Carnegie Mellon)

The Informedia programme at Carnegie Mellon started in 1994 under the supervision of Howard Wactler and is sponsored by the National Science Foundation (NSF) and the Defense Advanced Research Projects Agency (DARPA). The research projects focused on integrated speech, image and language understanding for creating digital video libraries (Informedia I project). In 1999, it was followed by the Informedia II project which concentrated on video information summarisation and visualisation.

The subject discussed here came into focus in 1997 when a project was started with the name "Experience on Demand" which developed tools, techniques, and systems allowing people to capture a record of their experiences unobtrusively, and share them in collaborative settings spanning both time and space. Personal EoD units recorded audio, video, position (GPS) and other sensory data, which could be annotated by human participants. The EoD system synthesised data from many EoD units into a "collective experience" – a global perspective of ongoing and archived personal experiences. The technology could be applied for remote crisis management teams.

Building upon the technology developed under Informedia the project CCRHE was started in 2001. CCRHE (Capturing, Coordinating & Remembering Human Experience) developed systems enabling people to query and communicate synthesised records of human experience derived from individual perspectives. These records were transformed into meaningful resources available retrospectively. The technology is applied in ongoing projects such as *CareMedia* in the domain of geriatric care and clinical studies. Through activity and environmental monitoring in a skilled nursing facility audiovisual records are captured and analyzed, thus empowering specialists with greater insights into patient behaviour.

b) MyLifeBits Project (Microsoft)

MyLifeBits is a project of the Media Presence Group of Microsoft's Bay Area Research Center (BARC) in San Francisco. The project is both an experiment in lifetime storage and a software research effort aimed at building multimedia databases that chronicle people's life events and make them searchable.

MyLifeBits uses Microsoft's enterprise data management platform SQL Server 2000 with Index Server supplying a full-text search (SQL = Structured Query Language). The database scheme is very simple: there is one table for resources, one table for annotation links, and one table for collection links. MyLifeBits makes stories easy with Interactive Story by Query (ISBQ). ISBQ enables users to make queries, then drag and drop selections from the query into a story. There are two story types: a slide show and a time sheet. The slide show allows images to be dragged and dropped into a sequence with captions added, an audio clip to be spoken for each image, and audio clips for background music. The time sheet is a composition of multiple time lines. Resources are dragged and dropped into each timeline. It is stored using XML.

The lifetime storage experiment is carried out by Gordon Bell who "has captured a lifetime's worth of articles, books, cards, CDs, letters, memos, papers, photos, pictures, presentations, home movies, videotaped lectures, and voice recordings, and stored them digitally. He is now paperless, and is beginning to capture phone calls, television, and radio"(Microsoft Research 2002). The *MyLifeBits* software has been designed to support him with the annotation, clustering, and rating of this information, and with quickly retrieving the right information at the right time. Articles appear with the titles "Logged on for life", "My life in a Terabyte", "Saving your bits for posterity", "back-up brain", "virtual brain", and "surrogate brain". The focus of these activities, however, is more on storage and retrieval than on experience.

c) WearComp Project (University of Toronto)

Steve Mann is a professor of engineering at the University of Toronto and calls himself the first Cyborg (Mann and Niedzviecki 2002). His focus is on wearable computing, capturing, and experiencing. For the last thirty years he has worn a headset (wearable wireless webcam) as if it were a part of his own body. His glasses actually act as a very compact electronic studio since they contain several lasers, diminutive video-cameras, and half-a dozen tiny computers strapped to his body. This vision system not only records daily experiences, but also provides analyses and intelligent feedback based on these recordings. It acts as a personal visual assistant and allows him to record, interpret and "augment" his everyday experiences.

Examples are freeze-frames (enhanced learning), annotated computer induced flash backs (déjà vu's), an agent for remembering places and people, and way finding (based on stacks of key frames in video recordings). Furthermore, the system learns from information access patterns.

d) LifeLog Programme (Defense Advanced Research Projects Agency)

In February 2004, the Pentagon cancelled its so-called LifeLog project, an ambitious effort to build a database tracking a person's entire existence. Run by Defense Advanced Research Projects Agency (DARPA), the Defense Department's research arm, LifeLog aimed to gather in a single place just about everything an individual says, sees or does: the phone calls made, the TV shows watched, the magazines read, the plane tickets bought, the E-Mail sent and received. Out of this seemingly endless ocean of information, computer scientists would plot distinctive routes in the data, mapping relationships, memories, events, and experiences. LifeLog is not a programme to track terrorists, but analysts believe its research may continue on the classified side of the Pentagon.

e) Shadow (University of California at Berkeley)

Shadow is an experience capture system proposed by Landay and colleagues at the computer science department of the University of California at Berkeley (Landay et al. 2001). Shadow is an experience capture system that will enhance our capabilities to recall, find, explore, create, manage, and share information. The basic concept underlying Shadow is to have a long-lived, roaming, personalised process follow a user wherever s/he goes and "know" everything s/he does. The motivation for this is based on a simple premise: events, experiences, and information from our past are

useful in the present. Through multimedia capture, inference, and filtering, the Shadow will help augment personal and group experience, memory, and knowledge.

f) Lifestreams (Yale University)

In their Lifestreams project (1996–2000) Freeman and Gelernter developed a file management system based on time-ordered streams of documents (life-streams) that you created or that other people sent you. The stream starts with your electronic birth certificate and contains person centred pictures, correspondence, bills, movies, email, and voice mail. Moving beyond the present and into the future, the stream contains documents you will need: reminders, calendar items, to-do lists, and so on. Lifstreams provides contextual cues for managing information and allows to label future events, such as meeting times that trigger alarms shortly before they occur (Freeman and Gelernter 1996).

g) ACM Workshop CARPE 2004

Finally, the research community organised the first ACM Workshop on Continuous Archival and Retrieval of Personal Experiences (CARPE 2004, October 15th in New York). This workshop brought together researchers from around the world to share their findings and insights into this burgeoning field.

10 Business Models

Certainly there is commercial interest in better ways of organising, integrating, searching, and interactively presenting personal content. Many commercial enterprises are built around search technology and have an interest in extending the types of data which can be searched. However, most commercial R&D is focused on short-term incremental improvements. Long term research is necessary to develop robust and trusted management tools for safeguarding your digital memories. Privacy and trust will become extremely important issues when personal content is concerned, let alone secure accessibility at any place and any time. The successful development of universally trusted protocols may require that no central authority controls privacy, and may thus depend on open standards and open research.

Basically, the sharing of multimedia personal content is a consumer-to-consumer economy. Experiences can be shared for free (P2P) or can be

commercialised for entertainment or educational purposes, resonating with the concept of the "experience society" described by Pine and Gilmore (1999) and the "dream society" analyzed by Jensen (1999). In fact, the TV "reality soaps" in which we share the experiences of well known personalities are first examples of personal content sharing. Broadcasting your activities or even your aquarium on the web are first examples of P2P "content sharing". Service providers facilitate this process by providing storage and transport networks, retrieval tools, and perhaps by acting as experience brokers.

Business models for Internet commerce can be defined and categorised in the following basic categories:

- *Brokerage model*: bringing buyers and sellers together. A broker charges a fee for each transaction facilitated and usually operates in the B2C, B2B, and C2C markets. Example: eBay.

- *Advertising model*: an extension of the traditional media broadcast model in which content and services are provided mixed with advertising messages which may be the sole sources of revenue. This model works when viewer traffic is voluminous or highly specialised. Example: Google.

- *Infomediary model*: collecting, analyzing, and selling data about either consumer behaviour (for marketing campaigns) or about producers and products (for buyer assistance). Example: Nielsen.

- *Merchant model*: wholesalers and retailers sell manufacturer goods and services based on list prices or through auctions. Example: Amazon.

- *Manufacturer model*: companies sell their products directly and compress the distribution channel. Success is based on efficiency, improved customer service, and a better understanding of customer preferences. Example: Dell Computer.

- *Affiliate model*: affiliates provide user click-through to merchants. Merchants pay per click or offer a percent-of-sale. Example: Barnes & Noble.

- *Community model*: voluntary contributions and open sharing of content, software, and knowledge by community members. Revenue is generated from related services like systems integration, product support, tutorials, and user documentation. Example: Red Hat.

- *Subscription model*: users are charged a periodic fee to subscribe to a service, independent of actual usage rates. Example: America Online.

- *Utility model*: this "on demand" model is based on actual usage rates like in traditional metered services such as electricity and water. Example: Telephony companies.

The business models for commercialising tools and services for managing personal archives, for mobile access, and for experience and sharing of personal content fall into different categories. In particular: the Manufacturer model (direct sales of management tools and services), the Utility model (mobile access and experience), and the Community model (sharing experiences). The analysis of personal archives and knowledge extraction for medical or financial purposes may fall into a variant of the Infomediary model in which the results are sold to the user him- or herself. A sort of Infomediary model for content management is seen in the UK where companies commercially exploit services such as content management and access of medical records.

