Media Transformation in Germany: A Comprehensive Overview

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Media industries are an important part of the "Creative Industries". They are in a very dynamic phase due to extreme changes since the early 1990s. Developments are driven by the "digital shift", changing media use, the commercialization of media businesses and new business models. An overview of media transformations is given from a German perspective. Information and communication technologies are the most important drivers for media development. This article will analyze developments in print media, electronic mass media and individual media.

1. Media

1.1 Definition and Media Development Drivers

Media businesses are in a very dynamic phase due to extreme changes since the early 1990s. Developments are driven by the "digital shift", changing media use, the commercialization of media businesses and new business models.

Some statements will highlight the current discussion concerning the "media revolution": "new media" will ruin and replace "old media", sometimes called "dead tree media". Companies will "stick with ink and sink". W. Thaenert stated: The revolution is that digital natives are less and less interested in traditional mass media [cf. 1]. The "new media" are mobile, social and interactive. The "new media" agenda is driven by companies like Google, Apple, Amazon and Facebook. Everybody is now a publisher by defining the degree of privacy of his information in the internet.

Therefore some major questions have to be answered: Which technologies are the important "enablers" for new media products and services? Is there a "world without print" in the future? Are there sustainable changes in the use of media? Who is driving the media agenda? Which business models will be successful in future?

From a social point of view the major question is: Are there changes in terms of "media democracy"? Where are the jobs in the media industries of tomorrow and what does this mean for education?

This article gives an overview of media transformations from a German perspective, but the situation in most of the industrialized countries will be similar.

How can media be defined? Media are part of our culture and influence our view of the society. Media are used because of their content. Therefore it is necessary to understand design and production of media, media use, the social consequences of media use (e.g. political power of media enterprises), media technologies, media business models and media business processes. Media businesses (Figure 1-1) include media industry sectors, media industry suppliers and media services in other industries.

Media industries are an important part of the "Creative Industries" [cf. 33] which include copyright industries, content and cultural industries. The "digital shift" is an important enabler for media industries. Media development is not a replacement of one media technology by another, it is only partially a substitution (Figure 1-2) with new dependencies between media (convergent media).

Changes due to the Internet are not limited to paper based media, they are true for movie industries and music industries, too [cf. 2]. Therefore the European Commission published a Green Paper "to open a broad, public discussion on the implications of the on-going transformation of the audiovisual media landscape, characterised by a steady increase in the convergence of media services and the way in which these services are consumed and delivered" [32].

1.2 Changes in Media Use

There are major changes in the use of media. Due to mobile media and the simultaneous use of different media the overall consumption of media is expanding. Especially the "digital natives" change from paper based media to digital media. There are different research studies coming to different conclusions whether the digital natives will change their behavior when they will switch to other phases of life. The perception is that mobile devices are part of the personal identity, status symbol and universal personal device. To be "always-on" and "always-in-touch" with "friends" in social networks is important for the behavior when using digital media

Media Industry Sectors	Media Industry Suppliers	Media Services in other Industries
- publishers - print shops - TV and radio - telecommunication - games & e-learning - computer animation - media asset management - movies and cinema - event management - advertising agencies - libraries and archives	- printing machines - paper - ink - audio and video technology - IT - network infrastructure and access	- corporate design - customer relationship management - information research - corporate publishing - (mobile) internet platforms - package printing - public relations

Figure 1-1: Media Businesses

integration (future)	- internet of things and adaptive media - Smart City: driven by IT, communication, media - Enterprise 2.0 (enterprises using social media)	digitalisation of all media
individual media	- the "Turing"-galaxy: location-independent and interactive media, "one-to-one" relations (www since 1993, GSM since 1992 in Germany) - the "social" web, semantic web, "Prosumers"	
electronic mass media	- TV, radio, cinema (radio in Germany since 1924, color TV since 1967)	
photography and telephone	- since 1840: diffusion of cameras - since 1880: diffusion of wired phones in Germany	
print media (1450)	- "Gutenberg"-galaxy: mechanical copying of information (mass production) - change from handwriting to typographic media - Gutenberg: printing press (Germany) - Bi Sheng: movable types in China (1040)	
written record (3500 B.C.)	- written records, paintings, manual reproduction - communication is independent from personal presence - storing of knowledge is independent from individual memory	
language, vocals	- oral tradition of knowledge	

Figure 1-2: Development of media and communications

Girls	%	Boys	%
listening to music	92	using the Internet	88
using the Internet	88	listening to music	87
using a mobile	87	using a mobile	74
reading books	65	computer gaming	63
listening to radio	61	looking at TV	57
looking at TV	52	listening to radio	51
reading newspapers	36	reading newspapers	47
computer gaming	29	reading books	45

Figure 1-3: Importance of media for youths [cf. 3]

as well as talk activeness. Information assessments of "friends" is often more interesting than the opinion of professional journalists.

User behaviour is measured regularly for the use of radio and print media via interviews ("Mediaanalyse"), for TV ("GfK-Panel") and for Internet by "Arbeitsgemeinschaft Online Forschung (AGOF)".

The JIM-Study, analyzing media use of young persons (12 to 19 years old) in Germany shows the importance of media for youths (Figure 1-3) and the importance of mobile media: 96% own a mobile phone, 47% can be characterized as smart phones. 87% are using online-communities. 87% have access to the Internet from their room. Approximately 60% have their own TV, radio and camera. 80% have a computer, 7% have a tablet PC. It is interesting that still the most trusted media for youths is the newspaper [cf. 3]. Comparing the JIM-Study of 1999 and 2012, the amazing changes in media use can be seen: Only 13% of young persons were using the Internet in the 1999 study [cf. 33 and 3], in the 2012 study 91%. They are using the Internet more than 2 hours a day on average.

1.3 Media Expenses: A Consumer View

From a consumer point of view the "digital shift" means costs for products, connectivity and integration of many devices: HD-TV flat screens (including 3D-TV, in future 4k-TV), Set-Top-Boxes, integrated DVD-, Audio-, Radio-, Home Cinema devices, AV-Receiver, surround-speakers, integrated media centers, gaming devices and mobile devices (tablets and mobile phones). Access costs (cable, satellite, wired broadband access or wireless access) are increasing. Interface technologies and standards like HDMI and USB between computers und audio-visual devices become more and more important. Many different "standards" for video, audio and compression of data including short product life cycles are often an excessive demand for customers. In addition, devices often have poor usability, there are compatibility problems and data conversion problems between devices.

