Dublin Institute of Technology
ARROW@DIT

Books/Book chapters School of Media

2010-01-01

Radio Broadcasting in Europe: the Search for a Common Digital Future

Brian O'Neill
Dublin Institute of Technology, brian.oneill@dit.ie

Helen Shaw
Athena Media

Follow this and additional works at: http://arrow.dit.ie/aaschmedbk

Part of the Broadcast and Video Studies Commons, Communication Technology and New Media Commons, and the Film and Media Studies Commons

Recommended Citation
B. O'Neill and H. Shaw 'Radio Broadcasting in Europe: the search for a common digital future' in O'Neill, B., M. Ala-Fossi, et al., Eds. (2010). Digital Radio in Europe: Technologies, Industries and Cultures. Bristol, Intellect Books, pp.27-42.

This Book Chapter is brought to you for free and open access by the School of Media at ARROW@DIT. It has been accepted for inclusion in Books/Book chapters by an authorized administrator of ARROW@DIT. For more information, please contact yvonne.desmond@dit.ie, arrow.admin@dit.ie.

This work is licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 License

[1] Chapter One

Radio Broadcasting in Europe: the search for a common digital future

Brian O Neill

Helen Shaw

Broadcasting services, as the media historian Burton Paulu observed in the mid-1960s, are integral parts of the countries they serve (Paulu 1967: 5). European broadcasting consequently mirrors great geographical, political, linguistic, cultural and religious contrasts, and constitutes a polyglot patchwork of competing cultural interests as diverse as the continent itself. Yet there is also an underlying tradition and an historical experience in common, particularly evident in the case of radio. The European consensus that broadcasting should be protected from purely commercial pressures, and that it should be subject to unified control and organized as a monopoly, was established early on (McDonnell 1991: 1), and has left a legacy of state-chartered corporations, predominantly funded by licence fees, with a tradition of strong, mutual co-operation and commitment to high programme standards. It is also a tradition defined in the main by public service. Despite the fact that it was David Sarnoff, the American broadcaster who first argued that radio 'should be distinctly regarded as a public service' (Briggs 1985: 18), radio in Europe is fundamentally very different to the radio landscape of the United States, where commercial radio and the marketplace rapidly became the dominant force, defining both the radio experience,

culture and ethos (Barnouw 1966; Smulyan 1994; Hilliard and Keith 2001; Hilmes and Loviglio 2002; Hilmes 2003). Finally, Europe's radio is also characterised by a long history of being defined and driven by the state, in highly centralized fashion in the case of countries such as France (Meadel 1994), or indeed in former totalitarian regimes of Eastern Europe (Paulu 1974), and along more federal or devolved lines in countries such as Germany, Switzerland and the Netherlands (Kuhn 1985). The development of state broadcasting monopolies in most European countries, established in the early years of the twentieth century following the invention of sound broadcasting, has ensured that there is an enduring shared common ideological approach to radio broadcasting, which now finds expression in the field of digital radio policy.

[2] The roots of European public radio: shaping a shared vision

National state radio stations, broadcasting on MW and LW, began switching on from 1920 and while the initial operating companies were often private businesses, radio broadcasting was quickly seen as a mass communications tool of the state, something to be controlled and regulated (Briggs and Burke 2005: 132). Across Western Europe, state radio evolved into a model of monopoly by public broadcasting, defined and structured in legislation. The arrival of television in the 1950s, and the introduction of commercial broadcasting, particularly in TV, had the effect of consolidating the dominance of the state-run public service model of radio broadcasting (Tracey 1998). For many European nations, public radio broadcasting remained a monopoly until the 1980s when spectrum was opened to commercial operators, forcing a re-appraisal of radio genres, audiences and markets (Vittet-Philippe et al. 1987).

This dominance of this public broadcasting ethos in Europe, and the governing role that its elites have played, have helped shape a European vision of both the media landscape and its role in society. The post-World War 2 creation of the Common Market and the genesis of the European Union have reinforced this centric view of the broadcasting system and the need for a common European approach to broadcasting in terms of policy and regulation. That ideological view of broadcasting and society as a means of shaping and supporting a shared European philosophy underpins the landscape as a whole, both public and commercial.

The creation of the European Broadcasting Union (EBU) in 1950 illustrates this concept of Europe as a common broadcasting sphere, with shared history and culture, driven and defined by the public broadcasting sphere (Fürsich 2004). Formed in the aftermath of World War 2 as an international organization of public service broadcasting (PSB) institutions, the EBU became one of those key European institutions articulating a vision of unification and co-operation as individual countries sought to rebuild their radio broadcasting networks and establish new television services. While individual nation states within Europe framed their audio-visual services and broadcasting landscape within national legislation and regulation, the ideal of a shared European space and the quest for a common purpose in broadcasting and society framed its discourse. The collapse of the Soviet Union from the late 1980s, and the emergence of the new East European nation states (Sparks and Reading 1998; Imre 2009), presented a unique challenge since these new states had largely remained in a tightly controlled state broadcasting model and struggled to catch up with the democracy and information matrix of European broadcasting tradition. However, the core European structures of both the European Union and the

EBU actively absorbed and assimilated both the new states and the new broadcasters, the EBU formally merging in 1993 with the Organisation Internationale de Radiodiffusion et Television (OIRT), the former organization of Eastern European Broadcasters (Fürsich 2004: 552).