11 Outlook

11.1 Memory Overload

With digital memory "the past is always here and always perfect; everything can be represented, no moment be lost. Moreover, all of it is as good as new, and every copy identical to the original. What's missing is a cadence, a play of values, or a respect for the way loss informs our experience of time. Like the map that's as big as the world itself, it's useless precisely because it's too good" (Lewis 2003).

Obviously, people worry about the dilemma that if you record 24 hours a day, seven days a week, you will never have time to "watch". And indeed, you cannot watch everything. Recordings should be presented at the right time in a form that is optimally attuned to the task and context of the "owner" of the digital memory. The fact that everything is recorded does not mean that everything has to be watched or remembered. It is recorded all because the owner does not know a priori which selection will be of value in the future.

Norman (1992) says that normal brain functioning requires the right balance between two modes of functioning. The first mode is driven by our sensory data and externally controlled by signals from outside, including the signals from external forms of memory. In the second mode, called

conceptually driven processing, the mind drives itself and develops and invents new concepts and thoughts. Excesses of the sensory driven mode may cause solitary thinking to disappear, along, perhaps, with creativity and invention. More generally, perception and introspection (remembrance) should be in balance.

11.2 Organisational Content and Personal Content

Not surprisingly, individuals usually organise their stored information in a way that differs strongly from organisations. The effectiveness of dealing with personal content is optimal when its organisation is ego centred. That is, when its structure and presentation optimally serve the owner's skill, task, and context. From a person's perspective, personal content serves a lifetime, and its value is in feelings, lifelong learning, social activities, privacy, and entertaining. Professional organisations, however, are more and more project centred and aim for knowledge based value creation. High priority issues are validation, consolidation, knowledge sharing within the organisation, intellectual property rights, security, and protection.

Ego centred and project centred organisation of content conflict in many ways. In a project centred organisation, documents and correspondence are usually organised in projects with inflexible formats, quality standards, and limited lifetime. Bilateral communication is often facilitated by non-recorded information channels. Consolidated knowledge is "published" within the organisation, and its accessibility by colleagues depends on their role in the organisation and the classification of documents. For security reasons, content is usually "imprisoned" in enterprise information systems and strictly separated from personal content.

Personal content is much more oriented towards keeping memories alive and sharing them with friends. Experiences are best preserved as audiovisual representations, not documents. And, in contrast to project centred information, personal information is extremely fragmented and stored in many formats. Additionally, the value of company information usually decreases with time whereas the value of personal content increases with age. And most of all, it is all about the person's life which has a time span far beyond the duration of a project.

A person's work, however, is part of his/her life and part of his/her experiences and thus should be integrated into his/her personal archive. An interesting challenge is to relate organisational and personal content in such a way that security and property rights are respected.

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Outlook

Prospects of E-Content in Europe

Peter A. Bruck

International Center for New Media, Salzburg, Austria

Promises are often over-inflated. Especially in the area of the new media technologies one has heard for years that convergence of platforms, formats and contents is a cake to be eaten anytime. But the normal world of European citizens is still characterised by the keyboard and mouse driven PC on the working desk, the TV with remote control in the living room, just above the DVD player, and the mobile phone on the kitchen table or in the hand bag. Little is to be seen of convergence, here.

Yet, if one looks at the electronic contents produced by young designers and developers today one can see that technologies and platforms are used in an increasingly convergent manner to create innovative media formats and entirely new contents (Bruck 2004). Young producers shape, twist and in part transgress the limits of the available soft- and hardware to create new messages, in form and intention. Convergence is not a far away prospect realised in these projects. Young producers need not talk about it; they just do it – and they do it with a stunning easiness. A lightness in the handling of technology pervades their projects providing a stunning body of evidence that a new media world is being shaped and that convergence is finally taken hold.

Contests such as the EUROPRIX Top Talent Award 04[1] show that from the Baltic to the Mediterranean, from small towns to the European metropolitan centres, young media designers have taken charge of the technologies to create new applications and contents that work in the real world. They put a DVD remote control in your hand to use as a joystick to make time go backwards, a mobile phone to move around in order to play an adventure game and a household ladder to create electronic music. When a website mutates into a synthesiser and the camera in the mobile phone takes prices in supermarkets, one is already surrounded by the world of convergence.

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[1] The EUROPRIX Top Talent Award is Europe's contest for innovative projects and creative contents for top students and young professionals using all multimedia channels & platforms. See http://www.toptalent.europrix.org

1 Prospect: Convergent identities

The digital content developers and producers are today a diverse, heterogeneous and often self-trained group of professionals who are working with advanced electronic and computer based technologies. The age of pioneers and visionaries, of technological rebels and transformers is over. They have been succeeded by an age of highly and diversely skilled, product minded and business model conscious professionals in media production.

These practitioners are quite likely to describe themselves as working not in the one and overall industry but in specific segments such as digital animation, interactive television or online advertising. Few would say they are multimedia developers or E-Content producers. In part, this represents the reality that, after more than a decade or so, digital content is going mainstream in an increasing number of areas, such as television, film, and web portals. As an industry categorisation, interactive multimedia does not represent a coherent business segment.

Yet, the use of the term "interactive multimedia" sharpens the focus that digital content production for particular end user markets (such as education, entertainment and advertising) and firms producing as part of a market value chain are part of the same very technology based business. A lot of firms described as in the business of interactive multimedia produce wholesale, intermediate inputs into other industries. A major finding from recent surveys is that there is considerable horizontal integration across digital content segments at the level of middleware and digital content production techniques, including content management systems and distributed content distribution network technologies.

There is evidence that content industry segments such as interactive games, online advertising and online education can benefit from propinquity to such platform developers. On the other hand, distinct industry segments such as interactive games themselves throw off generic technology innovations, the commercial exploitation of which and the multipliers from which appear to be enhanced by the extent of clustering with related industry activities.

Furthermore, the exploration of firms and activities loosely grouped as “interactive multimedia” focuses the attention on the evolving and changing characteristics of digital content production. A major conclusion of the EU funded project “Anticipating Content Technology Needs” (ACTeN)[2] is that digital content production is not distinctive and different in its own right, but rather that issues around the industrial organisation and structure

[2] See http://www.acten.net

of digital content activities are common to content and creative industries generally (Buchholz et al. 2004). This conclusion shifts the attention to the more challenging question of how the industrial organisation and market functions of overall content industries are changing within a digital environment and the role that Information Society Technologies play in transforming the competitive landscape.

2 Retrospect: Normalised Business Production

The multimedia and E-Content sectors were among the pioneering forces for establishing an Information Society. But they are changing in their function for society and economy. The penetration and permeation of digital technologies and the pervasive computerisation of the production, distribution and storage of digital content has become a normal part of present day societies in the EU. Digital contents are, however, key to the quality of the information society as experienced in the daily lives of citizens, and they are local and regional value creators due to their rootedness in the diverse linguistic and cultural landscapes of European countries including those in Central and Eastern Europe.

Five years ago, the markets were characterised by the shockwave from the abrupt deflation of the internet bubble and the downturn in the new media industries in most European countries. Advertising supported online contents had suffered up to 80% loss of revenues and many portal companies shut down operations. This was accompanied by a much slower uptake in E-Commerce activities leading to a general shift away from 'pure content' to content driven E-Business operations.

The business models were not clear even for many of the largest players, and telcos and ISP providers had to significantly scale back content offerings. They started to concentrate again on their core businesses after realising that they needed to develop differentiated content driven services rather than trying to match mass media in terms of depth and breadth. An exception of noteworthy interest is the attempt of a mobile operator who tries to jumpstart the 3G multimedia services using the UMTS technology. Hutchison, which has entered the UK, Italian and Austrian markets in 2003 under the brand of '3' is not only positioning itself as a mobile multimedia provider, but has also started up significant content production and daily information services in house.

Nonetheless, a common consensus has emerged that content suppliers have gained their markets. For instance, traditional media operators (publishers as well as broadcasters and film companies) have significantly de-

veloped a strong position in the maturing markets through cross-media offering of content, including complementary content services. Examples of this are web communities and info wells around popular TV shows as seen with reality TV in most European markets in the last two to three years. Other examples are personalised digital newspapers sold in bundles with a print subscription or access sale bundled with target group specific contents and services such as DSL subs with Internet TV magazines. Small independent producers, designers and developers of content have a strong market with all institutional and corporate content products and applications as E-Business starts to include holistic approaches to B2B and B2C supplier and client relations.

3 Presentspect: Using Cross-Media to Develop Online Portals

One of the significant developments of the last three to five years is on the one hand the demise of many of the new internet content offerings. On the other hand, online portals and content management services have established themselves quite successfully. Many of the stand alone web offerings, such as the horizontal destination portals which were designed to serve all users regarding all information needs and with all types of contents scaled to all depths, have flopped, but some have succeeded. The main factor in success is the proper and successful leveraging of cross-media strengths.