Actually there is no final answer how IT developments influence the media and communication budget of consumers. Will they increase their media budgets? Will they shift from paper based content to hardware devices and digital content? The answers to these questions will be important for the success of new business models of media producers.

A significant part of the media budget of consumers is spent on content. Research results in Switzerland in 2008 show the media budgets of consumers: On content they spent approximately 57%, on access 14% and on hardware 29% [cf. 4].

Real costs of media are often hidden for the customers: content is often financed by advertising, public subsidies (e.g. true for movies). Charges for the performing rights society (Gema) are included in hardware. Advertising based content and the possibility to copy digital content easily led to a free-of-charge mentality in the Internet.

1.4 Content Producer View

Content producers like authors, musicians, actors and designers have to deal with new work flows and technologies. Authors have new possibilities for example due to trans-media storytelling. This is the technique of telling a story across multiple platforms and formats using digital technologies. Consumer technologies and professional technologies are merging, e.g. in the field of photography. New types of media art are enabled by merging such as digital media and events (as shown in the German world expo pavilion in Shanghai). Everybody can publish easily on the Internet, so the amount of published information is increasing rapidly. For scientists it is easy to publish knowledge quickly and to find open access and exchange possibilities on platforms like researchgate.net. Nevertheless, an unstable financial situation for many persons producing content is increasing, because of the difficulty to get attention without efficient marketing structures in the information (overflow) society.

2. Developments in Media Industries

2.1 Designing new Business Models

Business models in media industries are changing [cf. 35]. New players like telecommunication enterprises and mobile hardware suppliers offer media content. Different challenges can be seen for businesses in the different media industries.

TV: Public and private sectors exist in parallel in the area of TV stations. There are challenging questions like: Which content has to be funded by the public (public-value-test)? Is there a crowding out between public and private businesses? How can public TV stations be organised efficiently?

Newspapers and magazines: In the past advertising revenues were an important percentage of their revenues. When changing from paper to internet, advertising revenues are usually decreasing. However earnings from retail sales and subscriptions cannot pay for quality journalism. In addition, it is still difficult to setup a "paid content" business for publishers due to the cost-free mentality of the Internet.

Internet: The first internet hype in 2001 often was not based on real business, but on hope and irrational promises.

Printers: Declining profits due to under-utilization are a typical situation. Print shops are often small and medium-sized businesses. They focus on similar technologies, reducing their part of the value chain to print jobs. Print jobs are comparable and therefore profit margins are very low. Their business model is often only based on local presence. The Printing industry is changing from commercial to industrial structures, and from a technology to a product and customer driven view.

Business models for media industries all start from several basic ideas:

a) Reduction of costs: This can be achieved by creating sales without intermediates e.g. selling directly via the Internet in the music or books sectors. Another example is direct access to customers via Web-to-Print solutions for print shops. In addition, the adaption of management concepts of other industries can help to reduce process costs, for example Lean Printing.

b) Increasing market shares: The number of customers can be increased via the Internet. Local radio stations get new customers via streaming in the Internet. TV stations offer their media on web 2.0-platforms. New communication cultures can increase the numbers of customers too, such as prosumers acting in mobile environments. On the one hand they are producers offering ideas and apps and on the other hand they are consumers of the company.

Personalized, customer specific software environments and advertising can help customers to search and navigate in the internet, to enable easy access to media and to enable transactions, to interact with others and to prevent an information overload. On the other hand the company has access to detailed customer profiles. Business models based on this idea are implemented by Google for example.

c) New media products and services: There are many new products like the implementation of distributed mobile computer games or cloud-based personal storage for music and videos.

It is possible to turn recipients and readers to customers, by pay-per-view in IP-TV or paid content in the publishing sector. Pay-TV stations are able to identify customers and offer additional services. To implement such structures processes including individual accounting and customer relationship management are necessary. Tasks range from production and distribution to brand management and customer management and intellectual assets management. Different IT systems are necessary to support these tasks like business intelligence systems to analyze "big data".

Printers have to think more about customer needs and products to be successful, not about technologies ("we can produce on a 6-color-machine"). Successful business models can be very different. Examples could include:

- A small printing company offering a manufactory atmosphere for artists using old-fashioned collotype printing equipment.
- A company specializing in products for toys and children's books using lenticular printing.
- A print-on-demand printer for scientific books, enabling small production runs offering the whole business process including accounting and logistics.
- A web-to-print company offering personalized printing products and fast delivery.
- A printer offering quality management and logistics for price sensitive and non-time- critical print production, for example in China.
- A printer understanding the winery business and offering specialized printed materials including high end wine labels with customer-specific color management.

d) Public Funding: Some business models are mainly based on public funding, such as the public TV sector in Germany and parts of the movie production sector.

2.2 Business Process Engineering

Implementing integrated business processes is an important challenge. Information and communication technologies and a strong focus on customers are essential.

Some media sectors can only change to new structures if all participating companies in the process switch their technologies, e.g. from analog cinema to digital cinema. TV stations have to implement integrated processes to enable cost efficient media distribution on different channels.

Printers can enable new services like order tracking by using JDF-workflow technologies and can reduce possible quality problems using integrated data handling in the pre-press sector.

Print shops are able to implement more value added steps in their processes by understanding the business of their customers. They can integrate their processes into the business processes and IT of their customers, e.g. for printing operation instructions for the automotive industry. Another example is to use CAD data of customers for generating images and information for printed catalogues and internet shops.

It is typical for media industries and challenging that they have to deal with interfaces between "creative" and technical and economics oriented staff. It is necessary to understand the working principles of each group, starting with the education of media specialists.