In a quite fundamental sense, technical co-operation in broadcasting has always been linked to this ideological and socio-political cultural framing of radio, through the need for Europeans to co-ordinate and share radio spectrum. That need becomes more crucial the closer you live to your neighbours and for many mainland Europeans (and less so in the case of Great Britain and Ireland) spectrum management is a matter of multi-national diplomacy. International bargaining over the allocation of scarce frequencies was first established with the Geneva plan for European wavelengths in 1926 (Briggs and Burke 2005: 132) and has continued ever since in a series of international conferences to plan, negotiate and manage the radio spectrum.

Likewise, research and development in broadcasting technologies was also part of the EBU's brief from its origins. As a pan-European organisation, embedded with the legacy thinking of the European Economic Community and later the European Union, its impetus was to seek out European technological solutions to ensure that public broadcasters had access to the most advanced technologies available – satellite distribution, digital studio and transmission systems, high definition television, Internet applications – to enable them to maintain a lead against commercial competition, and to support pan-European goals of high technology research and development.

‘Similar but different’ could be the slogan for European public radio. While the ethos of PSB is encapsulated and defined by the European Commission as a public mandate ‘fulfilling the democratic, social, cultural needs of a particular society’ (European Commission 2009), Europe has a broad spectrum of PSB models with a wide range of diversity on the economic and social scale from heavy (Norway) to light regulation (Spain), and from zero commercial activity, like the BBC in the UK and Radio France, to small nations like Ireland where PSB is at least 50 per cent dependent on commercial revenue (Van Dijk et al. 2006). The different models of public service broadcasting in Europe reflect the cultural and political characteristics and priorities of different states (Machet et al. 2002). That difference also informs how spectrum has been configured and deployed, creating different radio profiles in terms of stations and audiences. So in Germany, radio reflects the federal Länder structure with regional and local networks, while in Ireland and Portugal local and community radio play a significant role. In some countries, PSB is present at a local, regional and national level (e.g. the BBC in the UK), while in others it is restricted to the national sphere (Ireland), or there is internal national choice between PSB with different operators at national, regional and local levels (the Netherlands). This ‘á la carte’ PSB map of Europe reflects complex multi-layers of national economic and socio-political as well as cultural differences. It is probably the only way public service broadcasting in Europe could work – by being closely attuned to its harmonisation in terms of technology in spectrum, platforms and receivers in use in each territory.

What the diverse forms of European PSB models share, however, is a socio-political and ethical base which draws heavily on the BBC model shaped by Lord Reith in the 1920s: the concept that public broadcasting is a neutral force in society, using public

funds to be independent of both commercial and political bias, and producing content which 'informs, educates and entertains' and which seeks to be universally available (Scannell and Cardiff 1991; Rolland 2005). While diversity exists across the PSB spectrum, the shared ethos, which in Reithean terms incorporates a moral sense of purpose and duty, is expressed also, we argue, in the quest for common technological frameworks and universality of provision for European digital radio.

[2] Eureka 147 – Europe's digital radio solution

The digitization of radio is not uniquely a European issue, but the project of developing a vision and a technology solution for radio in the digital era was very much European in its origins. In order to set the historical context for Europe's digital radio industry, it is useful to examine the broader issues of its origins in European technology development policy, and the distinct socio-political concerns of the late 1980s and early 1990s that helped shape its 'European-ness'. Digital Audio Broadcasting or DAB, also known as Eureka 147, has its origins in the R&D departments of large electronics equipment manufacturers and engineering divisions of broadcasting and telecommunications organizations, as well as various public and private research institutes that constitute Europe's high technology research environment (Lembke 2003). Its development was part of a general effort in the 1980s to develop more efficient transmission systems arising out of the ability to carry information in the form of digital signals. As a relatively recent technology, its history and origins have not been extensively documented, though brief historical surveys are available (see for example: Kozamernik 1995; Gandy 2003; Hoeg and Lauterbach 2003; Rudin 2006; O'Neill 2009).

