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Further information on ERPANET and access to its other products is available at http://www.erpanet.org.

A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server (http://europa.eu.int).

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ELECTRONIC RESOURCE PRESERVATION AND ACCESS NETWORK

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Executive Summary

Broadcasting is the most powerful and widespread tool of communication and mass information. The explosion of private broadcasting companies in the past few decades has been key to the pervasiveness of the sector: one that reaches almost every home in the world in some form. The use of digital technologies has become common in programme development, reuse and broadcast, and vast quantities of valuable resources reside in most broadcasting organisations. These resources form important cultural reference points, and more practically their re-use value is not only a vital income stream for many companies, but also saves money in their own programming budgets. It is the awareness and understanding of these values and risks that have motivated the broadcasting sector to undertake digital preservation in such an effective manner.

Collaboration is the prominent feature of the work done so far to preserve digital materials. An astonishing degree of openness characterises the pattern of work.[1] Common efforts have resulted in a number of international organisations researching and promoting policies and strategies, securing external funding and producing tangible results. Joint standards and guidelines are either in use or being developed and integrated, and there is recognition and a very strong determination that any solutions must be implemented across the entire sector.

Ultimately, the broadcasting sector is one of the most advanced and successful areas that ERPANET has researched. The knowledge, understanding and model of collaborative action detailed below is instructive for all organisations, companies, and industries with a stake in digital preservation.

[1] This is in complete contrast with other sectors ERPANET has studied which have been characterised by individual solutions driven by profit and industrial secrecy.

Chapter 1: The ERPANET Project

The European Commission and Swiss Confederation funded ERPANET Project[2] (Electronic Resource Preservation and Access Network) works to enhance the preservation of cultural and scientific digital objects through raising awareness, providing access to experience, sharing policies and strategies, and improving practices. To achieve these goals ERPANET is building an active community of members and actors, bringing together memory organisations (museums, libraries and archives), ICT and software industry, research institutions, government organisations, entertainment and creative industries, and commercial sectors. ERPANET constructs authoritative information resources on state-of-the-art developments in digital preservation, promotes training, and provides advice and tools.

ERPANET consists of four partners and is directed by a management committee, namely Seamus Ross (HATII, University of Glasgow; principal director), Niklaus Bütikofer (Schweizerisches Bundesarchiv Hans Hofman (Nationaal Archief/National Archives of the Netherlands), and Maria Guercio (ISTBAL, University of Urbino). At each of these nodes a content editor supports their work, and Peter McKinney serves as a co-ordinator to the project. An Advisory Committee with experts from various organisations, institutions, and companies from all over Europe gives advice and support to ERPANET.

[2] ERPANET is a European Commission funded project (IST-2001-32706). See Hwww.erpanet.orgH for more details and available products.

Chapter 2: Scope of the Case Studies

While theoretical discussions on best practice call for urgent action to ensure the survival of digital information, it is organisations and institutions that are leading the drive to establish effective digital preservation strategies.[3] In order to understand the processes these organisations are undertaking, ERPANET is conducting a series of case studies in the area of digital preservation. In total, sixty case studies, each of varying size, will investigate awareness, strategies, and technologies used in an array of organisations. It is anticipated that upwards of 500 organisations, institutions and public bodies will eventually contribute to this research. The resulting corpus should make a substantial contribution to our knowledge of practice in digital preservation, and form the foundation for theory building and the development of methodological tools. The value of these case studies will come not only from the breadth of sectors included, but also through the depth at which they will explore the issues.

ERPANET is deliberately and systematically approaching disparate sectors from industry and business to facilitate discussion in areas that have traditionally been unconnected. With these case studies ERPANET will broaden the scope and understanding of digital preservation through research and discussion. The case studies will be published to improve the approaches and solutions being developed and to reduce the redundancy of effort. The interviews are identifying current practice not only in-depth within specific sectors, but also cross-sectorally: what can the publishing sector learn from the aeronautical sector? Eventually we aim to use this comparative data to produce intra-sectoral overviews.