2.3 Convergent Media

Media convergence is interpreted differently, focusing either on media distribution or on devices or on industrial sectors, for example the content distribution of text, audio and video via the same digital network. Another example is a device like a tablet PC, which allows watching TV, listening radio and reading newspapers on the same device. An important topic is the merging of the "TIMES"-industrial sectors: telecommunications, information technology, multimedia, entertainment and security services. Job descriptions and tasks are changing due to new structures and technologies. For example the role of the video journalists includes the jobs of a reporter, a cameraman and a cutter. Print, Online, Audio, Video, Mobile - all media will be produced and played out from a single point of information collection, selection and editing in a newsroom or newsplex center. Different play-out possibilities are much more efficient by using joint workflow technologies. IT-integration therefore is a key to convergent media. For example if a customer-oriented radio station has to be designed, the customer requests have to be known and user feedback has to be implemented. Customers give advice via phone and e-mail. A lot of data exist by analyzing access data in the Internet. IT enables one to collect and analyse this data in an integrated manner, display controlling information in management cockpits and give feed-back to the listeners and improve the radio program. Radio, TV and internet will be produced and used in a more integrated fashion (in Germany called "Trimedialität"). This will enable new interactive services and integrated devices. Media distributers like cable providers in addition offer integrated services like "TriplePlay" including phone, internet access, TV and video on demand.

2.4 Networks

The availability and development of mobile and wired networks for speech and data transfer have a significant impact on media development. In the mobile sector there is a rapid development including an increasing band width: from 2G-networks like GSM to 3G-networks like UMTS and 4G networks like Long Term Evolution (LTE). A major challenge is the encryption of data and the problem of safety from interception.

For wired Internet access broadband access like DSL and VDSL is used. Another challenging topic is net neutrality. This is the principle that Internet service providers should treat all data on the Internet equally, i.e. not discriminating for example by content.

Digital Video Broadcasting (DVB) is used for the transfer of digital TV and radio content using different transportation media including DVB-T (terrestrial), DVB-S (satellite) und DVB-C (cable). Satellite providers like ASTRA, cable network providers and telecommunication companies are important players for present and future network structures.

2.5 Media Effects and Ethics

Changes in media use raise the question of media control and media power in politics (media democracy) and media ethics. It will be important to improve media literacy for young people to understand media effects.

A lot of research will be necessary to understand possible effects of computer games including video game addiction and possible increase of readiness to use violence and new types of violence like "cyber mobbing". In Germany the "Bundesprüfstelle für jugendgefährdende Medien (BPjM)" tries to check effects of media on young persons. Voluntary and selfregulatory institutions for journalism, advertising and film exist too, such as "Presserat", "Werberat" and "FSK".

There are many sensitive questions to be discussed in the area of media ethics: TV ratings vs. quality in TV, access to media (information rich and information poor), hidden product placements in movies, self-control of media vs. all types of censorship, paparazzi vs. public interest and changing media power in politics due to concentration in the media sectors. It is an advantage that the increasing accessibility of the Internet on a world-wide basis makes censorship more and more ineffective.

Quality benchmarks are also changing. The assessment of information in social media is based more on the opinion of friends and users than on editorial quality assurance by journalists. Cost problems of newspapers increasingly enforce the reduction of the number of journalists, reducing the possibilities of investigative journalism as a "fourth estate" in democracy. Therefore there are discussions whether a public media fee could help to defend media pluralism.

New types of campaigns in media are developing. The President of the United States, Barack Obama organised the first "Internet electoral campaign". New problems have to be addressed like flash mobs or changes to the CVs of politicians in wikipedia during political campaigns. "Internet democracy" is not always representative. Are bloggers representatives of the society or representatives of particular interests?

Users get the power to influence companies via "shit storms" in social networks.

Digital media allows user profiling. This causes questions of internet law and ethical questions. For example, can information, published in social networks, be used in recruitment procedures by employers? In general, this is a question of the right of the citizens to data protection. Kruse [cf. 5] identified another possible problem. In social networks with a large number of users there is the danger of mutual escalations on certain topics. Such effects are known, for example from electronic trading platforms.

2.6 Government Supervision and Funding

Public support and control for changes in the media sector may contain the setting of an organizational and legal framework by regulatory authorities (Landesmedienanstalten). In addition, research can be done on the topic of innovative media services by universities. Platforms for the collaboration of media companies can be built. This is supported in Germany e.g. by the "Medien- und Filmgesellschaft Baden-Württemberg".

The main goal is the protection of minors, guaranteeing freedom of information, and diversity of opinion by prohibiting concentration in the media sector. In Germany, this is the task of the "Kommission zur Ermittlung der Konzentration im Medienbereich (KEK)" and the regulatory authorities of the states, which give licenses to private TV and radio stations. This is challenging because it becomes more and more difficult to define "broadcasting" in the Internet world and to define a financial balance between public and private stations.

Internet law therefore becomes wider: The Telemedia act (Telemediengesetz) and the German Interstate Broadcasting Treaty (Rundfunkstaatsvertrag) try to focus on these topics, in addition to the German Copyright act (Urheberrechtsgesetz).

2.7 International Aspects

The effects of the digital shift described above are true for most industrialized countries including the threats for publishers and quality journalism.

Another common issue is that the number of mobile phones is higher than the population in many countries, including Italy, Sweden or Great Britain. The responsible EU-commissioner illustrates: "There are today more mobile phone subscriptions than citizens in the EU" [6]. Mobile media have an increasing importance in emerging countries like India and China, too.

Internationalization and globalization of media enterprises is growing. The Rupert Murdoch group of companies is an example for this trend. Emerging nations like India established their own media production capacities, such as in the sector of film industries ("Bollywood").

The willingness to produce non time-critical physical products in offshore countries is increasing, because data transport via large distances and quality control has become very easy [cf. 7]. It can be expected that changes due to IT in media industries of industrialized countries will be the same for the emerging countries with a delay.

From a German point of view, the Chinese print media market is very important, especially for the machinery and allied equipment supplying industry. The effects of IT on processes in China are rather low because cost pressure on wages is still low. The conversion process of state-owned print shops to private companies will increase this cost pressure. There are many types of cooperations between German and Chinese companies concerning print products (Figure 2-1). They work together as print buyers, in joint ventures or via intermediaries (like the brokers for print products in Hong Kong). Success factors include dealing with different working styles, different cultures and different understanding of design.