The DAB project began as a collaboration between Institut für Rundfunktechnik (IRT), the research and development institute for the German broadcasters ARD, ZDF, ORF and SRG/SSR, and the Centre Commun détudes de Télédiffusion et Télécommunication, the research institute of France Telecom and TDF. Two essential ingredients of the system were already in development prior to the formal organisation of the Eureka consortium: the audio compression or bit-rate reduction system, pioneered by IRT in Germany, and a new radio frequency modulation system called COFDM, led by CCETT in France. The initial basis of the research was the development of an integrated services digital broadcasting system not specifically dedicated to radio. The DAB bit-stream could in fact be used to transmit all kinds of data including images and slow scan television (Gandy 2003:3). However, with the crucial support of the EBU and some of the leading broadcasting organisations across Europe (BBC, DR, YLE, SR etc.), a consortium of nineteen organisations from France, Germany, The Netherlands and the United Kingdom was formed in 1986 to develop DAB as a successor for AM and FM radio broadcasting.

The Eureka Project 147 was established in 1987, with funding from the European Commission, to develop a system for the broadcasting of audio and data to fixed, portable or mobile receivers (ETSI 2006). The objectives of the research were to develop 'a European technical standard for Digital Audio Broadcasting' and to seek its adoption as a worldwide standard by international bodies like the European Technical Standard Institute (ETSI) and the International Telecommunications Union (ITU). The technical development envisaged a digitalization of broadcasting distribution, which would produce improved reception compared to FM, particularly mobile reception, and with the potential to offer additional services such as text and

other data, conditional access, enhanced traffic services, and picture transmission (Eureka 147 n.d.).

The digital radio system developed under Eureka 147 was a highly successful technical feat of engineering that provided an innovative approach to digital audio and multimedia broadcasting (Hoeg and Lauterbach 2003). It was a highly versatile broadcasting system that could be used for terrestrial and satellite, as well as for hybrid and mixed delivery. For broadcasters it offered a new way of combining multiple audio streams onto a single broadcast frequency called a DAB ensemble or multiplex, thereby making much more efficient use of spectrum. Broadcasters could also vary the number of channels within an ensemble, modifying the bit rates of individual streams. The system is also much more robust with fewer artefacts from interference, noise or channel fading. From the user's point of view, DAB promises more choice, better quality, added text and graphic features and automatic tuning to all stations available.

Planning for digital transmission was conceived on the basis that nationally-based or regionally strong networks (for example, the BBC or a separate multiplex operator) would be primarily responsible for managing the network rather than individual local stations organizing their own transmission. The most cost-efficient coverage was achieved by a network of closely-spaced, relatively low power transmitters, organised into a Single Frequency Network that allowed multiple transmitters to cover an extensive area without mutual interference (Lau and Williams 1992: 12). The greatest spectrum efficiency, therefore, was at the larger national or regional level, and more localized services were much less suited to the system. This bias in transmission was

confirmed by the frequency allotments allocated for digital radio broadcasting following the ITU frequency planning meeting in Wiesbaden, Germany in 1995. Many smaller local and community services who had hoped that digital broadcasting would offer more secure access to the mass media market were sorely disappointed to discover that the transmission pattern and licensing structure would not favour their type of radio (as discussed in Chapter Nine. See also Rudin et al. 2004; Lax et al. 2008).

The multiplex organisation of programming, with potentially different providers contributing services, represented a significant reorganisation of the transmission chain (Riley 1994). From the relatively simple structure of broadcaster as content provider and owner of the infrastructure feeding final content into the broadcast chain for transmission and distribution, DAB introduced the distinct functions of programme provider, data service providers and multiplex or ensemble provider (Hoeg and Lauterbach 2003: 152). The DAB configuration thereby required effective co-ordination between each element of the service, and as such was optimally suited to the large broadcaster with the relevant technical and programming resources to serve all aspects of the DAB service. An idealised service provision model, therefore, mapped closely to the kind of programme services envisaged by DAB's main supporters: the large public broadcasting organisations such as BBC, Danmarks Radio or Bayerischer Rundfunk, who had the ability to produce suites of diverse programme material, associated programme data and other listener services under a common brand.

The switching on of the first Digital Audio Broadcasting network in 1995 in the United Kingdom was hailed as a new dawn for radio. It was claimed to be the most significant development since the introduction of FM stereo broadcasting (Bower 1998), and was presented as the replacement technology for AM and FM radio broadcasting (Witherow and Laven 1995). In 1995, with the support of the EBU, the European DAB Forum (EuroDAB) was established to co-ordinate the DAB standard and promote its adoption. This was reconstituted as the World DAB Forum in 1997, representing more than 30 countries, becoming in 2006 the World DMB Forum, which now presides over both the DAB and DMB standard. More recently, variants of the system have included the development of a related digital multimedia broadcasting system or DMB, and a revised and upgraded DAB+ specification using the AAC+ audio codec rather than the original MPEG Layer II, which now provides more capacity and better reliability.

