A GREAT FUTURE ?

DIGITAL RADIO IN EUROPE

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This article is about the difficult path towards digital radio in Europe. In technical terms, digitalisation refers to the transformation of communication technologies from an analogue to a binary logic. Digital may be seen as a synonym for « sampled, quantified, and presented in binary characters »; digital broadcasting refers to the transmission of digitised audio, video, and auxiliary information as data signals. (Reimers 2005 : 1) One might say that the logic of the computer, which always worked digitally, is gradually taking over all aspects of the production, distribution, consumption, and storing of broadcast messages. What sounds like a purely technical process has strong effects on all aspects of the media, including politics and economics, the production process itself, as well as programme content.

One aspect of digitalisation is that it allows for convergence, meaning the fusion of the traditionally separate functions of radio and

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the Internet – of mono-directional mass media and interactive individual communication. According to this understanding, technical convergence leads to content convergence. As such, convergence does not just describe a technological possibility ; it is seen much more as a model that guides the thinking of engineers, business managers, and political decision-makers about the future of the media. Because of this scenario, it is not only important to analyse what is going to happen, but it is also of central importance to look at the actors behind the process of digitalisation regarding their interests, their strategies, and their errors.

As digitalisation is driven by a number of forceful national and European actors, it also implies that non-political and non-commercial interests have little chance to participate. This refers mainly to the European consumer and/or user who is confronted with new technology designs that he or she is expected to accept, utilise, and pay for. Many problems of the very uneven process of digitalisation in Europe might have to do with discrepancies between different actors. Does the European broadcast audience actually want digitalisation, and if so, does it really believe in convergence or does it perhaps prefer a diverged future ?

Table 1 : Digitalisation of broadcast media

Content	Standards	Transmission channels	Terminals
Audio	DVB	Terrestrial	TV receiver
Video	DAB	Satellite	Set-top-box
Software App.	HDTV	Cable	HiFi set
Photos	MHP	Online	Laptop
Graphics	DRM	Mobile	PDA
Data			PC
Text			Telephone
Speech			

Source : Reimers 2005 : 19 ; and own design

Three phases of broadcast development

The history of broadcasting as a new mass media started in Europe after the First World War. Right after the year 1920, radio stations went on the air based on AM (amplitude modulation) transmission in the

long-, middle-, and later short-wave bands. Radio programming was organised by national governments or public organisations that usually offered just one or at the most just a few programmes. In the early 1950s radio entered its second phase by expanding into FM (frequency modulation) on much higher frequencies that provided the basis for a multichannel environment and more regionalised programming, based on public service programmers. In a later step (in most European countries since the 1980s), commercial stations, often with a local range, entered the market and offered programmes that increasingly followed a pattern of « formats », meaning that they relied mainly on specific « colours » of popular music and catered to smaller and more specialised audiences. Now we are standing at the threshold of a third phase that is marked by the digitalisation of radio transmission (DAB, etc., see below). Also, the concept of a radio station has been applied to the Internet, creating what has been called « cyber radio » : audio programming based on streaming technologies. This specification is able to merge the popularity of conventional radio with the individuality and interactivity of the Internet. The latest developments include audio-on-demand services like podcasting.

This process of moving into the « third stage » in broadcasting (BBC-General Director Mark Thompson) has been continuously accompanied by policies of the EU as well as of individual countries. The EU issued a major Green Book to argue in favour of convergence, and supported the development of new technologies based on its programmes for research and development. A major European project along this line was the attempt to introduce a version of digital radio, called DAB.

In practice, the media landscape currently looks like a patchwork of digital and analogue applications. Radio studios use digital technologies extensively for programmed production, and much of consumer electronics is digitalised, including the CD and the DVD – the technology that sells best at this moment. Radio sets at home are still based on an analogue design and most signal transmission is still analogue. Attempts – some successful and some not – to digitalise the whole chain of communication from production to distribution, including consumption and storage of media content, have been made during the last 20 years. This article goes on to report on the state of digitalisation of the transmission chain for radio in Europe.