Dominant online portals are all linked to major content firms for example from broadcasting such as BBC, ZDF, ORF, or from print publishers such as Neue Zürcher Zeitung, Le Monde, El Pais. Or they are connected to communications companies such as France Telecom, KPN, Deutsche Telekom or Telia/Sonera. The recent market entries of new mobile operators such as Vodafone with Vodafone Live! or Hutchison 3G have added a new trans-European dimension. These firms exploit their brand strength and the cost advantage of an integrated business.

An exemplary case from the media business is the Norwegian group Schibsted which applied in 1991 for a government permit to establish an independent commercial television channel, TV 2. Today, Schibsted owns 33.3% of this channel. On the film side, Schibsted controls Metronome Film & Television, the parent company of Scandinavia´s largest group of production companies for television and commercials. Schibsted also owns 50% of Sandrew Metronome, one of the leading Nordic cinema owners and distributors of feature films for the cinema, video and television.

By the mid-1990s, the group which had started after WWII with a newspaper named *Verdens Gang* was set on establishing a central position in online developments in Scandinavia, and today Schibsted is the leading multimedia group in the region. The various Internet sites which are either wholly or partly owned by Schibsted have more than 13.2 million unique visitors each month (Q2 2003). Of these, more than 9 million read the group´s online newspaper editions every month (Q2 2003). In 1996, Aftonbladet – the largest newspaper in the Nordic area – became part of the Schibsted Group, and in 1998 Schibsted acquired Svenska Dagbladet. Schibsteds activities today relate to media products and rights in the field of newspapers, television, film, publishing, multimedia and mobile services. The news, information and entertainment content is communicated in a variety of formats: paper, the Internet, television, cinema, video, DVD, and mobile phones. Schibsteds strategy is to strengthen and develop the established media, and at the same time to ensure that new growth and development are achieved within new media areas.

Many of the late 1990s boom time deals tied existing content or channel owners to new media entities or spin-offs in order to gain market attention and survive. In the more sober environment of today such linkages are likely to constrain innovative adaptations in business model and cultural formats. At present, the main players are not intent on venturing that far. They want to use their established brands and trusted business models and use cross-media to secure at least moderate additional revenue streams. As a participant at the 2003 ACTeN Scholars Conference noted, 95% of the effort is on how to turn existing content into cash: "No one is making much money yet".

In other markets, major commercial portals have begun to collaborate in campaigns to educate the corporate advertising market about online channels and their value. The Telekom Austria portal Aon.at has joined the Internet Advertising Bureau and the leading advertising magazine in the Central European Market to launch "Push Up" events and galas to convince themselves and their customers of the value of their communication channels. Others have joined forces to conduct business forums or offer special rate packages. Technologically, firms in the online portal business rely on established market proven suppliers and have significantly scaled back all R&D involvement as a long term result of the 2001 tech wreck on the stock markets and the downturn of Internet futures.[3]

[3] For a market overview see the chapter on "The State of Digital Media Service Business" by Tommi Pelkonen in this book.

4 Presentspect: The Market Power of Incumbents

New technologies do not create playing fields in markets. Despite many hopes to the contrary, many producers have to face the known facts of the old economy market dynamics where incumbents have the advantage of market power and new entrants have to fight for their shares. In the integrating broadband network environments, broadcasters and telecom providers are the main players and content producers with some exceptions such as Endemol have little to laugh.

Endemol stands out in Europe not only through its diversification as a content creating company but also in terms of market power. The recent deal into which Zeppotron, the comedy and entertainment arm of UK Endemol, has entered with '3 UK' not only provides comedy content for its 3G 'broadband' mobile multimedia and communications services, but gives Endemol a clear lock on the new delivery platform. In Italy, as another examples, Endemol cooperates not only with '3' with the recent issues of its reality show formats but also has deals with Sky, many of the commercial broadcasters such as Canale 5, Rete 4 or Italia 1, and its own and related web portals.

There are not many companies like Endemol which not only develop contents but have enough market power and cash reserves to play to all segments of the market. Format development is being incorporated into all aspects of the interactive business. In the broadcaster related business line Endemol produces interactive television contents and programme branded interactive applications. Viewers are integrated into the TV programmes via SMS, Internet, telephone or ITV network, and broadcasters share in the resulting revenue possibilities. In programme branded applications, interactive and convergent formats are produced and exploited bringing together TV, mobile, and Internet. In-programme applications made Big Brother, Star Academy or Operacion Triunfo commercial successes and helped expand Endemol in the area of interactive television.

Going along with the production of content is the development and co-exploitation of convergent "brandformats" with major consumer brands. Endemol offers clients consulting, concept development, creative design, production, and editorial maintenance for their products and brand to appear in the reality shows. These services are even offered across various interactive media, and Endemol strives to provide a coherent product and service to its customers. For example, the website www.dvdtjekijken.nl has been developed as a cross-media format based on DVDs and related products which was created by Endemol Interactive for Philips Consumer Electronics. In addition, Endemol aims at setting up projects directly for

fee-paying consumers. It got into the B2C market with everything from simple formats such as ringtones and logos to more highly sophisticated multi-platform content such as the upcoming *Special Forces*, a unique multi-platform game that starts where computer games normally end.[4]

The strong horizontal and also the strong vertical integration across both carriage and content markets stifle the general development of new contents. Content distribution channels for small and medium sized content developers are dominated in local markets by incumbent, pre-digital media channels and global channels are dominated by remote multinationals. Distribution bottlenecks are and will remain a key issue for content and application developers in the foreseeable future. Pre-digital incumbent media channels hold strong market power with respect to control over existing content libraries and repositories and the related digital rights. This is an advantage where entities have been formed to exploit these relationships. It creates potential transactional bottlenecks or bargaining asymmetries where these cross-channel relationships do not exist.

5 Prospect: Making 'Small' Work Well in Web Development

While online portals and incumbents using cross-media are clear cases where size and the economies of synergy and integration are decisive, one can find on the other end of the scale in terms of business size those who work to develop, adjust, update, configure and redesign the content on the web. Web developers are the quintessential wholesale providers of multimedia content services, providing web design, content management, and hosting services. In terms of firm structure and scale, these firms appear remarkably similar to support service firms in other business sectors. These firms operate on a fee for service basis, which caps potential earnings. There appears to be an inherent trade-off between competitiveness in terms of creativity and the scale of operations achievable.

Very few web developers have scaled in the way that other professional services have – such as traditional advertisers, legal, accounting or software services firms. Discussions with participants in the ACTeN Scholars' Conferences and the industry in general suggest a number of possible reasons for this lack of scaling. For one, web developers act very similar to other professionals in the creative industries. They sell their services using

[4] For further consideration see the chapter "Mobile Games: An Emerging Content Business Area" by Tommi Pelkonen in this book.

the value added of their personal originality and creativity. They exhibit the nomadic behaviour of creative and software people and teams in an immature market. This can also be said of the spin-offs from game developers. Furthermore, commercial success warrants rapid changes in the companies' administrative practices. The focus of the business changes from firm founders who frequently show the characteristic of being serial and chronic entrepreneurs to those leaders or administrators who control costs and keep marketing up. Not surprisingly, many companies fall apart exactly at that point when the key assets of business due to size shift from the individual creativity to the well organised work flow and customer service processes.

Additionally, there exists a constant need to reinvest in new technology platforms, new tools and new skills to keep up with the market. This limits the growth of companies. They cannot work with profitability models and time frames which can be found in other industries. Rather, technologies exercise a cash 'gulp' which especially cuts into the marketing budgets. Thus, firms face the paradoxical problem that they need to invest in their production facilities and upgrade technology to keep up with the spiral of new functionalities and platforms at the same time when they should invest into marketing and sales in order to sustain the customer base and develop their markets and thus revenues. There is little way out but to change the business structure. Thus, many web developers either ceased to exist or have broadened their offerings to either add other business or hook up into companies in other businesses. Trends in web markets link the segment increasingly with advertising and in-house corporate marketing. A key point of differentiation in the market for web services, as in information technology services, is the firm's understanding of its client's business systems.

It is noteworthy that some of the most interesting and innovative web developers show one or both of two characteristics. Their founders have a strong background in event management and approach the web more as a "venue" than a publishing site. And/or sites seek to provide a rich content experience and strong production values and score with innovation known and demanded in the advertising markets.

This severely limits the development of the web as a new medium with its own cultural formats and forms. Production values which are rooted in the traditions of cultural publishing and quality formats have little chance in the market. These issues are important and arise again in the prospect of interactive television. In addition, the slow take up of broadband constrains the competitiveness and innovation of the small size web developers and their companies will remain locked into local and regional markets.

6 Prospect: Turning Interactive Broadband and ITV Into Sustainable Services

The digital screen world is continuing its transformation journey. It is becoming a rich point of intersection for digital content developments. Web developers move across into programmed video streaming on broadband online channels and interactive video production (UK). Media production meets networking and virtual studios (Germany). Emerging producers find various government assistance programmes allowing them to act as innovative developers of new interactive television programmes (Austria). A NAS web developer becomes the catalyst for a major virtual heritage project in Romania. This cross-section of content producers highlights the diversity of activity in the opening up of bandwidth which is about to happen with the deployment of Digital Terrestrial TV, Broadband Internet Access, and Interactive Television.