As well as being an inventive technical feat of engineering, DAB was also promoted as the definitive future for Europe's radio in the digital era. Liz Forgan, managing director BBC network radio, described it as a 'historic moment' marking the 'dawn of a third age of radio' – from the original AM mode of broadcasting, which was 100 years old, to FM, over 50 years old, and now into the digital multimedia world of the twenty-first century (Williams 1995). All media – radio, television and the press – it was believed, would adopt digitally-based delivery systems and support convergence between different media platforms (Kozamernik 1995). DAB heralded a new revolutionary era in radio broadcasting (Lambert 1992; Nunn 1995; Witherow and Laven 1995), underpinned by the belief in the necessity for radio to embrace digital technology to survive in an increasingly competitive and complex market. DAB

provided the opportunity to keep 'radio not only alive but healthy in an increasingly competitive environment' (Witherow and Laven, 1995: 61). Conversely, radio risked being marginalised if all other broadcasting systems were to go digital and if radio alone remained in an analogue environment (Kozamernik 1999).

[2] Europe's shared vision: aligning digital radio to the Union

The project of Digital Audio Broadcasting emanated from within the European R&D high technology infrastructure, comprising research labs specialising in telecommunications and radio communications research, sponsored by large broadcasting corporations and funded through the inter-governmental Eureka investment programme. Its European origins and world-leading potential were a source of pride to its originators given the intense international competition in electronics. Strengthening the competitiveness of the European audiovisual industry has been a mainstay of European policy since the mid-1980s with an emphasis on the development of a single market, support for regulatory harmonisation and an enhanced, centralised role for the European Commission in the communications sector (Kaitatzi-Whitlock 1996; Levy 1999; Harcourt 2005). The consolidation of the single market in Europe following ratification of the Maastricht Treaty in 1993 led to a wide-ranging set of measures to capitalise on Europe's potential as a global player in communications technologies, and in audiovisual services to rival those of the United States and Japan. The environment thereby created was one with both liberalising market tendencies designed to encourage pan-European broadcasting, as well as interventionist measures to protect cultural diversity and European audiovisual heritage (Collins 1995). Measures such as the *Television without Frontiers Directive* established a thriving single European broadcasting market, particularly for trans-

frontier satellite broadcasting, while the MEDIA programme sought to support and protect European audiovisual production and distribution from international competition. One such measure within the MEDIA 92 programme included the venture capital Media Investment Club to support European audiovisual high technology development.

The Eureka programme, which directly supported the DAB research project, was established in 1985 as an inter-governmental initiative to enhance the competitiveness of European industries and to align them more closely with European Union research and development policies. A particular concern of the period was the increasing dominance of the Japanese consumer electronics industry, threatening Philips and other European manufacturers, and support for European technological innovation became a priority (Lembke 2003: 212). A key objective of European investment in technologies like digital radio, mobile communications and satellite navigation systems was to enable standardisation, firstly at the European level and subsequently on global terms in order to create opportunities for world leadership in high technology systems. With regard to digital radio, it was assumed that with the establishment of a common European standard, significant opportunities would be available for European manufacturers to develop a whole range of new products for the consumer electronics and automobile sectors. The development of DAB was frequently characterised as an attempt to emulate the success of GSM, the global standard for mobile phone communication, developed with strong European backing. As a member of the European Commission argued, 'After the digitisation of communications, digital radio is probably, after digital TV, the last chance for Europe to enhance its competitiveness in the consumer electronics sector. […] Europeans

who developed the system and invested most in DAB, have to put all their efforts to participate in the exploitation of the system. With such a joint European efforts, DAB can and will repeat the success story of GSM' (Lembke 2003: 214). Initial expectations for DAB as a consumer electronics item were high and market research suggested that Europeans could buy 50 million DAB sets in the first 10 years, with sales then rising to 35 million a year. This compared very favourably with the CD player, which took eight years to achieve annual sales of 5 million (Fox 1994).

A key component of this vision of developing a global standard for digital radio broadcasting was the requirement for public intervention on a pan-European level, with the appropriate political commitment and institutional backing to enable a stable regulatory framework, co-ordination of frequency allocation and a co-ordinated strategic approach to supporting market adoption of the system. The support of the EBU for the DAB project was particularly important in this regard: the EBU had initiated the first series of studies on satellite DAB in the mid-1980s and supported the formation of the consortium for Eureka 147. EBU members were the driving force behind the consortium and the EBU's Technical Department actively participated in its various working groups. Crucially, the EBU as an international organisation provided the essential logistical support in promoting DAB at the International Telecommunications Union and in the preparations prior to the adoption of DAB as an ETSI standard (Kozamernik 1995: 10). The EBU members, the public radio broadcasters, were and continue to be at the forefront of European digital radio services and are its driving force 'from technical testing, to content provision, to marketing and promoting the platform' (EBU 2007: 8). Most importantly, according to the EBU, public broadcasters have been to the fore in promoting the benefits of

digitization to citizens, and acting as the social force underpinning the provision of services that commercial broadcasters would be unable or unwilling to do. As such, DAB articulated a vision of sustaining that service into the digital era, embedded with the values of large-scale national and regional broadcasting and incorporated into the architecture of a system that suited PSB needs rather than other forms of broadcasting.