2.8 Sustainability

Sustainable production and distribution of print media and digital media is becoming more and more important. Many tasks have to be solved: Reduction of energy consumption, like "Green IT" for computer centers and consumers. Green Printing focuses on comprehensive views of processes (including paper production, transportation, ink production, printing, recycling, deinking) supported by carbon footprint initiatives, environmental audits and life cycle assessments. There are different labels to identify "green" paper and printing companies like EMAS (Eco-Management and Audit Scheme), Pan

Printed in	Sales Market	Property rights / Definition of content and layout	Examples
Germany	Germany	China	Novel of a Chinese author
	China	Germany	Industrial catalogue of a German manufacturer selling in China
China	Germany	Germany	▪ Printed calendar (in general: cost-sensitive and non-time critical products) ▪ Children's book ▪ Packaging of industrial goods and printed operating manuals
		China	Chinese language textbook
	China	Germany	Technical instructions textbook

Figure 2-1: Examples for print products in German-Chinese Cooperation

European Forest Certification, European Eco Labeling Board, Nordic Eco Labeling Board and FSC Label. In addition there is the possibility to trade with emission rights (like CDM = Clean Development Mechanism) in order to give incentives to print companies to develop sustainable technologies and processes.

2.9 Job Markets

In Germany there are 155,000 employees in the printing industry [cf. 9]. The number of employees in German print industry decreased approximately 30% (i.e. 70,000 jobs) between 2000 and 2011. In this time span 4,100 print companies went out of business [cf. 9].

However, the printing industry is offering higher salaries than the average of electronic media (according to the statistics agency Baden-Württemberg, analyzing alumni of Stuttgart Media University). In addition there are printing companies in the area of packaging, which are not included in this Figure and the suppliers of printing machines and equipment, like Heidelberger Druckmaschinen with approx. 15,000 employees worldwide.

In libraries and archives the job market is related to the public budget. There are 11,600 employees in public libraries and 117,000 in academic libraries (only academic staff) [cf. 8].

Publishing houses range from big enterprises to small companies. They produce and sell books, magazines, newspapers and electronic services, including even TV and radio channels. The number of employees in the publishing sector at present is estimated to about 125.000, out of which 34.000 are working with magazines publishing houses [cf. 10]. The number of publishing firms has decreased to about 2.000 today.

There are powerful media enterprises like Axel Springer AG (14,000 employees) and Bertelsmann (more than 100,000 employees) with global activities: They include publishing, media production and media services.

There are two groups of TV and radio stations: two public groups (ARD with 20,000 employees and ZDF with 3,600) and mainly two private groups, ProSiebenSat.1 Media AG with approx. 4,100 employees and the RTL group with 12,000 staff.

Many film production companies and animation companies exist, many structured in micro enterprises and many persons work based on freelancer contracts.

The employment situation in the field of communication depends very much on the economic (economic cycles). This is true for advertising agencies and partially for communication departments, public relations departments and corporate publishing activities in big companies. The field for journalists without skills in new sectors like cross-media is rather difficult.

Parts of the ICT sector are related to media, including games, car and in-flight infotainment. Media industries need a lot of IT specialists, so the job market is still growing. New job descriptions like "game level designers" exist. The games association BIU estimates 10,000 jobs in the industry related to the gaming sector in Germany [34].

In all media businesses there is a need for high qualified specialists that can deal with changing technologies, business models and new services.

The applicant number and quality of universities do unfortunately not reflect the needs of the job market. Applicants often opt for subjects expecting "creative jobs" and "Hollywood glamour".

3. Digital Shift: Technologies and Markets in Media Sectors

It is necessary to give an idea of the market size. Gläser [36] estimates the media market size in Germany around Euro 60 bn (in 2008). This Figure includes TV 12 bn and radio 3.5 bn (sales and licence fees for public channels), 2.4 bn cinema and video libraries, newspapers 9.1 bn, magazines 6.4 bn, advertising journals 2 bn, books 9.6 bn, music 1.6 bn and games 1.8 bn. The distinction of the media sector is difficult: Which part of the Internet business is related to the "media sector"? Another example is the advertising sector: The sales of media industries in the advertising sector are 20.4 bn, the industry expenses in advertising (like advertising design and media production, payments for spots in TV, newspaper advertisements) are 30.7 bn Euro [37].

3.1 Publishing Houses and Online-Distribution of Media

Publishers have to deal with print and IT products. The traditional distribution of print products is supplemented by online distribution and new intermediates like Amazon. Some publishers try to establish platforms together to reduce the dependency of the new gatekeepers like Apple, Google or Amazon. Web platforms allow persons and institutions to publish information without being a publisher. The option of paid content is still seen controversial, therefore strategies are different. In every case there is a demand for adequate payment systems for internet based services.

The situation and strategies of publishers are very different:

a) Big players with different media channels and services: These big players like Bertelsmann in Germany cover TV, radio, internet and print media. They can offer cross-media and trans-media services for advertising and transactions (for example the execution of travel bookings for hotels described in travel magazines).

b) Book publishers: 80–100 thousand new titles in Germany per year show the market significance. E-books, audio books and learning software are competitors of printed books. In Germany book prices are fixed, due to the so called "Buchpreisbindung". Intermediate structure was characterized up to now by intermediates called "Barsortimenter" between publishers and bookstores. Intermediates are increasingly using online platforms which include product assessment by users and additional services, for example for selling used and antiquarian books. New global player like Amazon change the market. E-books use dedicated e-book reader hardware or tablet computers. The market is increasing on a low base (they currently have 2% market share). Different technical data formats and copy protection systems are used. From a legal point of view the users usually buy a reading license, not a book.

Partially traditional print solutions were nearly totally substituted by online solutions, for example Wikipedia in the sector of encyclopedias. Wikipedia follows the Internet approach of prosumers, i.e. being consumer and often producer at the same time.

Due to decreasing circulations in production shorter runs have to be realized like scientific books using book-on-demand solutions.

c) Newspaper and magazine publishers: Circulations of daily newspapers in Germany are decreasing from 25.9 Mio/day in 1993 to 18.8 in 2011 [cf. 12]. The number of magazines and newspaper titles is still large, but the circulations are decreasing in total and market concentration is increasing. An exception is the corporate publishing and partially the advertising journal sector.

Switching of advertising from print to internet causes problems for the publishers (Figure 3-1). The figures for advertising revenues in Germany in 2011 are: Euro 18.9 bn in total, daily newspapers 3.6 bn, TV 4 bn, magazines (including professional magazines and academic journals) 2.3 bn, radio 0.7 bn, online 1 bn [cf. 20]. Advertising revenues in Internet-based media are usually lower than in the print sector. As a consequence, publishers have to reduce their news desks and number of editors. This will lower quality and sales and lead to a negative feed-back loop. Intermediates market is regulated, the so called "presse-grosso".