Interactive multimedia content is still finding its cultural formats and changing them significantly in the course of developments. While the digitisation of the audio world both in recording and radio is virtually complete, the transition in the video world is more complex and still underway. Working from servers with files rather than from reels and tapes is especially for creatives a big switch. In addition, the demands of the real time broadcasting world with live programming and instant command execution requirements are vastly different from the administrative office and creative studio world of many of the web developers.

On the content production side, one can illustrate generically the demands and challenges to creatives when they move into new technology in terms of platforms and delivery channels. A company which started out as an advertising agency or an independent film maker has to evolve into a firm with branches covering documentaries, animation, and now networked content delivery through globally significant developmental work on using extremely high compression technologies to deliver high quality video in real time. Such a company has also to develop in-house capability to support a networked "virtual animation studio" to enable it to access global talent pools –and make itself suitable for international contracts.

Technology and skill investments can pay off only if there is supranational marketing, and this requires a huge investment to set up and maintain the virtual studio linking people with various skills for an animation project. Only these developments will allow the company to sustain the new delivery platforms which will enable the significant re-packaging of traditional content formats necessary to create sufficient return. The funding of the development work cannot be done internally, and such a com-

pany would need to secure significant equity funding to enter the content delivery business. Therefore, even before a company can entertain the further upgrading of their technological base, the executives have to find the VC or bank financiers for their market extension. This is something which is hard to find in the present climate in most EU countries.

Companies where the original business of web services has been used to support diversification into new areas show this problem in an acute way. In their case, the journey can take them into streaming media, broadband content development, and programming. This will require them to drift into traditional media, but with a digital production model. But there the company will find itself in competition with bigger competitors such as those mentioned above.

One of the realities of the industry is that telecom broadband might be the only available delivery platform for content players in quite a number of markets for some time. This is specifically the case where cable services are not being upgraded sufficiently (Germany) or where a monopolising services operator dominates the market (chello in some UPC in markets such as Netherlands). This reality also serves to lock out potential new content suppliers, limiting the growth options of competing firms and undercutting the rate of return especially of those companies who had to invest heavily into technology in order to make the move.

Some content producers have sought new opportunities for broadband channels in business education and corporate training. After the crash in the E-Learning hype in 2001/02 such firms are setting themselves up as Application Service Providers or corporate university operators and consultants. The emergence of these new media channels is causing difficulties and raising complexity in matters of the international licensing of content.

There are also issues of competitive neutrality being raised with the development of online channels being fuelled by content from the special broadband initiatives of public broadcasters or special government programmes. A competitive advantage can be gained from a relationship with an established production house. This might bring an international orientation and the access to distribution channels into international markets, significantly reducing information discovery costs. Many players in European markets see a lot of benefit and potential in collaboration to develop international market access. On the other hand, the mobility of skilled professional labour and contract teams across firms is severely limiting the sustained development of collaborations and the willingness of companies to share information openly.

Digital production for interactive programming has shown a sharp learning curve in the ability to work alongside traditional video and TV crews

or film units. Publicly funded educational programmes and/or collaboration with public broadcasters in countries like Germany or the UK have provided companies with a significant platform for honing new production skills. There have been many experiments and broadcasts with enhanced television by members of the European Broadcasting Union (EBU). In Germany, the national broadcaster federation ARD has made episodes of their *Tatort* detective show with multimedia, where the viewer is invited to guess 'who has done it ' using multimedia overlaid on the screen. In Denmark, an enhanced television version of a children's consumer affairs programme was made – ROFL – . which is a good example for 'enhanced television' and what it can do.[5] In the UK, the BBC has produced enhanced television for news, sports, and many other programmes. The penetration of digital television in the UK is substantial, and thus the use of enhanced television is also relatively large.

Virtually all the people we spoke with about interactive television and new digital screen work raised the issue of the cultural divide between traditional film people and interactive television producers. Part of this divide relates to the need for different production techniques and values, or the opportunities with digital production to develop new formats and production values. The development, albeit slow and starting on a small scale, of digital television production and multi-channelling is implying that new formats are likely to have significant impact on the structures and production values of the television and screen industries. Here, the UK developments are quite ahead of European countries where some news and specialty channels are breaking new ground in looking at programming genres for specific niche markets. There are strong similarities and potential synergies here with developments in the online advertising markets, where some companies are targeting previously neglected markets and are particularly interested in young people segments and gaming extensions. This raises the possibility of international positioning and competitiveness in specific market segment innovations.

The emerging markets for interactive television and television multichannelling (or multicasting) appear to create disruptive new industry dynamics and to open up new opportunities for content developers. Reflecting on early experience, producers encounter changes in production processes. Digital multi-channel TV production becomes more like digital radio production. The skill requirements change and reflect the pressures for smaller production teams and the consequent need for multi-skilling. Production values change with the emergence of new genre templates for formats and content presentation. In the near future, the opening up of new

[5] See http://www.drsales.dk/programmes/cy_for_ROFL.html

channels is likely to create a shortage of appropriate content, creating "swap markets" between channel operators in different content markets. There is also a need for new and highly efficient tools for interactive content production which address genre needs and cross-media usage of contents. At the same time the potential proliferation of channels in a broadband and digital television environment challenges traditional funding and revenue models for commercial operators.

Within the labour market, the lure of the interactive screen is attracting lots of young people and emerging content producers into the field. With the job markets in the traditional media fields and in the software development and multimedia technical fields being stagnant or recessive in most EU countries many flock to the opportunities seemingly offered by the new technology services. The continuing emergence of new genres and new developments in broadband interactive media has shifted the sense of creative excitement and immigrant vigour.

Despite the technology driven new content developments, many firms do not have strong market linkages with technology firms. They have different cultures, different agendas and see each other intuitively not as partners or worthy collaborators. Content pull appears to work better than technology push.

Technology based ventures are struggling themselves and are looking for big deals and view their markets as international. Many of the ventures have died in the general Internet downturn. During the course of the previous years, many tech website developers went out of business, and companies were placed into receivership. The fatalities of the industry suggest that the vulnerability of niche suppliers to developments – or the lack of them – in upstream or downstream markets is a persistent threat to technological upgrading. In addition, digital television's slowness to develop momentum and the consequent reluctance of the television industry to invest in interactive digital content in advance of significant market penetration will persist. The example of HDTV is here quite suggestive. Industry technology players have been developing the standard and appliances since 1982. But outside the Japanese market and some North American ventures there is little movement. To the contrary, the EBU recently affirmed the correctness of European broadcasters' refusal to invest in this new technology for market and audience acceptance reasons (EBU 2003).

Interactive producers we spoke with provide intriguing examples of career development and firm evolution as independent producers. Firstly, they had to realise that in the age of high performance multimedia the importance of individual passion, commitment, and the pursuit of creative vision are essential but not enough for survival. New technologies and infrastructures open up new career opportunities at first, and those who are

quick to adopt and learn the new tools are ahead of the pack. Professional training in film and television, on the job training in creative companies, and the transient moves from web to TV and film studios are useful and help building strong personal professional assets. With these comes the ability to plug into networks of professional advice and project related mentoring.

Nearly as important is the knowledge of seed funding for innovative work from a variety of public and government sources and the development of own works. The record of finished products and the reference list of clients become equally important to the mastery of technologies and tools. Consequently, the assistance from a micro-level clustering of collocation and resource sharing with firms in related markets such as advertising or games development become important success factors.

What becomes apparent here is the importance of geography for the opportunities in personal and industry development. While creatives in the corridor from Paris to Amsterdam and London and the wings down from Cologne to Munich have a broader range of opportunities, creative producers and designers from other European markets suffer the disadvantages of a generally low media production capacity and monopolised regional markets.

In order to have a chance also in the deployment of new technologies and tools, it is not only the size of the individual company but of the general content market including for instance film and television which are decisive factors. Diversity of opportunities in convergent markets requires major sets of players. The dominance of one or a few clearly affects adversely the economics for new or independent producers. The cost of contract services and for location fees are set to their disadvantage and the biggest barrier is the distance from the cluster of distribution activity in major centres and getting a share of mind with gate keeping executives and distributors.

7 Prospect: Interactive Media in a Community and Cultural Context as High-Tech Transfer

From the very beginning, the promise of the digital technology has been twofold: to make cultural things and media products cheaper to produce, transmit and receive, and to make the means of technologically mediated communication and information easier to use.

While the technology has kept the promise, it has failed the grass roots expectations rampant among the early Internet pioneers. Rather, the struc-

turally favoured players and big companies have moved in and the "well of free and global interaction and communication" has been spoiled by E-Commerce, pornographic sites, and spam marketing waves. Nonetheless, interactive media play a critical role in the development of communities and in the cultural arenas, providing depth to industry markets, fuelling innovation in creative contents, and functioning as training grounds for emerging producers.