From a European media policy perspective, the focus of attention has more often been on the cinema and television sectors rather than radio, though a central aim of the participating partners in Eureka 147 was to lobby Brussels for an equivalent level of political support for the digital radio sector. As noted earlier, from its inception the ambition of the Eureka consortium was that DAB should be the defining global standard for the digital system to replace analogue AM and FM broadcasting. Within European policy terms, Eureka 147 was the radio industry's vision of its role within communications convergence and the digital revolution. However, the fact of its successful early development and adoption as the first digital broadcasting standard, before rival systems such as Digital Video Broadcasting (DVB), suggested to the Commission that little public intervention would be needed (Liikanen 2001). The subsequent snail's pace of adoption has led to renewed calls for more direct European support. At a European Commission conference in 1998 to examine political support for DAB, World DAB's then chairperson, Michael McEwen, decried the Commission's hands-off approach: 'If it is not led by Europe, then how can you expect the rest of the world to adopt a European technology?'(European Commission 1998).

However, the European policy commitment to removing regulatory barriers, market intervention and the principle of technological neutrality in liberalised communications markets, meant in European Commission terms that success or failure was primarily the responsibility of market players (Liikanen 2001: 4). The counter argument from the radio industry and the EuroDAB lobby group for Eureka 147 was that there was a 'European' dimension to digital radio, i.e. a question of public policy that could only be satisfactorily addressed at a European rather than at a national level, and that diverging regulatory frameworks and implementation strategies in the Member States would lead to fragmentation of the European market. Manufacturers, for example, strenuously argued that the fragmented and disjointed roll-out of digital radio, with successful implementation in some countries and very little in others, was a serious impediment to the development of a new market for digital radio receivers. The prevailing view that radio was a local medium, and the primary responsibility of diverse national and regional authorities, however, worked against any further European co-ordinated action, and as a consequence decisive European Commission support was always qualified.

The guiding assumptions underpinning the development of Eureka 147 DAB were that a robust and mature technology developed within Europe's highly regarded high technology research environment would provide an ideal replacement standard for the international radio broadcasting industry. DAB's version of digital radio built on the proud experience of its trusted and oldest broadcasting institutions and looked confidently to an imagined future in which the major broadcasting institutions would continue to provide more content of higher quality, and in interactive and multimedia formats. It represented an exemplary model of co-operation between European

member states, and between public broadcasting organisations and private manufacturers, with the guiding and financial support of agencies such as Eureka and the EBU. Its early achievements in technology design and rapid development of a fully working system suggested that, as hoped, it could indeed become as great a success as GSM had been previously, and would contribute further to Europe's leading role in global technology development. DAB was certainly successful in attaining early international standardization, with adoption of the basic DAB standard by ETSI in 1993 followed by the ITU-R recommendation of DAB as the only digital radio standard in 1994. The allocation of spectrum for terrestrial digital radio broadcasting by the World Administrative Radio Conference (WARC) in 1992 provided a major boost to its international standing, and launched its efforts towards implementation in Western Europe and beyond.

Despite these early promising indicators, DAB deployment stalled and languished in an extended period of early market deployment and adoption with both ongoing successes and reversals. Lacking the sense of urgency and political priority given to analogue switch off for television, radio contended with a multiplicity of delivery mechanisms (analogue and digital) and deferred the question of whether AM and FM broadcasting needed to be replaced. Strategies for the introduction of digital radio have been characterised by a liberal market approach where it is largely left to market forces to decide the fate of particular technologies. As with previous technological developments in the sector, this resulted in long delays in new technology development, competing solutions, confusion for the radio industry and for audiences, and an uncertain environment for future planning. The appeals by the sector that strong market intervention was needed to create an extended single market with

harmonised approaches to spectrum planning and market regulation, coincided with a shift in policy towards a market for content as opposed to support for particular media such as radio or television. Ultimately, the lack of a European dimension to Eureka 147 and agreement of a need for European-level intervention led to a situation where the development of digital radio has remained a matter for individual member states.