IT can enable cost-efficient solutions like newsplex centers to offer information and news on different channels. New business models like individualized newspapers are being tested.

The distribution of newspapers can be based on print, apps for smartphones, tablets or web-pages (financed by advertising or fees). A mix of online and print can be offered by augmented reality. The camera of a smartphone can identify certain parts of a newspaper page and offer additional information on the Internet.
In general experts expect that the area of fast information will disappear from print media. Paper-based media will remain on in-depth analysis and background stories (especially on local activities) including a positive slowdown effect to prohibit inefficient information overflow.

New services can be designed. Individualized newspapers are tested on the Internet, such as "news2paper" [cf. 25]. A problem may be that many users want to be

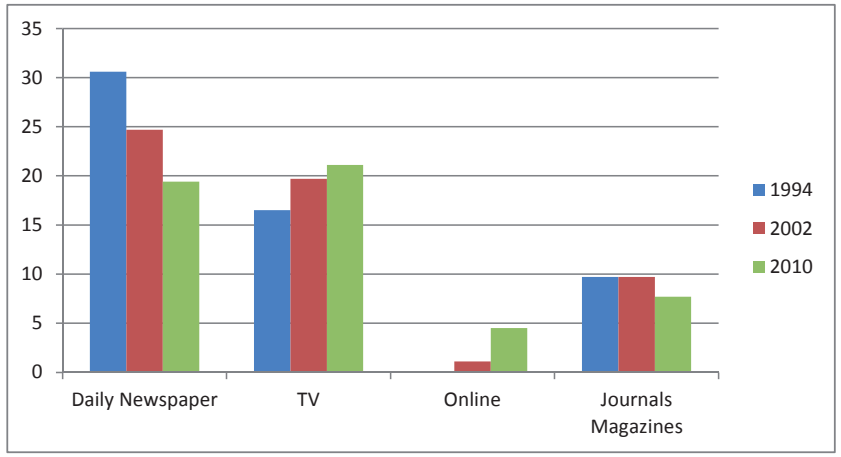

Figure 3-1: Advertising Revenues in Germany in % [cf. 20]

"surprised" by unforeseen news, they often do not want to preselect news areas.

Some newspapers try to publish only online without print (like huffingtonpost.com in the US), but coming from paper media it is often difficult to transfer the brand and to use online media as a "push" and campaign oriented media.

An important legal issue is the charge-free use of Internet content. On the one hand "Google news" offers links and headlines to online content of publishers. Google makes profit via advertising on the Google pages. On the other hand, most publishers would have less traffic on their pages without Google. Publishers are convinced that the right to a financial compensation should be fixed by law.

3.2 Mobile Media

Mobile Media are location-independent and interactive. They are the most important basis for revolutionary changes in media use: "create your own content" and "always in touch" define the new developments. The hardware for mobile media is based on mobiles, smartphones and tablets as well as car infotainment systems and mobile gaming devices.

Mobile hardware often includes Internet access via UMTS or LTE and integrated communication (e.g. unified Messaging, text-to-speech), Bluetooth, NFC and location based services based on GPS and in the future on Galileo.

These technologies allow the design and implementation of augmented reality and responsive media, offering communication, services and online transactions including mobile payment.

Business models of hardware suppliers are more and more based on software eco systems. These systems include hardware, free software development kits and platforms for apps and content like news, videos, images, maps and cloud services.

3.3 Advertising and Communication

IT enables challenging possibilities for communication in enterprises and with customers and stakeholders. A wide area of communication aspects has to be supported, including public relations, corporate publishing and multi-channel advertising.

Information and perceptual overload leads to below-the-line advertising. Above-the-line advertising is traditional advertising in TV, radio, and print media, often implemented as trans-media and cross-media concepts. Below-the-line advertising concepts are guerilla marketing, viral marketing in social networks, sponsoring and product placements (those integrated in mobile games).

Communication to employees using B2E-platforms (business to employee) or communication in change management processes are becoming increasingly important. This includes spatial media design for product presentations or stockholder meetings.

Measurement of advertising in Germany is done by the "ivw" association for the determination of the dissemination/circulation of advertising media (print, broadcast and internet).

Some trends highlight the development:

a) Online advertising and communication: As already described in section 2.1 enterprises like Google have significant impact on advertising by offering services for profiling of users, user-specific advertising and success measurement in the Internet. Their systems are able to detect and compare similar user profiles and to analyze possible customer preferences. Combining tracked data of users from different applications the assessment of customer preferences can be very precise.

b) Dialog marketing: The Internet allows interaction with customers on a 1:1 base. Internet (e-mails, chat rooms, communities) and phone allow feedback channels. Personalized mailings support the interaction with customers. Interactions with customers have to be organised in an efficient way in order to win new customers, to improve products by customer ideas or to deal with claims to satisfy customers. Customer knowledge has to be documented and valuable customers have to be detected.

New specific IT systems are necessary: customer relationship management systems (CRM), content management systems, data warehouses, data mining, computer aided telephony systems, media planning and campaign management tools support customer care centers. Legal issues are serious, e.g. on e-mail-advertising and legal possibilities of contracts made by phone calls. In many cases customer satisfaction with customer care centers is low e.g. because of inefficient process integration into the company.

c) Cross-Media-Marketing: It can be defined as integrated actions in advertising campaigns. Planning and concepts take into account all media. All media are used with respect to their advantages concerning costs, benefits, and prospects. Newspapers often have the role of push media in such concepts. The fields of information, advertising, entertainment and learning lead to new mixed formats like edutainment, infotainment, advertainment and infomercial.

d) Brands: Branding is a big issue in advertising, such as the transfer of brands from print to the Internet and establishing new brands for products and companies.

e) Mobile and social media advertising: It is a fast growing market including completely new services like Second Screen services, where TV and Internet is integrated by detecting the actual TV channel of a user, enabling the user to chat with others simultaneously and to discuss the program and to enable shopping products seen on TV (e.g. wywy.tv). Consumers will expect a mix of community experience and inspiration, being partially a "lean back" consumer (couch potato) and partially an interactive "lean forward" consumer.