The digitalisation of radio transmission

Digital Satellite Radio and Astra Digital Radio

Since the early 1980s, several attempts have been made to replace analogue by digital transmission for radio. Starting around 1990 the first technology of digital transmission via satellite was readily available in Germany : Digital Satellite Radio (DSR) that included 16 radio channels (mostly already existing public service programmes, often classical music) in full CD-quality (because of an uncompressed signal). Distribution was via the cable network. It is estimated that around 150,000 decoder boxes had been sold when the Deutsche Telekom (at that time the owner of the cable networks) decided to cancel all transmissions because of insufficient demand, rendering the boxes useless. DSR so far was the first digital technology that failed the market test.

During the 1990s, the Astra satellite company, the main satellite broadcasting company of Europe, started to offer Astra Digital Radio (ADR, a term that is no longer in use) that required a special set-top box and provided a limited number of programmes for different markets, e.g., about 40 radio programmes in the German language. In 2005 Astra satellites offered around 410 analogue and digital radio programmes for all of Europe (www.ses-astra.com). As most day-to-day use of radio reception is mobile and/or done with small unconnected receivers, the audience's response to ADR was rather weak. Cable and satellite radio delivery seems to be of limited utility. The future (like the past) probably lies in the mobile reception of digital radio programmes ; in the United States digital pay audio bouquets are a market success (leader XM provides 3.7 million subscribers with up to 100 formatted channels).

Digital Audio Broadcasting

Already in the early 1980s the technical centre of the German ARD broadcasters started to think of a follow-up technology to FM transmission. In 1987 heavy funding on the side of the European Community (Eureka 147) and the governments of Germany and some other European countries initiated the designing of Digital Audio Broadcasting (DAB). After years of development, pilot projects first started around 1995 in several European countries. In 1999 the technology was fully devel-

oped and introduced for regular service, first in the United Kingdom and Germany (Kleinsteuber 2004).

In 2005, DAB, now called digital radio, was available in practically all Western and most Eastern European countries. It was usually offered in the more densely populated parts of the country, mainly in metropolitan centres and along important highways. It was also being tested in other countries like Canada, Australia, China, and South Africa. Only in the United States has a competing technology been designed, based on an IBOC concept (in-band on-channel) that fits the digital bits into the analogue signal. IBOC is still in the experimental stage. All in all, in 2005 DAB reached more than 300 million persons with more than 600 radio services on different continents (www.worlddab.org).

DAB uses a compressed digital signal that offers audio quality close to the sound level of the CD. Additional data may also be transmitted, providing a small display with images. The signal is transparent, meaning that each transmitter offers a range of about six programmes and leaves space for additional data services. The signal is especially optimised for goals like audio quality comparable to the CD, unimpaired mobile reception in cars at high speeds, efficient frequency utilisation, transmission of ancillary data, and a wide range of value-added services (Hoeg/Lauterbach 2003 : 6).

In Germany in 2005, around 80% of the population was covered by DAB and about 80 different stations were on the air (but many simulcasting with FM). DAB expanded further because a share of the public service fee has been legally set aside to provide funds for covering Germany with a network of DAB multiplex antenna towers. Up to the year 2004 at least €250 million had been invested in DAB in Germany alone. In other European countries the DAB picture was not much different. Usually some of the territory is covered by DAB signals (e.g., 85% of the population in Sweden), some existing radio stations (mostly public service) offered simulcasting of FM programmes, and some exclusive stations transmitted only in DAB. A weak point of the diffusion of DAB was the lag of receivers, as at first only high-priced car radios were available (at about €500 each). In 2005 receivers for different modes of reception were available, with all in all 150 DAB products at prices starting at €60 each.