A renewed effort to realign DAB within a vision of common European standards was launched with the announcement by WorldDMB in 2008 of common Digital Radio Receiver Profiles which would act to unify a fragmenting market and build upon the potential for new service launches on the DAB+ platform (Howard 2009). The European digital radio landscape by 2008 had reached a point where there were relatively successful markets for the original version of DAB in the United Kingdom, and Denmark; emerging new markets for DAB+ such as Hungary, the Czech Republic and Malta; other countries where DAB and DAB+ coexisted, to ensure an existing listener base was not disenfranchised (e.g. Switzerland and Germany); and countries such as France, which opted for digital multimedia radio based on DMB, or Norway, which adopted a mixture of DAB and DMB combining free-to-air mobile TV with its existing DAB networks and services. As such there has been no single pattern for digital radio across Europe, much fragmentation, no incentive for manufacturers to develop new products or for consumers to have confidence in a common standard. World DMB's solution, to develop a standard specification for receiver profiles that would be capable of decoding DAB, DAB+ and DMB, sought to make the individual country choice less of an issue. The goal of a digital radio without frontiers therefore is to ensure manufacturers benefit from a single European market for digital radio receivers while minimising the complications arising from

different strategies and approaches to digital radio adoption within the Eureka 147 family of standards.

[2] Back to the future: the failing quest

The transition to digital radio has echoes of an earlier technology leap for radio when FM superseded AM in the 1970s as the preferred mode of transmission – see Chapter Four. This, combined with transistor radio and the political upheaval of the age, placed radio at the centre of a social and popular movement, closely connected with the boom in the music industry at the time (Barnard 1990; Negus 1993; Neer 2001). But while that was a zeitgeist moment which allowed radio to be liberated and become mobile, it is almost the opposite of terrestrial digital radio's painfully slow journey from 1995 onwards. The FM transition was global, universal, ensuring that all radios were sold with the same choices and allowing listeners to tune with ease between AM and FM, while the 1990s saw global radio divide, based on geographical need, and offering competing digital futures for radio. The future scenario for digital radio, at least from the late 1990s on, depicted a future where you would potentially need different radio sets when you were travelling, particularly the US which was already firmly outside the DAB experiment by that stage.

Central to understanding the European digital radio story is that Eureka 147 and the DAB project were seeking to answer the question of digital migration and spectrum management on the basis of national and spectrum structures and interests that pertained in Europe's 1980 media landscape. A clear motivation for terrestrial digital within individual countries was lack of spectrum, and as one of the core issues for the European roll out of DAB was that while some countries like the UK had hit spectrum

scarcity, others still had as much as 25 per cent of FM sitting empty (Ox Consultants 2004). The origins of European radio, in centric-focussed national structures under a European umbrella, required a terrestrial solution to best serve national and perceived geo-political interests. The counter development of satellite and Internet radio from the late 1990s on were challenging in that they presented global media solutions which threatened to undermine or de-stabilise the status quo, and which appeared to suit commercial interests over public media (Kozamernik et al. 2002).

While the European radio landscape has now evolved, and its structure, audiences and content are shared with commercial radio, the technological innovation of radio continues to be framed by some of the founding assumptions of the Eureka DAB project and led by the combined interests of national and European media policy interests. In many ways the development, roll-out and implementation of terrestrial digital radio in Europe has been defined by this need to serve not end users and markets, but national and European interests, organised around a concept of 'European-ness' and underpinned by a shared vision and common purpose. This dichotomy helps frame our understanding of digital radio, specifically DAB technology. It also helps to explain the slow pace of its adoption and some of the difficulties it later encountered connecting with both users and with the marketplace. The quest was never to find the best or most innovative neutral digital radio solution – it was, by the very nature of who framed the question, to find the best and most innovative digital radio solution which would best serve the needs of the status quo – in this case the concept of European unity and ideology as led by the EBU and its network of public broadcasters.

DAB envisaged a future very much within the boundaries and limitations of the present. It was proposed as a technology that could replace analogue radio and its requirements for stationary and mobile reception, and which would best protect, and even replicate, the existing national and supra-national interests. Those interests, as defined by the key institutions governing Europe's radio, in many ways shaped the blinkers of how the technology was envisaged and implemented.

While the concept of a common digital future with one single platform replacing analogue radio may still seem distant and confused, it remains a key motivator for key institutions within the European centre. The prospect of digital diversity, with each country mapping its own path using a variety of platforms whether DAB, DAB+, DVB, or DRM, is seen as one which will lead to radio fragmentation and a weak market (Howard 2009). In the midst of digital divergence, the global, economic slow-down since mid-2008 has hit media badly, with advertisement and sponsorship falling. In the UK, the digital radio market received a significant setback in October 2008 when Channel 4 cancelled its digital radio plans due to the changed economic environment. Since then, many UK commercial digital radio stations have been switched off because of falling revenue.

The poor financial climate for radio has seen dramatic cuts in radio operations in both commercial and public radio. While the commercial sector has been hit by falling advertisement revenue, many public broadcasters have also experienced reductions in state revenues. The potential to invest and grow digital radio networks and original channels of content is low, and at the same time the role of the Internet as a global content platform for both audio and video is growing.