3.4 Digital Libraries

Academic and public libraries become hybrid structures, with both paper-based and digital media, the library becomes a learning center and learning space. Libraries offer services for searching in digital catalogs and using online media content (e-books, digital journals).

Archives and academic libraries are focusing on the challenge of long-term archival of paper and fast increasing digital data, like the "Nestor" project [cf. 13].

In addition, there are information hosts, (e.g. FIZ Karlsruhe) and private information hosts like Genios for industrial online research like trademark and balance sheet enquiries, competitor and industry structure enquiries.

A new service quality is free global access to data, like scanned books. This development - forced by Google - is seen by many publishers as critical and very controversial. On the one hand, the power of companies like Google as gate-keepers of the digital age is gigantic. On the other hand, there is the threat that content being not integrated into the big gate-keepers will be of no more relevance in future [cf. 14]. As an "answer to Google" [cf. 15] the development of a German digital library (Deutsche Digitale Bibliothek - DDB) has been started. The DDB can be seen as the German contribution to the European Digital Library (Europeana) which will provide digital access to the cultural goods of Europe.

Even in the sector of museums the digital shift causes changes: Virtual museums and the digital animation of objects are examples for this changes.

3.5 Music, Games and E-Learning

Computer and video games are an increasing market: First-person-shooter games, adventure and strategy games, simulations like flight simulators, sport games and Massively Multiplayer Online Role-Playing Games (MMORGs). These games run on game consoles including mobile devices, Gaming PCs and increasingly on smart phones.

An increasing market is serious gaming and e-learning. In 2012 in Germany sales were 1.85 Billion Euro. 150 companies in Germany develop and market games [34].

The changes due to the digital shift are dramatic for the music industry. Music downloads from illegal internet exchange sites and peer-to-peer copies are

challenging problems. As the conventional music industry had implemented new business models only in parts and also too late, it could not prevent new players such as Apple from the entrance into and the dominance of the market.

3.6 Digital TV, Radio, Cinema & Animation

The German TV market: In Germany there is a competition between public (primarily financed by license fees) and private TV stations (c.f. chapter 2.1). The biggest public stations are the ARD broadcasting group and ZDF, the biggest private companies are ProSiebenSat1 Media AG and RTL Groups.

The number of shopping channels and special-interest channels is increasing. In addition, Pay-TV channels are available. Most private channels try to become more independent from the advertising market by fees, additional services on Internet platforms and by offering cross-media services. All TV stations have to manage increasing costs due to play-out for different distribution channels (DVB-T, satellite, cable, internet) and increasing costs for broadcasting and property rights in the sports sector.

Public TV stations have to manage the problem that young people in particular get their information often from the Internet or private stations [cf. 16]. On the one hand, public TV stations have to offer more information on the Internet. On the other hand, authorities have to prohibit unfair competition between public TV (and the financial power of public license fees) and publishers and private stations.

Audio-visual productions in Germany: A large number of often very small production and animation companies for movie and film productions in TV and cinema exist, including advertising spots. The financing of movies is especially complex. Different (partially public) investors have to work together, in order to reduce financial risks. New forms of financing like crowd-funding (individuals who pool their money, to support film or game productions) are currently tested [cf. 21]. New formats like scripted reality have been developed. It is still difficult for TV channels to develop successful new television formats. Therefore it will be interesting to have "labs" for testing new formats before "going live". The production of audio-visual content in the low-end technology sector for Internet platforms by political parties and companies is an increasing sector. Prosumers produce more and more audio-visual content for platforms like Youtube. Developments like "Google hangout on air" allow new services similar to TV on the Internet.

Radio: A large number of radio channels exist: public and private channels, nation-wide and regional, commercial and non-commercial. For the radio sector new digital technologies like web radios (audio services transmitted via Internet), DAB (Digital Audio Broadcasting) and the up to now unsuccessful DRM have been developed. DAB+ offers the possibility of additional information like Slideshow Service (SLS) and Dynamic Label Service (DLS) for the users. The diffusion of digital broadcasts is still difficult due to millions of existing analogue devices.

Cinema: The cinema sector is changing to fully digitalized processes including production and distribution and different 3D technologies. Difficulties are high investment costs and prevention of illegal copying. The number of video libraries is still decreasing due to different types of virtual video libraries.

IT drives developments: IT has to support cost-efficient processes, and the integration of very heterogenous IT infrastructure and digital workflows, by using SOA (service oriented architecture) IT concepts [cf. 17]. IT will allow the flexible integration of new spots for commercial breaks just before going on air.

IT systems include studio and broadcasting equipment as well as Production Planning and Control Systems for TV and radio (PPC), playout and archiving (including digital asset management), ERP-Systems, Intellectual Property Management systems, Media Asset Management databases and settlement systems for customers. Specialized standards for TV compression formats and metadata are important as well a new software for virtual studios or 3D-TV. Consumer IT producers are large enterprises, in contradiction specialized IT providers for TV stations are often small and not always stable. In the computer generated imagery (cgi) sector there are a lot small specialized companies for animation, motion capturing, motion control, light caves, virtual reality (VR) and vfx.

Pay-TV developed from unknown recipients to customers and the possibility of building user profiles. On-demand services like video-on-demand, pay-per-view und pay-per-channel services are available. Interactive TV allows new business models. The precondition is digital broadcasting, Set-top boxes and a (Internet based) feedback channel. Integrated production of Internet and TV is implemented by the Swiss joiz channel, for example.

Service-Engineering for new types of cooperation between TV stations and publishers, the usage of archives (legal and technical problems) and the outsourcing of the IT of TV stations (BBC-Siemens) have to be done.

New services can be realized in future or have just been started, such as a personalized news presentation by avatars collecting photos, videos and news from Internet pages and blogs. An example is News-at-Seven [cf. 18].

3.7 Print and Packaging

From a technological point of view there is still a mix of printing technologies. The supplier market consists of paper, ink, presses, consumables and prepress and post press equipment. Germany is still the leading supplier of sheetfed-offset technology. The market share of printing press technologies depends whether the figures are based on the number of presses or the paper output in m^2 or sales value (Figure 3-2). In addition, printing technology is used not only for publications and packaging, it is used e.g. for decorative printing or printed electronics, too.

Gravure printing (excluding packaging printing) is concentrated on a few large enterprises offering high volume printing capacities. Digital printing technologies are typically used for personalized or on-demand products or large scale products with short print runs in production.