This cross-sectoral fertilisation is a main focus of ERPANET as laid out in its Digital Preservation Charter.[4] It is of primary importance that disparate groups are given a mechanism through which to come together as best practices for digital preservation are established in each sector.

Aims

The principal aims of the study are to:

- build a picture of methods and match against context to produce best practices;
- accumulate and make accessible information about practices;
- identify issues for further research;
- enable cross-sectoral practice comparisons;
- enable the development of assessment tools;
- create material for training seminars and workshops; and,
- develop contacts.

Potential sectors have been selected to represent a wide scope of information production and digital preservation activity. Each sector may present a unique perspective on digital

[3] Chapters 2 and 3 are taken from 'Cross-sectoral Development of Digital Preservation Strategies: ERPANET and the Expansion of Knowledge', given at *Preservation of Electronic Records. New Knowledge and Decision-making*, Symposium 2003.

[4] The Charter is ERPANET's statement on the principles of digital preservation. It has been drafted in order to achieve a concerted and co-ordinated effort in the area of digital preservation by all organisations and individuals that have an interest and share these concerns. Hhttp://www.erpanet.org/www/content/documents/Digitalpreservationcharterv4_1.pdfH.

preservation. Organisational and sectoral requirements, awareness of digital preservation, resources available, and the nature of the digital object created place unique and specific demands on organisations. Each of the case studies is being balanced to ensure a range of institutional types, sizes, and locations.

The main areas of investigation included:

- perception and awareness of risk associated with information loss;
- understanding how digital preservation affects the organisation;
- identifying what actions have been taken to prevent data loss;
- the process of monitoring actions; and,
- mechanisms for determining future requirements.

Within each section, the questions were designed to bring organisational perceptions and practices into focus. Questions were aimed at understanding impressions held on digital preservation and the impact that it has had on the respective organisation, exploring the awareness in the sector of the issues and the importance that it was accorded, and how it affected organisational thinking. The participants were asked to describe, what in their views, were the main problems associated with digital preservation and what value information actually had in the sector. Through this the reasons for preserving information as well as the risks associated with not preserving it became clear.

The core of the questionnaire focused on the actions taken at corporate level and sectoral levels in order to uncover policies, strategies, and standards currently employed to tackle digital preservation concerns, including selection, preservation techniques, storage, access, and costs. Questions allowed participants to explore the future commitment from their organisation and sector to digital preservation activities, and where possible to relate their existing or planned activities to those being conducted in other organisations with which they might be familiar.

Ten organisations in each sector, and three people within each organisation are targeted for each study. In reality this proved to be problematic. Even when organisations are identified and interviews timetabled, targets often withdrew just before we began the interview process. Some withdrew after seeing the data collection instrument, due in part to the time/effort involved, and others (we suspect) dropped out because they realised that the expertise was not available within their organisation to answer the questions. The perception of risks that might arise through contributing to these studies worried some organisations, particularly those from sectors where competitive advantage is imperative, or liability and litigation issues especially worrying. Non-disclosure agreements that stipulated that we would neither name an organisation nor disclose any information that would enable readers to identify them were used to reduce risks associated with contributing to this study. In some cases the risk was still deemed too great and organisations withdrew.

Chapter 3: Method of Working

Initial desk-based sectoral analysis provides ERPANET researchers with essential background knowledge. They then conduct the primary research by interview. In developing the interview instrument, the project directors and editors reviewed other projects that had used interviews to accumulate evidence on issues related to digital preservation. Among these the methodologies used in the Pittsburgh Project and InterPARES I for target selection and data collection were given special attention. The Pittsburgh approach was considered too narrow a focus and provided insufficient breadth to enable full sectoral comparisons. On the other hand, the InterPARES I data collection methodology proved much too detailed and lengthy, which we felt might become an obstacle at the point of interpretation of the data. Moreover, it focused closely on recordkeeping systems within organisations.