Yet the need for a shared vision on radio's digital future, the need for a common platform, remains. As Europe both enlarges its membership and moves closer in its institutional decision-making, the integration of digital terrestrial platforms and receivers in television and radio will promote a more effective union. While the United States equally struggles with digital radio platforms, the compelling logic is for a harmonised approach. Ironically, the Internet remains the common base; the global platform that increasingly sees all forms of content converge and flow. While it is currently not a replacement for terrestrial analogue services, the future may yet be defined more by its successes than by digital terrestrial's failures. The BBC's proposed RadioPlus player effectively takes the best of both the online and terrestrial offerings and presents a user-focused radio with on-demand interactivity, re-thinking radio's proposition to take full advantage of digital technology (Martinson 2009). That marriage of a DAB+ network with high speed Internet connectivity, providing the best of linear and non linear radio, podcasts and interactive tools (like search, archiving and programming), may be the beginning of radio's re-invention. What has become apparent in the past fifteen years is that the simple transition from analogue to digital terrestrial networks is not sufficient; radio needs to re-think itself from the inside out. The European vision may have seen radio's future as secured by the unity of the Eureka 147 project, but, in reality, radio's future may more likely be based in a multi-platform, multimedia base that recognises the changed relationship between content and the audience, and between content and the market.

References

Barnard, S. (1990), *On the Radio: Music Radio in Britain*, Milton Keynes: Open University Press.

Barnouw, E. (1966), *A history of broadcasting in the United States*, New York: Oxford University Press.

Bower, A. J. (1998), 'Digital Radio – The Eureka 147 DAB System', *Electronic Engineering,* April 1998, pp. 55-56.

Briggs, A. (1985), *The BBC: The First Fifty Years*, Oxford: Oxford University Press.

Briggs, A. and P. Burke (2005), *A social history of the media : from Gutenberg to the Internet,* Cambridge: Polity.

Collins, R. (1995), 'Reflections across the Atlantic: Contrasts and Complementarities in Broadcasting Policy in Canada and the European Community in the 1990s', *Canadian Journal of Communication,* 20:4.

EBU (2007), *Public Radio in Europe 2007*, Geneva: European Broadcasting Union.

Eureka 147. (n.d.), 'Eureka Project 147- DAB (Imp)', http://www.eureka.be.html. Accessed 1 June 2009.

European Commission (1998), 'Radio in the digital era: A Report on the Meeting organised by the European Commission (DG X)', Brussels: European Commission (DG X).

European Commission (2009), 'Draft Communication From The Commission On The Application Of State Aid Rules To Public Service Broadcasting Brussels', Brussels: Commission of the European Communities.

European Telecommunications Standards Institute (2006), 'Radio Broadcasting Systems: Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers', Sophia Antipolis Cedex.

Fox, B. (1994), 'The perfect sound machine', *The Times*, London, 14 October 1994.

Fürsich, E. (2004), 'European Broadcasting Union', in C. Sterling and M. Keith (eds.), *Museum of Broadcast Communications Encyclopedia of Radio*, 1, New York: Routledge, pp. 552-555.

Gandy, C. (2003), 'DAB: an introduction to the Eureka DAB system and a guide to how it works', *BBC R&D White Paper*. WHP 061.

Harcourt, A. (2005), *The European Union and the regulation of media markets,* Manchester: Manchester University Press.

Hilliard, R. L. and M. C. Keith (2001), *The broadcast century and beyond : a biography of American broadcasting,* Boston, MA. and Oxford: Focal Press.

Hilmes, M. (2003), 'British quality, American chaos', *Radio Journal: International Studies in Broadcast & Audio Media,* 1:1, pp. 2-17.

Hilmes, M. and J. Loviglio (2002), *Radio Reader: Essays in the cultural history of radio*, London: Routledge.

Hoeg, W. and T. Lauterbach (2003), *Digital Audio Broadcasting Principles and Applications of Digital Radio,* Chichester: John Wiley & Sons.

Howard, Q. (2009), 'One digital radio across Europe', *EBU Technical Review,* pp. 1-11.

Imre, A. (2009), *Identity Games: Globalization and the Transformation of Media Cultures in the New Europe*, Boston, MA: MIT Press.

Kaitatzi-Whitlock, S. (1996), 'Pluralism and Media Concentration in Europe: Media Policy as Industrial Policy', *European Journal of Communication,* 11: 4, pp. 453-483.

Kozamernik, F. (1995), 'Digital Audio Broadcasting — radio now and for the future', *EBU Technical Review,* 265.

Kozamernik, F. (1995), 'Eureka 147 to a worldwide standard', Presentation at *Audio Engineering Society. DAB - The Future of Radio,* London.

Kozamernik, F. (1999), 'Digital Audio Broadcasting – coming out of the tunnel', *EBU Technical Review,* 279.