In most urban areas of Europe, a significant number of community portals and internet service providers have set up operations and maintained their position as sources of streams of innovation in areas as diverse as virtual reality web, online services, and public multimedia installations. Indeed, some have become a global benchmark for cultural and social policy analysts interested in online community organisations and youth cultures. A major source of their attraction within the community market is a focus on training and infrastructure support mixed with sometimes strong ideological commitments and overt political ambitions. Many of these operations have been set up by students or graduates from universities or other training institutions of higher education and have kept those ties. One can see here a form of hidden technology transfer from the academic research and development community into new cultural usages and/or innovative application services platforms. Here, the adoption of new tools and technologies in content creation is fuelled by the organisational requirements and the community policy objectives.

Virtual community or heritage projects might serve as first entries and connections to innovative cultural institutions and municipal services might play catalytic roles in market development. The community "shopfront" interactive media rival the initiatives for community museums and centres for collaborations linking industry, the education sector, and SME institutions. Local and regional events might offer the opportunity to get larger grants, and the participation in public debates the necessary profiles.

Identifying key aspects of these developments, one can say that traditional cultural institutions play an important role in industry development through their functions of producing digital screen and interactive regional education programmes for schools or by adding innovation to the networked distribution of digital contents. The commissioning and collecting of new media works – and thereby supporting and credentialing digital content creators – appears equally important and is being done by the many digital interactive festivals . Finally, the establishing of international linkages and networks can serve as a low cost way for technology and tools training and exploitation.

The importance of the collaboration of university institutions with creative community and arts centres lies in the low cost innovation flow from

research to implementation and from tool experimentation to innovative cultural practice. This is a different type of technology diffusion which builds on the low commercialisation of the two sectors and their linkages and exchanges. Technology research institutions and cultural institutions thus take part in digital content industry development through providing an occasion and a place for cultural production, venues, and commissioning platforms for creative research and development in areas as diverse as performing arts or music festivals. Here, we can see an in-culturation of technology which is more profound than the computerisation of leisure time of the European youth through the game boy or consoles of the newest high performance bit rate.

What is developing here are platforms for young developers and creators who can use the new media technologies and tools with the highest of proficiencies and skills, and who become inventors both on the cultural as well as the technological side of multimedia. A two-way movement of people, ideas, skills, and tech innovation takes place as part of not-for-profit activities in the cultural and community arenas and the RTD world of information technologies. The links to the commercial creative content industries develop with success and a record in innovation. Environments in which such interactions and engagements can occur become important factors in nurturing creativity and innovation in content development.

8 Prospect: Changes in the Value Chain

The value chain for content production has changed dramatically through digitisation and the resulting interconnection and convergence of delivery channels and technologically defined media. Until the end of the 1990s one could speak of separate and distinct media channels which also defined the forms and formats for the content producers. In broadcasting, this meant that each channel, public, private or pay, was a distinctly perceived property by advertisers and policy makers, and a distinct place for entertainment or information for audiences. For museums, this meant that they would produce print catalogues and audio guides for their visitors and produce some PR materials for journalist trying to cover new exhibitions. For advertising agencies, this implied that they were making separate media plans for TV and print and considered corporate videos an added benefit or luxury. For short film makers, it meant that they knew that they had to get some alternative distribution chain to cover cinemas outside the mainstream and lobby public service broadcasters for a late night slot. For game developers, it meant that they were producing boxed products to be played

either on consoles or PCs. Finally, cultural producers counted on CD-ROM sales of their partly publicly subsidised fine and artistically created multimedia treatment of great figures of art and public life.

The new value chain has dropped all simplicity and consists of crossed paths, clusters and clouds, not streams and sequential organisation. The chain shows vertical and horizontal integration and new differentiation. There are new freedoms and new gatekeepers, new delivery networks and new business models. In industry consultations a number of issues featured prominently involving wider markets and some policy implications. These issues are considered from the perspective of the business operations of content producers and creators. In the following, the more important of these issues are presented. All of them require further discussion and especially consultation with the stake holders involved, primarily, however, the producers, designers, and creators.

The technologically induced changes in the media environment are often considered to be mainly or primarily on the production side. However, it is a fact that Europe is on the verge of the greatest changes on the distribution, transmission and reception side since the introduction of TV in the 1950s. Set top boxes have amplified the channels and increased choice, but digital transmission will in fact profoundly change the behaviour of users. They will record, time delay, copy and edit programmes at will and use them on appliances which are mobile or hi-fi, watching and using contents in practices not defined and controlled by the technology but by their own interests and intentions.

For producers, this is an entirely new situation. They do not only loose control of the audience/viewer but they also loose touch with the idea of how the user behaves during the reception/use of the content. Economically, they have to face growing costs of advanced technology platforms and thus an added entry barrier for innovative contents. In the games sector for instance access is controlled by proprietary console developer kits. This is both a cost and an access issue as console vendors want to pre-qualify developers and control their contents. Gaining access to kits is particularly challenging for small emerging firms and young innovative producers. In addition, there is little or no evidence of companies trying to match up and share the use of scarce, high cost facilities even though there would be a clear economic advantage for such inter-firm transactions. This is not only a function of small market size and immaturity. It is also the result of the technology push and marketing gap described earlier on.

European content producers and their companies try to gain a competitive advantage with the technological state-of-the-art they buy and try so hard to keep. Very few know and can act accordingly to take advantage of their marketing strength. When most or much of the investment for a prod-

uct is spent on the technology platform and tools, little or nothing is left for promotion, distribution and sales. In this sense, many content producers behave as if they were in non-mature markets. The high levels of improvisation in marketing undermines sustainable business in the longer term.

More problems arise when the business model envisages the networked distribution of digital content or applications. Companies face a range of hurdles. For a start, the broadband penetration in European markets is still very uneven and translates into a small, subscale market for developers. While growth has picked up, user behaviour will not change over night and stick with some of the traditional suppliers of content, particularly TV channels.

The limited broadband market means that European developers will have less experience of engaging with broadband users and emerging markets than developers in markets with quickly growing broadband penetration. In South Korea the broadband environment has significantly fuelled the local games industry. This hurdle will become increasingly significant in the area of massively interactive multi-player online games. Underdeveloped local and regional markets for broadband network supply, dominated by one or two players, create huge access barriers and power imbalances in market transactions for content producers and suppliers who are not in the cross media business. Companies who do not have privileged access to a relationship with a broadband network provider are largely shut off the market and have little or no alternatives open to themselves. Many will not be able to surmount those barriers and realise the growth options which possibly exist. This is particularly discouraging as policy makers are keen to advertise the gains in broadband penetration and usage, but fail to do much beyond reading access statistics and applauding the providers.

Producers thus are faced with regional uncompetitiveness in the access to broadband networks and this will turn out to be a problem on a European scale. It will limit the growth of experience with the new environment and will limit the scope for producers and creators to participate in global co-productions, virtual studios or inner-EU collaborations. Collaboration and networking digital content production involves shifting massive data files, e.g. game developers upload sometimes more than 4 gigabits per session.

Intellectual property regimes are at the core of the business model for any content industry and related fields. General issues around copyright law and digital rights are complex and hotly debated in companies, industry gatherings, professional associations, and at public policy levels. There is much confusion in the market over the promise of the new regimes, and technological solutions to the rights management issues which are neither fully understood nor much trusted by content creators and producers. Some

from smaller markets even consider that copyright will only serve and pay for the big players and that the vast majority of producers, independent or contractual, would have more to gain from a vibrant "digital commons". The Global IP regime does not work in the interests of many European markets. In those, it might be appropriate to become a rich market of public domain content repositories and content mining, fuelling the local content industries. Countries like Canada and Australia are actively considering following such an approach[6].

The increasing complexity of the issues and changes in digital rights management and of the reuse of digital materials creates high levels of business uncertainty and management insecurity even with established players in the traditional mass media. They tend to stick to their core business and shy away from considering the business prospects potentially open to them. Producers and developers tend to avoid many if not most areas of content rights development as they appear too complicated to them, and they will be thus in no position to "cash in on their ideas and creativity".

The specific issue of exploiting public sector information resources is recognised by the EC which has a specifically funded programme[7] to fuel the development of contents using these resources. But apart from the specific areas of educational content and digital applications for E-Government services the matter of government policies about copyright and intellectual property is largely a terra incognita. Much more effort needs to be spent here.

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[7] See http://europa.eu.int/information_society/policy/psi/index_en.htm

A Guide to European Initiatives and Resources in E-Content

Andrea Buchholz, Bernd Hartmann, Swaran Sandhu

MFG Baden-Württemberg, Stuttgart, Germany

E-Content is and will remain a thriving force in European economy and society. However, in a dynamic field like this it is of crucial importance to keep oneself up-to-date about the developments taking place.

Thankfully, there are quite a number of resources available that provide information on all kinds of E-Content topics, no matter whether one's interests are general or rather more specific. These can be broadly divided into: 1) information services, 2) European research projects, 3) associations and initiatives, and 4) national centres of competence in European countries. Some resources can be further subdivided into those with a general and those with a topic-specific focus on E-Content.