The ERPANET interview instrument takes account of the strengths and weaknesses from both, developing a more focussed questionnaire designed to be targeted at a range of strategic points in the organisations under examination. The instrument[5] was created to explore three main areas of enquiry within an organisation: awareness of digital preservation and the issues surrounding it; digital preservation strategies (both in planning and in practice); and future requirements within the organisation for this field. Within these three themes, distinct layers of questions elicit a detailed discovery of the state of the entire digital preservation process within participants' institutions. Drawing on the experience that the partners of ERPANET have in this method of research, another important detail has been introduced. Within organisations, three categories of employee were identified for interview: an Information Systems or Technology Manager, Business Manager, and Archivist / Records Manager. In practice, this usually involved two members of staff with knowledge of the organisation's digital preservation activities, and a high level manager who provided an overview of business and organisational issues. This methodology has allowed us to discover the extent of knowledge and practice in organisations, to understand the roles of responsibility and problem ownership, and to appreciate where the drive towards digital preservation is initiated within organisations.

The task of selecting the sectors for the case studies and of identifying the respective companies to be studied is incumbent upon the management board. They compiled a first list of sectors at the very beginning of the project. But sector and company selection is an ongoing process, and the list is regularly updated and complemented. The Directors are assisted in this task by an advisory committee.[6]

[5] See Appendix. We include the questionnaire to encourage comment and in the hope that other groups conducting similar research can use the ideas contained within it to foster comparability between different studies.
[6] See www.erpanet.org for the composition of this committee.

Chapter 4: Introduction to Sector

Broadcasting is the most powerful and widespread tool of communication and mass information. Its impact on contemporary society is felt not only in the social, political and economic life of a community, but in the private lives of citizens with religious, moral and cultural consequences. The broadcasting industry covers a huge and diverse spectrum, encompassing all radio and television transmissions, and in the last decade, this has been supplemented with cable and satellite broadcasting. The materials produced are as diverse, ranging from audio, video, and photographs to multimedia productions using analogue and digital technology.

By examining the statistical and technical data, we can understand the pervasiveness of the sector in the world and the complexity of its implications at a global level. The 2000 Central Intelligence Agency World Report states that there are 33,071 television stations across the globe, translating into approximately 193 million hours of television programming per year (assuming each station broadcasts 16 hours per day). If we estimate that about a quarter of the programmes are original, this equates to 48 million hours each year. If one-hour of video requires 1.3 - 2.25 GB of storage, then worldwide, television would require between 250,000 and 435,000 TB.[7]

Peter Lyman and Hal Varian's 2000 study suggests that there are around 43,800 active radio stations in the world (16,500 AM, 26,000 FM stations and 1,500 short-wave stations).[8] Again if we estimate that FM radio stations broadcast 20 hours per day, AM stations 16 hours per day, and short-wave stations 12 hours per day, there would be approximately 290 million hours (188 million FM, 98 million AM, and 6 million short-wave) of radio programming per year. Applying the 50 MB/hour rule of thumb, this would require annual storage capacity of about 14,500 TB if one were to record everything broadcast on the radio.

The broadcasting sector was essentially created as a public sector industry under the direct control of governments, with a social and cultural purpose to serve the public. In the last twenty years the participation and involvement of private companies provided the sector with a new commercial implication, impacting on the nature of its aims and the activities carried out. Ownership restrictions (nationality, sectoral dominance and multi-sectoral activity) during most of the past century prevented the growth of substantial multinational broadcasting groups. During the late 1970s a handful of broadcasters accounted for most audiences in each country. In the US for example the three networks ACB, CBS, NCB garnered around 92% of US television viewers – a figure that had been stable for around twenty-five years.

Those restrictions began to break down from the 1970s onwards. Most advanced economies have seen the growth of large-scale national broadcasting networks, as distinct from past affiliate arrangements. In the US groups such as Clear, AOL Time Warner, COX, and Disney have acquired existing cable and terrestrial networks (e.g. CBS, Infinity and ABC) and/or created their own (News' Fox, Viacom's UPN).

In the US the prime time audience of the big three television networks dropped from 74% in 1983 to 53% in 1996 because of competition from cable networks and new broadcast networks such as News' Fox and Viacom's UPN. In Italy MEDIASET has taken a 45% audience share and over 60% of total advertising sales. Public sector broadcasters such as the BBC have largely retained their market share but proved less successful in coping with demands for greater audience numbers.