Kozamernik, F., N. Laflin and T. O'Leary (2002), 'Satellite DSB systems — and their potential impact on the planning of terrestrial DAB services in Europe', *EBU Technical Review,* 289.

Kuhn, R. (1985), *Broadcasting and politics in Western Europe,* London: Cass.

Lambert, P. (1992), 'DAB: Signs of coming down to Earth', *Broadcasting,* 122: 25, pp. 37-1/2.

Lau, A. and W. F. Williams (1992), 'Service planning for terrestrial Digital Audio Broadcasting', *EBU Technical Review,* 252.

Lax, S., M. Ala-Fossi, P. Jauert and H. Shaw (2008), 'DAB: the future of radio? The development of digital radio in four European countries', *Media Culture Society,* 30:2, pp. 151-166.

Lembke, J. (2003), *Competition for Technological Leadership: EU Policy for High Technology,* Cheltenham: Edward Elgar Publishing.

Levy, D. A. (1999), *Europe's digital revolution broadcasting regulation, the EU, and the nation state,* New York: Routledge.

Liikanen, E. (2001), 'Prospects for Digital Radio Development in the European Union', Presentation at *World DAB Annual General Assembly*, Brussels, 8 November 2001.

Machet, E., E. Pertzinidou and D. Ward (2002), 'A Comparative Analysis of Television Programming Regulation in Seven European Countries: A Benchmark Study', Report by the *European Institute for the Media* commissioned by the NOS, Düsseldorf: European Institute for the Media (EIM).

Martinson, J. (2009), ‘BBC bids for online catchup service for UK's radio stations’, *The Guardian,* 23 March 2009.

McDonnell, J. (1991), *Public Service Broadcasting: A reader,* London: Routledge.

Meadel, C. (1994), 'Between corporatism and representation: The birth of a public radio service in France', *Media, Culture & Society,* 16:4, pp. 609-24.

Neer, R. (2001), *FM: The Rise and Fall of Rock Radio,* New York: Villard.

Negus, K. (1993), 'Plugging and programming: pop radio and record promotion in Britain and the US', *Popular Music,* 12, pp.57-68.

Nunn, J. (1995), ‘Introduction’, Presentation at *Audio Engineering Society. DAB - The Future of Radio,* London.

O'Neill, B. (2009), 'DAB Eureka 147: a European vision for digital radio', *New Media Society,* 11: 1-2, pp. 261-278.

Ox Consultants (2004), *Final Report: Review of Licensing of Radio Services in Ireland. A Study for the Department of Communication, Marine and Natural Resources,* Dublin: DCMNR.

Paulu, B. (1967), *Radio and television broadcasting on the European Continent,* Minneapolis: University of Minnesota Press.

Paulu, B. (1974), *Radio and television broadcasting in Eastern Europe*, Minneapolis and London: University of Minnesota Press.

Riley, J. (1994), 'DAB multiplex and system support features', *EBU Technical Review,* 259.

Rolland, A. (2005), 'Establishing Public Broadcasting Monopolies: Reappraising the British and Norwegian Cases', *Media History Monographs,* 8:1, pp.1-22.

Rudin, R. (2006), 'The Development of DAB Digital Radio in the UK: The Battle for Control of a New Technology in an Old Medium', *Convergence,* 12:2, pp.163-178.

Rudin, R., W. A. K. Huff, G. F. Lowe and G. Mytton (2004), ‘Digital Audio Broadcasting’, in C. Sterling and M. Keith (eds.), *Museum of Broadcast Communications Encyclopedia of Radio*, 1, New York: Routledge, pp. 456-462.

Scannell, P. and D. Cardiff (1991), *A Social History of British Broadcasting, Vol.1 1922-1939,* Oxford: Basil Blackwell.

Smulyan, S. (1994), *Selling Radio: The Commercialization of American Broadcasting, 1920 – 1934,* Washington, D.C: Smithsonian Institution Press.

Sparks, C. and A. Reading (1998), *Communism, capitalism and the mass media*, London: Sage.

Tracey, M. (1998), *The decline and fall of public service broadcasting*, Oxford: Oxford University Press.

Van Dijk, M., R. Nahuis and D. Waagmeester (2006), 'Does Public Service Broadcasting Serve The Public? The Future of Television in the Changing Media Landscape', *De Economist,* 154: 2, pp. 251-276.

Vittet-Philippe, P. and P. Crookes (1987), *Local radio and regional development in Europe,* Manchester: European Institute for the Media in association with the European Centre for Political Studies.

Williams, R. (1995), 'BBC switches on CD-quality radio', *The Independent*, London, 28 September 1995.

Witherow, D. M. L. and P. A. Laven (1995), 'Digital audio broadcasting-the future of radio', *International Broadcasting Convention, IBC 1995*, Amsterdam, Netherlands.