Printing Volume	Sector	Main Technologies
178 bn Euro	Commercial (Advertising, catalogs,...)	Sheetfed-Offset 45% Web-Offset 28% Digital 16%
99 bn Euro	Packaging (Folding boxes and flexible packaging each 40%, labels 20%)	Flexo 41% Sheetfed-Offset 33% Gravure & others 23% Digital 3%
136 bn Euro	Publishing (newspapers 35%, books 19%, magazines 30%,...)	Web-Offset 55% Sheetfed-Offset 27% Digital 7% Gravure & others 11%

Figure 3-2: World Printing Market [cf. 29 and 30]

However large format printing has been partially replaced by digital "outdoor media". Due to the customer demands and an increasing quality of digital prints the market share of digital printing is rising.

Automatisation and increasing printing capacity per press causes an overcapacity problem in the printing industry. In addition data for print jobs can easily transported to other (cheaper) parts of the world. Therefore, printers need a strong product and customer focus (as discussed in chapter 2.1) strong business models and if possible integration into the processes of customers. The showroom of many German printers is still the shop floor. They present production technology instead of products. "Printers need to become more involved in their customers' businesses. Once printers can gain a deeper understanding of their customers' business strategies ..., they can better develop creative solutions through their services. This requires a different selling strategy for printers and encourages them to move beyond the title "printer" to a broader title that encompasses the flexibility to alter services to match their customers' needs" [19].

The number of print shops in Germany is decreasing: from 13,900 (in 2000) to 10,900 (in 2007) to 9749 (in 2011). 284 have more than 100 staff, 6838 less than 10 [cf. 9]. The number of opened insolvency procedures of print shops in Germany is significant. A maximum of more than 350 in 2003, and in 2011 more than 200 [cf. 20].

Nevertheless, a large production volume of printing industry in Germany remains (in 2011): Euro 16.3 bn in total, consisting of advertising material/catalogues 5.9 bn, books 1.2 bn, newspapers and magazines 2.8 bn, labels 1.2 bn [cf. 20].

The costs of German printing industry in 2010 show an interesting structure: Materials Euro 7.5 bn (48%), staff 4.4 bn (28%), financial costs (depreciation, interest) 1.6 bn Euro (10%), others 2.1 bn [cf. 20].

The German Government expects that the pressure of digital media on print media will still be increasing and be a permanent pressure for the economic situation of the publishers. However, it expects newspapers, magazines and books to be a integral part of the media offer [cf. 11].

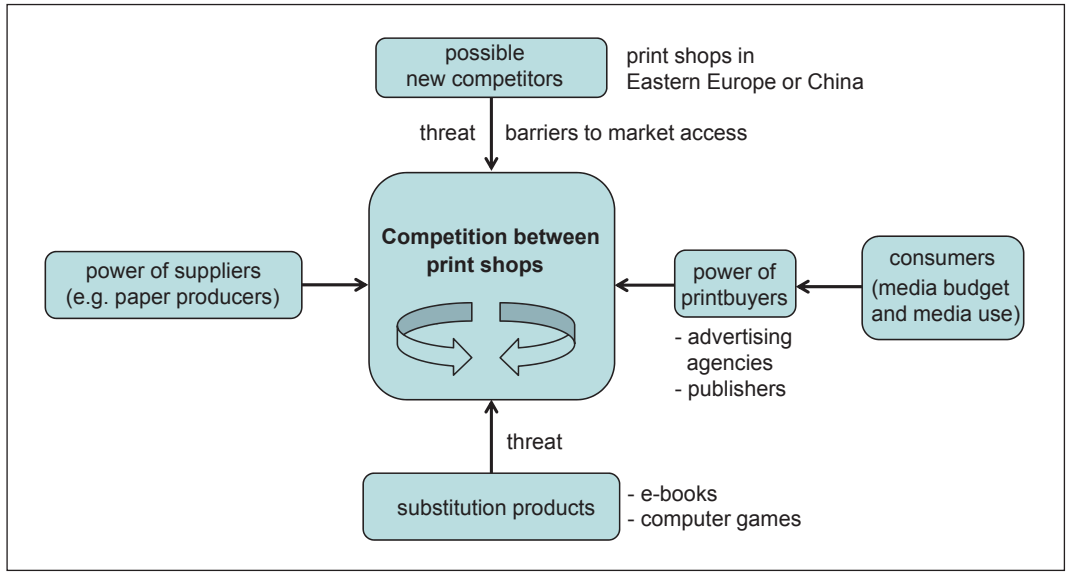

Figure 3-3: Mapping Porter's Strategy View on the Printing Industry

Figure 3-3 shows the mapping of Porter's strategy view [cf. 31] on the printing industry. Barriers of market access for competitors are lowered by IT (easy data transfer around the world, cheap transportation enables offshore printing), digital media can partially substitute print media. Print buyers like publishing houses have to make make-or-buy-decisions.

New services like web-to-print and database publishing can be offered by print shops. Data usage for different media can be enabled using media-neutral database management systems (separation of content and format information) and editorial systems.

The pre-press sector is completely digitalized: photography, software for DTP, page assembly and workflow support based on Job Definition Format (JDF) [cf. 22]. In the business-user sector integrated print, scan and copy solutions (scan-to-mail) and settlement systems are available. New technologies like 3D-scanning, 3D-printing and mobile tagging offer new possibilities. Green Printing is an issue for all sectors of printing.

The traditional strength of print will remain, including surface feeling, reading experience and offline capability.

Packaging is a very important issue for the preservation of goods and for product marketing and therefore a field for the printing industry (Figure 3-4). Packaging cannot be replaced by digital media and is a growing sector. The average annual growth rate is around 3.5% and the value is expected to reach US$ 597 bn by 2014 [cf. 23]. Development is including green printing & packaging (renewable raw materials, recycling), age appropriate packaging, finishing possibilities in printing, intelligent packaging using IT (e.g. RFID) or barcodes for improved logistics and additional information from the internet. A research topic for media is the different understanding of packaging design in different cultures, a big topic for global enterprises.