[7] See Hhttp://www.sims.berkeley.edu/research/projects/how-much-info/broadcast.htmlH.
[8] Peter Lyman and Hal Varian, *How much information?,* 2000, University of Berkley, Hhttp://www.sims.berkeley.edu/research/projects/how-much-info/summary.htmlH (accessed June 2003).

With these radical changes, an increase in regulations was required. All state and supra-national organisations adopted policies, directives and recommendations to regulate the sector from an ethical (freedom of information, access to information, protection of privacy, and minors' rights), technical (signal and frequency regulation), and economic perspective (advertising). This had enormous implications on issues such as copyright, concessions, and the marketing of products. The European Union alone, in its different bodies, began with the treaty of Amsterdam in 1997, and issued about thirty directives, recommendations and resolutions on the these topics aimed at the broadcasting sector. International organisations have done the same, including FIAT (International Federation of Television Archives) and IAB (International Association of Broadcasters), as well as trade organisations such as the EBU (European Broadcasting Union), URTNA (Union des Radio diffusions et Télévisions Nationales d'Afrique), OTI (Organización de la Televisión Iberoamericana), ABU (Asia-Pacific Broadcasting Union), ASBU (Arab States Broadcasting Union), and ABA (North American Broadcasters' Association). Their actions have concentrated mainly on the definition of development and strategic management policies for the sector but also the implementation of shared technologies, guidelines and standards. Their activities together with a general pro-active role of broadcasters has made this sector one of the most advanced areas of research, testing and application of new technologies based on the use of digital information.

Chapter 5: Details of Interviews

Four Broadcasting companies were involved in the case study – a short profile of the participating organisations is outlined below. Two of the broadcasters received the questionnaire via email and duly returned the completed form back to the sender, while there was a more direct approach with the questionnaire directly administered on site following an arranged visit with the remaining two.

Many companies were asked to take part in the case study but a variety of different reasons restricted their ability to participate. The report's content was supplemented with information collected on the web sites of different companies and international organisations operating in the sector.

RAI (Radiotelevisione Italiana)
http://www.rai.it/
RAI - Radiotelevisione Italiana, is a public-sector company holding the sole concession for the public broadcasting service in Italy. RAI is made up of three distinct areas: corporate units that define strategies; service units responsible for technical tasks and the general functioning of the company; and industrial and editorial units devising, developing and creating programmes for the radio, television and satellite channels of RAI.

The company was set up in 1924 as URI (Unione Radiofonica Italiana); changing in 1928 to EIAR (Ente Italiano Audizioni Radiofoniche). Television broadcasting began in 1954, and consequently the name changed again to the present RAI. The company was placed under the control of IRI (Istituto Ricostruzione Industriale) in a situation of state monopoly of radio and television broadcasting. This came to an end in the 1970s, and in 1975 RAI was reformed with the creation of three independent networks. Digital satellite channels were set up in 1997.

In the last few years RAI has been very active in the sector of New Media including Internet platforms. In the year 2001, in addition to RAI Sat, the companies RAI Net, RAI Click and Sport Set were operating.

BBC (British Broadcasting Corporation)
http://www.bbc.co.uk/
The British Broadcasting Company, as the BBC was originally called, was formed on 18th October 1922 by a group of leading wireless manufacturers. In 1927 the British Broadcasting Company became the British Broadcasting Corporation when it was granted its first Royal Charter. This charter defined the BBC's objectives, powers and obligations.

The world's first regular high-definition television service developed rapidly between 1936 and 1939. In 1950 there were 350,000 combined radio and TV licences. In September 1955 the BBC's broadcasting monopoly came to an end when ITV (Independent Television) was launched. The sixties were also a decade of expansion for television and radio. The BBC was granted its seventh Royal Charter in 1996. Today the total BBC budget is approx €4 billion, with €35 million a year for the archive budget. Of this, €10 million is allocated for preservation purposes.