Information services are often set up similar to online newspapers or web portals, publishing news from the E-Content sector regularly or listing references to further resources in the field. They are provided by political institutions such as the European Commission, by commercial as well as non-profit organisations.

A special kind of information resource, often with a research or development focus, can be seen in *international projects* with a European scope. Usually, partners from several European countries cooperate in those measures to gain more insight into diverse E-Content fields. As the European Commission gives funding to a lot of those projects, the results are made accessible to the public.

Another kind of resource are *associations and initiatives* dedicated to E-Content. Their aim is to promote specific aspects of E-Content or the field as a whole through e.g. networking, training and events, research, projects and services. Being institutions with seasoned persons working together, they can be addressed when in need of relevant expertise.

The same is true for the *national centres of competence* in E-Content that are portrayed in the last section of this guide. They have experience in E-Content matters gained through national and international projects such as ACTeN, and can thus serve as a first point of contact for business and research purposes.

1 Information Services

1.1 General

Content Village

An accompanying measure of the *eContent* programme of the European Commission – key to information on the *eContent* programme, its projects and participants. This communication and knowledge-sharing platform offers a wealth of resources of interest to the digital content community, language industry, and public sector.

http://www.content-village.org

Cordis

Cordis is the European Community's Research and Development Information Service. It is an important source on EU R&D programmes and relevant matters and can help to participate in EU funded research programmes, find partners, and transfer innovative ideas.

http://www.cordis.lu

Strategic Studies on E-Content

Within the *eContent* programme of the European Commission, a number of strategic studies were carried out, e.g. on mobile content or on the commercial exploitation of Europe's public sector information.

http://www.cordis.lu/econtent/studies/studies.htm

El.pub – Interactive Electronic Publishing R&D News and Resources

The El.pub web site provides a focal point for news and resources about research and developments (R&D) in interactive electronic publishing.

http://www.elpub.org

First Monday

First Monday is one of the first peer–reviewed journals on the Internet, solely devoted to the Internet.

http://www.firstmonday.dk

EContent Magazine

EContent Magazine is an online magazine that is targeted at executives and professionals involved in content creation, management, acquisition, organisation, and distribution in both commercial and enterprise environments.

http://www.econtentmag.com

Contentmanager

Contentmanager.net is an online information portal for Content Management and the professional use of modern web IT-solutions.

http://www.contentmanager.net

Rightscom News Briefing

Rightscom News Briefing is a free newsletter provided by Rightscom, a London based consultancy offering services for digital content. The newsletter focuses on developments in the digital information industries such as E-Content, digital rights management, as well as online and mobile content distribution.

http://www.rightscom.com

Screen Digest

The news and market research journal *Screen Digest* was founded in 1971. *Screen Digest* is an important source of business intelligence, research, and analysis on global audiovisual media.

http://www.screendigest.com

1.2 Specific

EPS – Electronic Publishing Services

EPS is a consultancy which has concentrated its whole attention specifically on the information industry. It provides newsletters and reports on electronic publishing trends mainly for business and scientific contents.

http://www.epsltd.com

Game Studies

Game Studies is a cross-disciplinary journal dedicated to games research. The focus lies on aesthetic, cultural, and communicative aspects of computer games.

http://www.gamestudies.org

Jakob Nielsen's Alertbox

The well-known usability expert Jakob Nielsen publishes a bi-weekly column on usability issues on his website. The archive dates as far back as 1995, and the topics covered include almost everything from web design over usability engineering methods to newsletter usability. The website also features an introduction to usability.

http://www.useit.com/alertbox

Mobile Content World

The Mobile Content World web magazine looks at every stage of the mobile content value chain – from origination, through distribution, to sales. Its mission is to promote innovation in the development, distribution and monetisation of mobile content across the world.

http://www.mobilecontentworld.biz

MobileInfo.com

MobileInfo.com is a website for mobile computing and wireless information. The site offers mostly business related and marketing information and solutions for different industries.

http://www.mobileinfo.com

MocoNews.net

MocoNews.net is a news site dedicated to the mobile content sector, that also offers a daily newsletter. Like *Paidcontent.org* (see below) it is run by ContentNext, an independent media and information company covering the business of digital media.

http://www.moconews.net

PaidContent.org

PaidContent is an independent service for the digital media and technology executives, providing news and resources on: tethered and wireless paid content industry, subscription-enabling technologies, and corporate initiatives in gaining subscription revenues through content.

http://www.paidcontent.org

Public Sector Information: Access and Re-use

Within the context of its policies on digital content and the *eEurope* action plan, the European Commission stimulates the access to and the reuse of public sector information through a number of actions, ranging from legislation to the exchange of good practices. This site provides a detailed overview of PSI topics and EU policy measures in this area.

http://europa.eu.int/information_society/topics/multi/psi/index_en.htm

Streaming Media

This industry-oriented site provides news and business intelligence, and covers strategic and technological developments related to streaming media.

http://www.streamingmedia.com

Streaming Media World

Streamingmediaworld features articles, hours of audio/video content, news, research reports, industry directory and case studies that showcase the latest real-world streaming media implementations.

http://www.streamingmediaworld.com

Wireless Enterprise World

Wireless Enterprise World is a online publication focused on enterprise productivity through the deployment of wireless data services.

http://www.wirelessenterpriseworld.com

2 International Projects With European Focus

2.1 General

eContent programme

The *eContent* programme was adopted by the European Council in December 2000 for a period of four years with a budget of € 100 million. Later on, it was agreed upon an update of the work programme from 2003 to 2004. *eContent* aims at supporting the production, use and distribution of European digital content and promoting linguistic diversity on the global networks. The programme contributes to the third objective of the *eEurope* action plan: "to stimulate the use of the Internet".

http://www.cordis.lu/econtent

ACTeN – Anticipating Content Technology Needs

ACTeN is a EU-funded thematic network headed by MFG Baden-Württemberg, in which 11 partners from 10 countries cooperated to build an enlarged business and industry community in the area of multimedia technologies and E-Content applications and tools. With this, ACTeN provided an East-West collaboration by addressing the opportunities and challenges of the enlargement of the EU towards Central and Eastern Europe. The monthly Content Market Monitor Newsletter will continue to get published and is available through the website.

http://www.acten.net

BRIDGES – Business Route for Investors to Determine Gifted Entrepreneurs and Start-ups

Supported as a preparatory action under the *eContent* programme, this project supports the establishment of a "common language" to bridge the gap between European digital content providers (entrepreneurs and start-ups) and potential investors.

http://www.eurobridges.net

OECD Work on Digital Content

The OECD's Working Party on the Information Economy (WPIE) is undertaking analysis of the digital delivery of content, recognising that the rapid development of "always-on" broadband Internet services is

transforming high-growth industries that provide or have the potential to provide digital content. Specifically, it was agreed to undertake stock-taking studies in the following three areas: scientific and technical publishing, music, and online computer games.

http://www.oecd.org/document/62/0,2340,en_2649_33757_32160190_1_1_1_1,00.html

2.2 Specific

CONTESSA

CONTESSA has the objective to provide flexible mediation services enabling universal access to distributed content and transaction management systems through alternative emerging access devices.

http://contessa.intranet.gr

DELOS

DELOS is a network of excellence on Digital Libraries that intends to conduct a joint program of activities aimed at integrating and coordinating the ongoing research activities of the major European teams working in Digital Library-related areas with the goal of developing the next generation Digital Library technologies.

http://www.delos.info

ENTED – European Network for Technological Development

Supported as a preparatory action under the *eContent* programme, this project was designed to improve access to risk capital by SMEs operating in the digital content industry.

http://www.ented-eu.org

EEEL – Excellence in European E-Content Localisation

The E-Content project EEEL aims at improving knowledge and awareness of Best Practice for E-Content localisation. The project documents best practice through in-depth case studies, developed in collaboration between leading practitioners and their customers.

http://www.eeel-online.com

FIGARO

This project aims at enhancing scientific communication by providing effective and efficient E-Publishing services to individual scientists and scientific organisations through the use of a shared organisational structure and the utilisation of open source and standard base software tools.

http://www.figaro-europe.net

INYOP

The Media Plus Programme of the European Community has co-funded INYOP which aims at providing Interactive Narrative Courses for Young Professionals.

http://www.inyop.org

mGain

The mGain project aims to study mobile entertainment technologies, business concepts and culture together in order to gain a comprehensive picture of the field.

http://www.mgain.org

OPELIX – An Open Personalised Electronic Information Commerce System

The objective of OPELIX was to develop a business model for paid content by providing tools to create personalised information offerings, taking into account copyright protection of information, certification of data, timely delivery of the data and payment schemes that apply to this type of business.

http://www.ipsi.fraunhofer.de/oasys/projects/opelix/index_e.html

sagas Writing Interactive Fiction

This joint initiative of the European MEDIA Plus Programme Training with the Hochschule für Fernsehen und Film München aims at furthering fiction writing skills for the interactive media market. The aim of the ongoing cross-disciplinary project is to encourage a knowledge transfer between the audio-visual industry and the interactive market.