The extremes in Europe seemed to be the United Kingdom and the Netherlands. In the United Kingdom more than 80% of the population was covered in 2005, with some 300 national, regional, and local stations were active, about half of which only in DAB. A special Digital

Radio Development Bureau attempted to market the new technology. The BBC was broadcasting its existing national analogue programmes BBC 1 to 5 and BBC World Service in DAB technology, and offered another five digital-only stations like Sports Extra, 1Xtra with ethnic music, the BBC Asian Network, and BBC 7 for comedy, drama, etc. On the national multiplex there were commercial stations available like Classic FM, Virgin Radio, and talkSPORT. (www.ukdigitalradio.com) The United Kingdom seemed to be the country where a mass market for DAB has started to emerge and most available receivers are fitted to this market. The opposite impression was given by developments in the Netherlands, where the foundation responsible for the introduction of DAB temporarily turned off further transmission of DAB signals because of users' disinterest. It returned to the digital market only in 2004.

The fact is that the sale of DAB receivers outside of the United Kingdom was minimal and most activities are still subsidised. DAB promoters accepted the argument that introduction moves much slower than expected, but pointed to the fact that there is no alternative to DAB in radio, and that it has been adopted in many countries. The technology seems to be well-developed but it does not relate closely to the traditions and conventions of radio listening. It appears that engineers showed little interest in either economic or political conditions, or in the radio listener. For example : DAB was especially designed for radio use in high-speed cars, but (to take the German example) less than 15% of radio programme consumption takes place while driving. The idea of a display offering pictures relating to the radio programme (news items, CD covers, weather reports) or independent information (hotels, stock exchange data) seems to counter the tradition and culture of pure audio consumption, and is rarely used.

There were also economic problems. Political decision-makers decided to provide public service broadcasters in many European countries with the necessary money to move into DAB, but the commercial radio industry claimed to be confronted with high costs and unequal competition. The lobby organisations of commercial broadcasting in many European countries remained sceptical about the merits of DAB. There are also licensing problems. Furthermore, DAB provides different, usually smaller transmission ranges, so by moving into DAB broadcasters might lose listeners. On the political side, official support is still strong : A number of European governments decided that by the year 2015 all analogue radio will be cut off and all FM frequencies will be

offered for DAB. In sum, DAB was very much designed « top-down » by a coalition of the entertainment electronics industry and parts of the political spectrum, including public service broadcasting. In terms of technology, it represents the vision to replace FM by a new design that is radically different and allows no evolutionary change.

Digital Radio Mondial

On the other side, DAB offers basically more of the same and is increasingly endangered by competing technologies. (Hoeg/Lauterbach 2003 : 14-25) DVB-T that is in the process of being implemented in many European countries (see below) may carry radio signals if needed. Another project that is being pushed in Europe is Digital Radio Mondiale (DRM) based on the digitalisation of AM signals (short-, middle-, and long-wave). It was introduced in 2003 and the first receivers were available on the market by 2005 (www.drm.org). Behind DRM stands a global consortium with its seat in Geneva; its chairman is the Chief Engineer of the German international broadcaster Deutsche Welle. DRM follows distinctly different visions compared to DAB, and it allows the reception of a radio signal of decent quality (near-FM) over very long distances. Hundreds of additional stations from all around the world would be instantly available on DRM radio sets. In addition, the change to DRM is much simpler as available AM senders may be used after minor modifications, and receivers should only be slightly more expensive than present transistor sets. DRM has significance for today's radio markets in Europe as frequencies in the AM range are no longer in use and could be revitalised via DRM. It is too early to evaluate the quality of DRM, but it demonstrates that options beside DAB are possible, and it also shows the dynamics of public service engineering that is able to design innovative technologies.

Cyber Radio

A final reference should be made to radio stations on the Internet (cyber radio), based on audio streaming technology. About 10,000 stations were available worldwide at the beginning of the Twenty-First Century, some of them offline stations that also offered their programmes via the Internet. Others were pure online stations that were accessible only via the Internet. The concept of an Internet radio station includes offering a single programme or a bouquet of channels following diffe-

rent formats, audio-on-demand, additional music information on the computer screen, and possibilities to buy the music on CD that is just playing. In any case, cyber radio is costly because it requires continuous connection to the Internet. First Internet radio sets have been designed that allow listening without using a computer. A question of course remains : Is cyber radio really comparable to a radio programme, or is it just another Internet service ?