ERT (Elliniki Radiophonia Tileorassi SA)
http://www.ert.gr/
ERT is a public-sector company holding the sole concession for the public radio and television broadcasting service in Greece. Its history began in 1938 with the setting up of the National Radio Institute (EIR) with three national channels and a service broadcasting abroad for migrant Greeks. In 1965 the first experimental television programme was

transmitted. In 1970 EIR took up its present name of National Radio and Television Institute (ERT). In 1987 a law was passed to unify radio and television stations, and one single radio–television body was set up: ERT-AE (Hellenic Radio and Television Joint-stock Company) and at the same time a further peripheral station was set up, ERT3 located in Salonika. In 1997 a law was passed to regulate the two state television channels ET-1 and ET-2.

At present ERT includes four television channels (ET-1, NET, ET-3, ERT-SAT) and seven radio stations. Its overall budget is about €250 million and it employs about 3500 staff.

SF DRS (Schweizer Fernsehen der Deutschen und Rätoromanischen Schweiz)
http://www.sfdrs.ch/
The SRG SSR Idée Suisse is the Swiss public radio and broadcasting company. It consists of subsidiaries for the German, French, Italian, and Rhaeto-Romanic speaking regions as well as Swissinfo (Swiss Radio International).

The company comprises of seven independent units with the German and French components of the radio and broadcasting companies separated and the Italian and Rhaeto-Romanic combined. The Constitution and the Federal Radio and Television Law define the legal framework for SRG, while a concession regulates its mission, in particular the need for producing full programmes in German, French, and Italian, and emissions in Rhaeto-Romanic.

SF DRS (Schweizer Fernsehen der Deutschen und Rätoromanischen Schweiz) is the German-speaking broadcasting company. SF DRS started its pilot operations in 1953 and was launched officially in 1958. Since 1997 the company unit operates two channels, SF1 and SF2 with a total of 32.9% market share in German-speaking Switzerland. In 2001, over 800 employees produced some 19,000 hours of programmes. The unit's sales volume was 500 million CHF.

Chapter 6: Circumstances

Initially a large number of broadcasters in Europe were approached to participate and many chose not to reply, while others declined the invitation to take part in the study. The four companies that accepted the invitation, were, in almost all cases, involved through a personal contact with employees of the company. This is a very complex sector with diverse awareness levels, but which is to be considered at the forefront in the management of digital information.

All the interviewed companies have an archival department employing a document management system within their organisations. The people involved in the case study belong to this unit at different levels (managers, technicians, and archivists) and are well trained and knowledgeable on the problems and implications of digital preservation. This specifically archival-oriented approach led to a more focussed and specific analysis of technical and strategic aspects in document management. Moreover the diverse background and experiences of the staff involved in the case study provided an overall and transversal view of their activities.

The data gleaned from the questionnaires was further supplemented with information from other sources. The research-work carried out through the Internet proved to be very useful – with facts and figures on strategies, standards used, and future projects – contributing to shed additional light on the choices made and policies being implemented in the broadcasting sector.

Chapter 7: Analysis

This section presents an analysis of the data collected during the case study. It is organised to mirror the sequence of topics in the questionnaire.

- Perception and Awareness of Digital Preservation
- Preservation Activity
- Compliance Monitoring
- Digital Preservation Costs
- Future Outlook

Perception and Awareness of Digital Preservation

A good level of awareness of the importance of long time digital preservation is present in the broadcasting sector. Not only are the archivists sensitive to this question but the managers and executives involved in technical and/or administrative activities in the individual units are well aware of the problems. This level of awareness was supported and enhanced by international organisations in the sector (EBU), and specific projects launched by the European Union (PRESTO[9]). In addition, broadcasters are recognising the benefits and advantages to be gained from being knowledgeable about digital information – a high quality end product, easy re-sue in the production of new programmes, easier and faster access opportunities. This is combined with an increased consciousness of the need for digital documentation and research. This awareness is in tandem with the increased importance attached by broadcasting companies to specific policies for long-term preservation of digital information in the general context of archive management plans. The commitment of broadcasting companies is shown by three main factors:

Continuous rise in expenditure for preservation purposes. In just a few years the expenditure went from 10% to 60% of the total budget devoted by the most important public-service broadcasters to archive management (in the case of one of the interviewed companies the total sum was €100 million over a period of 10 years, equal to a 50% increase)

Increasingly more systematic and detailed acquisition of information and knowledge devoted to the training of employees and the definition of strategies and projects. In addition to the know-how of the companies, the biggest sources of information are made available by international organisations (FIAT/IFTA, EBU, AES), derived from mainly European projects, or acquired/produced in the context of cooperation projects with other broadcasters.