3.8 Social Web, Semantic Web and Internet of Things

Web 2.0 or the "Social Web" is social software with interactive and collaborative elements as well as virtual worlds like Second Life. Social software often contains the option of "store & publish" in the Internet, exchange and communication with other persons (n:m media) and blogging. Popular web 2.0 platforms include Youtube, Facebook, Xing, and Twitter (Micro-Blogging). Business models are usually based on personalized advertising and profiling of users. The social web assumes that users are talkative, interactive and willing to share information with friends and to publish private information (user-generated content). The assessment of friends is often more important for the users than the assessment of traditional gate keepers like journalists. According to corporate information in the Internet figures of web

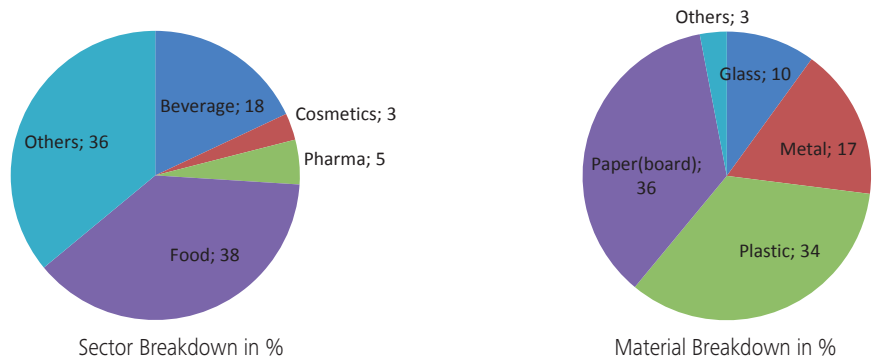

Figure 3-4: Global Packaging Figures [cf. 23]

2.0 companies are really impressive. In Youtube 4 billion videos were seen per day (in 2012) and 60 hours of new video material / minute were uploaded. One billion Facebook users existed at the end of 2012.

The semantic web adds metadata to the web, which allow the semantic analysis of content by computers. This can improve search engines. A search implementation is wolframalpha.com. Search questions like "Which is the highest mountain on Earth?" will be possible as will searching for information referring to geographical issues or sounds.

The "Internet of things" or "next generation media" is the enhancement of the web by things/items which can communicate, such as "intelligent" packaging using RFID and wearable computing. The aim is to have sensors, mobile access and computing power in a large amount of items to facilitate everyday life. A serious risk is that this can lead to "trackable" users, thus many new services are related to a reduced information privacy.

Usability aspects are getting more and more important. New hardware interfaces are available or will be available in future like head-up-displays, e-paper, Google glasses, smart watches, holograms, gaming devices like MS-Xbox kinect or even brain wave patterns. Digital media will become adaptive and responsive. They will adapt themselves on user needs, assist the user and interact with the user. Aspects of information psychology [cf. 24] have high relevance. Research has to be done on aspects like "immersion", where users "get part" of realistic virtual worlds.

3.9 Enterprise 2.0 and Smart City

According to A. P. McAfee, Enterprise 2.0 is the use of emergent social software platforms within companies, or between companies and their partners or customers. Enterprise 2.0 supports open innovation, knowledge exchange and project management in boundaryless organizations (described by A. Picot), enabling creative frameworks and a management style of moderation instead of leadership. Corporate information systems will get the "look and feel" of consumer media. New ways of collaboration and communication will be used by companies or be transformed for corporate use: Blogs, community platforms and social networks. New problems have to be solved for enterprises, like implementing a social media policy. The enterprise 2.0 IT-architecture will consist of ERP, CRM and SCM-Systems, enterprise portals including identity management, filtering and social search, and "social software" like collaborative worksphere, blogsphere and the possibility to publish to an open space. Dedicated enterprise software for these tasks is available like Microsoft Sharepoint. In addition, software for knowledge management like knowledge maps will be used. An infrastructure is needed for secure communication and identity management, such as those supported by trust centers.

- Smart City is a concept which could be defined as a sustainably organised city of the future using smart technologies. Cities of the future will be based on complex IT, smart grids, communication and media structures to organise all aspects of city life.
- A Smart City [cf. 26] could be a driver/enabler that influences various aspects:
- New business models based on usage-principle rather than the need to possess, for instance car-sharing, energy contracting.

- New socialization in open / fluent networks (social groups like new urbanists living in a connected society) rather than fixed processes and structures. Patterns of behavior are transferable from private habits to business live.
- Development of new responsive and adaptive media (including the Internet of things), to support all aspects of living in the smart city by using ICT (e.g. location based services) and plugged in services and networks.
- A new innovation strategy for new media services based on engagement of people in ideas (in social networks) has to be developed. The relationships between citizens and public and industrial organizations will change (organizations without boundaries).
- Interactive City 2.0 [cf. 27] will integrate digital guidance, general information, advertising systems and services in physical architecture.

4. Conclusions

Information and communication technologies are the most important drivers for media development. The future or media industries will lead more towards a media revolution than a transformation.

Structural changes will continue in media industries, media will partially be substituted by others. New media are changing the use of media. Media use is expanding and has effects on society. Driven by the digital shift, successful and sustainable business models have to be implemented. Many of them are based on Internet hypes or self-exploitation. Business models of new gate keepers like Facebook have to prove that their profits and not expectations will reflect their share value.

Mass media like TV, radio and print will remain to a certain extent. Traditional radio and TV will often be used simultaneously with interactive media and partially be replaced by them.

Print will be part of the media future. Packaging is a strong media for communication. And packaging and label printing cannot be replaced. The surface feeling, reading experience and campaign ("push") capability of paper based media will ensure that paper-based media will still exist. But publishers and printers need a clear customer focus, a clear business model and in many cases an integration in their customers processes. In addition, their business will become much more international.

The successful CEO Kallen summarized the success factors for state-of-the-art media enterprises like Burda [28]:

- understand your technologies, be close to your customers, users, readers and recipients
- a simple transfer from print to digital is not possible, the new possibilities of digital media have to be used. For example from digital advertising to real transactions like booking a trip
- print is a technology for the future, if using internationally oriented business models and efficient processes.

The future will lead us to the Internet of things and a world of adaptive media. Media revolutions have changed society and culture today and in the past. The printing press of Johannes Gutenberg in 1523 led us to the Protestant reformation and alphabetization in Germany. Media industries are small comparing with many other industries. But they will change our social life and our democracies in the future, too.

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