The general picture

In the context of Europe, digital radio is still at the beginning ; DAB signals are widely available but meet little demand. A radio receiver of the future may only become successful if it allows for mobile reception and integrates all existing standards (like DAB, DRM) without bothering the user with technical differences. Further, services like pay audio and audio-on-demand might become prominent in a digital environment of multichannel and multicultural programming. But radio may also become more costly and the activities of small community stations which are sprouting up in Europe may be endangered. The developments will be mostly market-driven as the EU has shown little interest in radio innovation; its audiovisual policy seems to centre around television and film.

Conclusion

Whoever begins to reflect about the digital future of radio must begin with two general considerations : First, the future will be digital; secondly, the shape of this future is still unclear.

Digitalisation of media has been planned for the last 25 years although many specifications have never left the stage of speculation; the term "vaporware" has been coined for this phenomenon of grand designs without real results. The fascinating thing is that some digital specifications have historically picked up immediately, like the CD, while others have already been cancelled like DSR. Today some innovations, like the iPod, quickly become extremely popular, while others face a very uncertain future. This includes most of the attempts to digitalize the radion transmission chain, including DAB and DRM.

As was outlined above, digital media show clear advantages compared to the more familiar world of analogue media. Most attempts

in Europe to digitalise have followed a "top-down" approach, meaning that centralised authorities like the EU, leading European national governments, or transnational companies (often jointly) have decided to introduce a specific standard that they hope becomes the de facto norm, but is – not infrequently – ignored by markets and consumers. An optimistic attitude can nonetheless be registered in Europe, e.g., plans are being upheld by the European Commission and national governments to cancel all analogue radio by 2015.

Clearly, in the emerging digital age, political decisions in favour of one technology do not guarantee success : In former stages of radio development there was much more of a « pull » situation with the consumer urgently waiting for new technologies; the main barrier was the consumer's limited buying power. Today the user – who always is the final person to choose a specific technical design and pay for it – seems to be much more reluctant. Rarely before in the history of media development has such a fundamental revolution in new technologies taken place. This also means, though, that a high degree of uncertainty causes a high risk to all who are involved (Chalaby/Segell 1999).

If one looks at the genesis of some of the digital technologies described here, it becomes clear that engineers, managers, and politicians were at the root of digital development and did not always have the future user in mind. Furthermore, they did not always build on traditions and cultures of media consumption that shaped audiences over decades in Europe. Conventional radio is integrated into complex daily routines and habits, and if digital designs plan to intervene they have to convince the user. They have to demonstrate where the added value lies. Another element of uncertainty might be the continuing bombardment of the consumer with promises of fancy technologies with exaggerated abilities, and the subsequent disappointment with the actual limited solutions. Experience has made many users either turned off or cynical. The potential user reacts with increasing scepticism, becomes irritated, and consequently withholds further investment.

In general, the breakthrough of new technologies has not only to do with the technical qualities of the new product as such. Often "soft" factors seem more important, like easy handling, a secure future of the standard, image factors, or simply fashion. The surprising successes of the Walkman and the CD demonstrate this, and mechanisms like these seem to be working with digital radio transmission. In 2006 some mobile telephones are either equipped with FM-reception or are able to

receive piped audio programming; it remains uncertain, how this might affect the existing radio landscape.

There is no doubt that broadcasting and computer technologies will converge, but this has little meaning for the listeners who use radio in very diverse stationary and mobile situations. Probably other factors are more important, e.g. the copyright situation : will radio programmes in the future be the source for the consumer of recorded music or will this be made impossible by special digital encoding ? How will the expansion of pay-audio and piped audio music change the scenery ? This also raises the question : What is radio? In which cases does it make sense to talk about audio services that definitely do not follow the rules of conventional radio?

It seems that the overall slow process of radio digitalisation might have to do with the fact that technology has been seen as an autonomous power, whereas some basics of human behaviour have been ignored by some of the actors for too long. A lot of work has been left for the radio researcher.

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