http://www.sagas.de, http://www.sagasnet.de

SCIX

The project aims at building an open, self-organising repository for scientific information exchange through setting up an on-line service, where scientific work, including results of EU projects, will be available for free.

http://www.scix.net

TIPS – Tools for Innovative Publishing in Science

Main goals of TIPS are building a web-based portal supporting the activities of document writing, reviewing, publishing, searching, disseminating and reading, as well as the communication among members of the research community.

http://tips.sissa.i

UsabilityNet.org

The project *UsabilityNet.org* has the objective of promoting usability and user-centred design in Europe and elsewhere. The website thus offers usability information and resources for usability practitioners, managers as well as professional groups.

http://usabilitynet.org

3 Associations and Initiatives

3.1 General

European Multimedia Forum (EMF)

The European Multimedia Forum is an association dedicated to the development of all aspects of the digital media industry. EMF is representing commercial businesses, institutions and professionals who work in the field of digital media.

http://www.e-multimedia.org

International Federation of Multimedia Associations

Established in 1997, IFMA's main mission is to promote international cooperation between multimedia associations from around the world. It organises a yearly multimedia summit, and supports industry networking and exchange of knowledge.

http://www.fiam.org

Content Reference Forum (CRF)

The CRF is a recently formed standards group of leading technology and content-related companies established to develop a universal way to distribute digital content across various media and geographies.

http://www.crforum.org

Digital Content Forum (DCF)

The Digital Content Forum represents industries who share a common interest in using the tools and functions of interactive digital media to bring new products and services to the market.

http://www.dcf.org.uk

E-Content Institute

Although primarily with a focus on the Canadian E-Content community, this independent organisation also publishes the Information Highways magazine and the Hot Bytes newsletters that feature topics that are relevant to everybody involved in E-Content matters.

http://www.econtentinstitute.org

Internet Society (ISOC)

The Internet Society provides leadership in addressing issues that confront the future of the Internet, and is the home for the groups responsible for Internet infrastructure standards, including the Internet Engineering Task Force (IETF) and the Internet Architecture Board (IAB).

http://www.isoc.org

International Centre for Digital Content (ICDC)

The ICDC is a university-based but externally focused centre whose activity spans teaching, research and production, carried out in partnership with industry, education and the wider community. It is based in Liverpool, United Kingdom.

http://www.icdc.org.uk

Online Publishers Association (OPA)

Founded in 2001, the OPA is an industry trade organisation dedicated to representing high-quality online content providers towards the advertising community, the press, the government and the public.

http://www.online-publishers.org

3.2 Specific

Academy of Interactive Arts & Sciences

The Academy of Interactive Arts & Sciences is a non-profit professional membership organisation serving the entertainment software community.

http://www.interactive.org

Digital Divide Network

The initiative and its website offers a range of information, tools and resources that help practitioners stay on top of digital divide developments.

http://www.digitaldividenetwork.org

Digital Games Research Association (DiGRA)

DIGRA is a non-profit, international association of academics and practitioners whose work focuses on digital games and associated activities.

http://www.digra.org

Digital Storytelling Association (DSA)

The DSA is dedicated to evolving the practice of digital storytelling by providing services, advocacy, resources, and information. This group also organises the Digital Storytelling Festival.

http://www.dsaweb.org

eForum – Forum for European ePublic Services

The eForum Association is dedicated to analysing the future needs of E-Government in Europe, and promoting excellence in defining solutions to those needs by bringing the private and public sectors together.

http://www.eu-forum.org

Mobeyforum

Mobeyforum was founded by a number of the world's leading financial institutions and mobile terminal manufacturers with the mission of encouraging the use of mobile technology in financial services.

http://www.mobeyforum.org

Mobile Data Association (MDA)

The Mobile Data Association is a non-profit, global association for vendors and users of mobile data and their advisors. As the online forum for the mobile data industry, the MDA website provides information on all aspects of mobile data.

http://www.mda-mobiledata.org

Mobile Entertainment Forum (MEF)

The Mobile Entertainment Forum is a global trade association representing all participants in the mobile entertainment value chain interested in driving the industry's evolution and commercial potential through collaboration, consultation and promotional activities. MEF is committed to reducing the barriers for entering into the innovative mobile entertainment market, thereby encouraging entry by new businesses and increasing competition and growth to the benefit of all industry players and consumers.

http://www.mobileentertainmentforum.org

UMTS Forum

The UMTS Forum is an open, international body for promoting the global uptake of UMTS third generation (3G) mobile systems and services.

http://www.umts-forum.org

UPA – The Usability Professionals' Association

The Usability Professionals' Association supports usability specialists, people from all aspects of human-centred design, and the broad family of disciplines that create the user experience in promoting the design and development of usable products. The primary goals are networking and the sharing of knowledge on usability issues. The website is a good starting point for anyone interested in usability in general.

http://www.upassoc.org/

Public Library of Science (PloS):

The PLoS is a non-profit organisation of scientists and physicians committed to making the world's scientific and medical literature a freely available public resource.

http://www.publiclibraryofscience.org

Wireless World Forum

The *Wireless World Forum* is a global trade association representing all participants in the mobile entertainment value chain interested in driving the industry's evolution and commercial potential through collaboration, consultation and promotional activities.

http://www.w2forum.com

4 National Centres of Competence

Austria

International Centre for New Media (ICNM)

ICNM is a Non-Profit Organisation seated in Salzburg, Austria, working throughout the European Countries (33) and networking around the

world (Africa, America, Asia). Its programs and projects deal with analysis, support and training for the development of New Media content and markets. Strengths of the ICNM lie in Best Practice Evaluation, Promotion, Showcasing and Education as well as on its international network of co-operation and competence.

http://www.icnm.net

Czech Republic

Technology Centre of the Czech Academy of Science (TC AV)

TC AV is a consortium of Czech research institutes fostering transnational technology transfer. It is also the national centre for European research. TV AV supports start-ups and high-tech enterprises and participates in strategic studies and projects focused on perspectives of research and development, new technologies, and innovation strategies. It was founded in 1993. TC AV is engaged in many international and national projects.

http://www.tc.cz

Finland

MindTrek Association (MindTrek)

MindTrek Association is a non-profit umbrella organisation for societies working in the fields of digital media and information society. The association consists of university partners, non-governmental organisations and companies. The Association operates both nationally and internationally. Nationally, the association coordinates the MindTrek Week and arranges different kinds of seminars and conferences on important themes in the field. Internationally, MindTrek has hosted the EU INFO-2000 Programme Conference in 1999, the EUROPRIX Awards Gala, the International Mobile Media Summit, the first EUROPRIX Scholars Network Conference and a number of other international networking events.

http://www.mindtrek.org

France

Digital Dispatch (DD)

Digital Dispatch provides assistance in conceiving, designing and producing material intended for publication on the Web. The company unites a number of specialists with experience in Web consultancy, web programming, on line publishing, multimedia design, marketing and project management. Digital Dispatch follows the notion of a "publication platform", a Web server which will be at the centre of a company's publication strategy, and which optimally exploits all the advantages Web technology has to offer. The company has multiple cooperations with communication and Internet service companies, as well as with the European Commission regarding audits, Web strategy definition, site design, etc.

http://www.digit-dispatch.com

Germany

MFG Baden-Württemberg – Agency for IT and Media (MFG)

MFG acts as a center of excellence for IT and media in Germany. It was founded in 1995 by the state of Baden-Württemberg, the economic powerhouse in the Southwest of Germany with more than 22.000 firms working in the IT and media branch, among them SAP, IBM, HP, Siemens and Sony. Nowadays, MFG is a driver of innovation in many branches. A staff of more than 40 highly qualified academics offers services like consulting, project management, professional trainings / events and communication. MFG is organiser of the German Multimedia Congress (DMMK), responsible for the regional branch initiative doIT Baden-Württemberg, runs a number of websites with daily updated E-Content and is responsible for major research programs and EU projects. Organised both as a company and a foundation, MFG handles an annual business and promotion volume in the order of € 12 million. More than 50 percent of the budget is earned through commissions and external funding.

http://www.mfg.de, http://www.doIT-online.de

Hungary

Hungarian Association of Content Industry (MATISZ)

The Hungarian Association of Content Industry (MATISZ) was registered in January 2002 as the successor of a former organisation, the Hungarian Association of Database Suppliers founded in 1991. The organisation has 144 members – three-quarters of them are small or medium enterprises (SMEs). About 50 companies – mainly SMEs – out of the 144 members are engaged directly or indirectly in multimedia production. Others have key position in telecommunications and at the same time are key Internet providers. MATISZ is promoting a free flow of information, the E-Content market and the more effective social exploitation of information. Activities cover preparing studies and strategies, organising conferences, workshops and training events in the E-Content field. Since 2001, MATISZ organises the annual contest of the best Hungarian multimedia content called eFestival.

http://www.matisz.hu

The Netherlands

European Academy of Digital Media (EADiM)

The European Academy of Digital Media (EADiM) is a Network of Excellence of the best producers and designers in multimedia in Europe. EADiM provides an infrastructure for sharing and networking expertise among the nominees, winners and jurors of EUROPRIX and of teachers and trainers dedicated to best practice in e-content creation. EADiM is incorporated as a not-for-profit foundation under Dutch law. It serves as the personal, professional Europe-wide contact network independent of the companies or institutions individuals might work for. EADiM is dedicated to the development and advancement of quality E-Content in Europe.

http://www.eadim.org

Electronic Media Reporting (EMR)

EMR was founded in 1990 and is based in Utrecht (The Netherlands). EMR is a consultancy for the content industry, specialising in new media, electronic publishing, and content strategy. The fields of activities consist of market studies and research, audits for the European Commission, setting up conferences, seminars and workshops, as well as pub-

lishing journalistic products on the content industry (Telecombrief and IMI).

Poland

Information Processing Centre (OPI)

The Information Processing Centre (OPI) was created in 1990 as a research and development unit supervised by the State Committee for Scientific Research, at present the Ministry of Scientific Research and Information Technology. The main task of the Information Processing Centre is to facilitate quick access to the most up-to-date and thorough information on the Polish science. The Information Processing Centre owns information resources ready to be used for the formulation of the state policy related to research and innovation as well as for preparation of due analyses and statistics. Works conducted at the Information Processing Centre are aimed at the adjustment of binding national norms and standards related to the scientific information to those being in force in the European Union.

http://www.opi.org.pl

Romania

SC ITC SA – Institute for Computers (ITC)

ITC was founded in 1967 as a research development company in the information technology domain. The years from 1990 until 1993 were a restructuring period for ITC, concerning both its structure and its activity. It is now an agency providing IT strategies with emphasis on software development, IT solutions providing, and system integration. A pioneer of activities related to multimedia products development, ITC is also member of ARMI (Romanian Association of Interactive Multimedia) and coordinator of the Romanian E-Content Competition, a national initiative for promoting quality E-Content products on international markets.

http://www.itc.ro, http://www.itcnet.ro

Slovakia

ELET, s.r.o.

ELET was founded in May 1995 under the name Easy Learning & Teaching. It is the oldest company in Slovakia doing business in company presentation, communication and marketing on the Internet. The activities focus especially on the creation of corporate identity and branding programs on the Internet, web sites and online marketing systems, mobile application solutions, online education systems and specialised online courses. ELET is the national co-ordinator of the Slovak competition covering the best multi-media products and web pages called SlovakPrix MultiMedia, held under the auspices of the pan-European competition EUROPRIX.

http://www.elet.sk/english

About the Authors

Boumans, Jak (BA, MDiv.) is principal consultant with Electronic Media Reporting in Utrecht (The Netherlands), which is specialised in content strategy. He worked previously for TNO Centre for Technology and Policy Studies and the publishers Wegener, VNU and Kluwer. He is author of several books and many articles for national and international trade magazines and has been a member in several juries for multimedia competitions (EPPY Awards, EUROPRIX, Europrix Top Talent Awards). He is General Secretary of the European Academy of Digital Media (EADiM), member of the World Summit Award board, and also member of the Slovakian Academy of Communication.
E-Mail: jak@euronet.nl

Bruck, Peter A. (MA, Dr. iur., PhD) is Head of the Research Studios at ARC Seibersdorf Research, the most eminent research institution in Austria. He has over 25 years of consulting experience in the area of media, communications and IT. He earned degrees in law, sociology, and communications and received numerous awards and fellowships in Europe, the US, and Canada. Overall, he has founded, built up and headed research institutes at three universities and has been senior partner in ICRA International Communications Research Associates, Ottawa (Canada). He is Chairman of the Advisory Committee on Media Diversity of the Council of Europe, has been principal researcher in numerous EC funded projects and initiated the EUROPRIX, Europe's leading multimedia award, as well as the World Summit Award. He is also honorary President of the International Centre for New Media in Salzburg (Austria), and Chairman of the Board of the European Academy of Digital Media (The Netherlands).
E-Mail: bruck@research.at

Buchholz, Andrea (MA, PhD) has been project manager of the EC-funded ACTeN project at MFG Baden-Württemberg, Stuttgart (Germany) from 2002–2004. Prior to this she studied computer science (University of Hamburg, Germany) and then turned to the social scientific study of new technologies (University of Edinburgh, Brunel University in West London, UK). She graduated in 2001 at the Department of Human Sciences at Brunel University with a PhD thesis on users in the virtual university. Furthermore, she worked as a lecturer and as a researcher in a German university project.
E-Mail: andrea.buchholz@gmx.net

Hartmann, Bernd (MA, Dipl.-Germ.) is currently working as Junior Project Manager for MFG Baden-Württemberg, Stuttgart (Germany). Prior to this, he interned in numerous companies of the cultural and media sector. He studied Journalism, Literature, and Business Administration and holds degrees from the University of Bamberg, Germany, and the University of Waterloo, Canada. He recently published a book on the narrativity of Computer Games.
E-Mail: hartmann@mfg.de

Karssen, Zeger worked as an researcher for IT companies and for the University of Amsterdam, after which he got involved in several companies related to the creation of contents for the Internet. Since 1997, he is working for Digital Dispatch in Paris, specialising in consultancy for E-Publishing strategy and delivery. In 2000, Zeger started to work as a publisher of scientific journals and books, both appearing in print and online. He also works for the European Commission as an evaluator of proposals and ongoing projects concerning electronic publishing and E-Commerce.
Email: zkarssen@digit-dispatch.com

Nagy, Attila is an ICT specialist in the area of training and education working in Budapest (Hungary) and Leuven (Belgium). He has participated in various development projects of web based applications and distributed database design and implementation, both for academic institution and for the industry. He also has strong experiences in multimedia enriched learning content development. He had worked in various non-governmental organisations and companies in Belgium, Hungary, and in The Netherlands.
E-Mail: nattila@enternet.hu

Orava, Janne (MSc Econ.) is a researcher at the Center for Knowledge and Innovation Research (CKIR) at the Helsinki School of Economics (Finland). Previously, he has worked as a researcher at LTT Research Ltd, as a product manager and sales manager at Smartner Information Systems Ltd, and as a consultant at Adcore Finland. He has done several research and market analysis reports and business projects on topics related to digital TV, digital communities, mobile and Internet services and portals.
E-Mail: janne.orava@hkkk.fi

Pelkonen, Tommi (MSc Econ.) is a researcher at the Helsinki School of Economics (Finland). He has worked as management consultant specialising in mobile telecommunications, internationalisation, and business strategy formulation at Satama Interactive, a European digital services firm. He also has professional experience as project manager and senior researcher at LTT-Research Ltd analyzing the developments in the Finnish interactive service provision markets. This topic forms also the theme of his doctoral dissertation. Pelkonen has authored several publications of the Finnish digital media landscape.
E-Mail: pelkonen@hkkk.fi

Perttula, Mika (BSc Econ.) is a consultant in his own consultancy company, Unique Element Ltd., and a researcher at LTT Research Ltd., Helsinki (Finland). Previously, he has worked as a director of Professional Services at Smartner Information Systems Ltd and as a project manager at Adcore Finland. He has done several research, market analysis and business development projects for Finnish companies on topics related to digital TV, software business, mobile and Internet services.
E-Mail: mika.perttula@hkkk.fi

Sandhu, Swaran (Dipl. rer. com., MSc) is Head of Innovation Management/Research Management at MFG Baden-Württemberg, Stuttgart (Germany) and responsible for EU projects as well as research transfer projects. Prior to his current position he worked at the University of Hohenheim as a research assistant and also as freelance communication consultant. He holds degrees in Communication Studies and Public Relations from the University of Hohenheim, Germany, and Syracuse University, NY.
E-Mail: sandhu@mfg.de

Werkhoven, Peter (MSc, PhD) is director of Knowledge at TNO, Delft (The Netherlands), one of the largest research and technology organisations of Europe. Since 2001, he is also full professor in Multimedia Interaction of the Intelligent Sensory Information Systems group at the University of Amsterdam (in part-time). He has significant research experience in the area of human perception, Virtual Reality and information processing and previously held positions at Utrecht University and New York University. He has published over 40 scientific papers and over 30 scientific TNO-reports on contract research.
E-Mail: peter.werkhoven@tno.nl

Zerfass, Ansgar (Dr. rer. pol., Dipl.-Kfm.) is a Member of the Management Board of MFG Baden-Württemberg, Stuttgart (Germany). He is responsible for communication, professional training, internet, and research teams at MFG and holds several honorary positions in branch associations and academic bodies. Ansgar Zerfass graduated in business administration and communication sciences. He has 15 years of professional experience in corporate communications, as a publisher, university lecturer and as consultant to the state's government. He has received renowned awards both for his academic work (several books, about 90 articles) and his communication programmes.
E-Mail: zerfass@mfg.de