High interoperability among many companies in the sector obtained mainly through the participation in shared projects and with the exchange of information and experiences in an area where many problems are still unsolved and solutions must still be found and tested.

Main Problems

The progress of research and experimentation in broadcasting raised several questions relating both to technology and archives, with consequences in the field of document management and preservation. Among the various problems mentioned in the questionnaires, the most important ones are listed below:

[9] For further information see also Hhttp://presto.joanneum.ac.at/index.aspH.

- Speed of deterioration of formats;
- Uncertainty on the stability of new formats;
- Technology obsolescence;
- Quality of images (mainly those derived from digitisation of analogue material);
- Difficulty in the management of information and metadata (due to the large quantity of material and relating information);
- Optimisation of access to and sharing of information (with internal staff);
- Lack of experienced operators.

This is a simple list of problems identified by the interviewees and is not in ranking order.

Asset Value and Risk Exposure

The production of digital information in the broadcasting sector has grown exponentially in the last few years. It plays a very relevant role in the creation of television programmes (replacing analogue material) with a quantity of hour/product reaching several dozens of thousand of hours per year (two interviewees indicated the production of their companies at around 50,000 hours per year.)

The vast majority of digital information is generated in the production of programmes, (including information programmes), films, fiction, documentaries, entertainment shows and programmes on current affairs. In addition, administrative documents, mainly relating to the legal contracts and copyrights and those referring to production activities constitute digital information assets as well as context data on the production of programmes: metadata, descriptions, documents, production processes and procedures. The latter has a very high added value for internal staff and the general public enabling searching and access to information.

All these information assets are preserved by the interviewed companies, which have set up archives within their organisations. The missions of these units are the management and preservation of records. These units are equipped or are being equipped from technological and archival points of view to collect and preserve digital information.

The motivation behind why broadcasters decided to invest in the production, management and preservation of digital information can be summed up as:

- the possibility of re-using the digital information in the production of new programmes;
- the respect of legal requirements imposed by legislations on the preservation of administrative documents in particular; and,
- the management of official documents to record important decisions or initiatives relating to programmes, schedules and documents annexed to contracts.

Not all interviewees attributed a historical value to digital information although there is evidence of a special awareness. Scepticism on technological aspects, on the actual challenges and possibility of preserving the record as an historical source, raised the suggestion that this was the most important problem to face.

All interviewees considered digital information an indispensable tool for their work – its loss would cause serious legal, economic and management risks. In particular economic risks are highlighted – loosing digital information on programmes and productions means jeopardising the investments made year after year, as well as possible profits. The loss of records on the

acquisition of copyrights would nullify the expenditure to buy them (in one company the expenditure incurred for the acquisition of copyrights amounted to 50% of its annual investments).

In spite of the awareness of the risks involved, only one company carried out a risk analysis on technological aspects, and in particular the deterioration of older electronic formats. This analysis led to the migration from old formats because their quality had deteriorated and the risk of loosing information forever was identified.

Preservation Activity

Policies and Strategies

All companies are conscious of the need to identify and implement solutions for digital preservation and consider this as a serious problem associated with high costs and an ever-present risk of loss of information assets. Thanks to this awareness, efforts have been made to find common solutions in the last few years. One of the most significant outcomes is the increasing cooperation existing within the industry and among broadcasters who are actively collaborating to face the problem.

Cooperation among broadcasters on the research and development of policies and strategies for digital preservation is taken as granted and ranges from the simple exchange of information, the definition of a common cost policy, shared strategies to look for alternative technical solution, to standards and guidelines. This joint effort is believed to be useful by all interviewees to meet the internal needs of broadcasters in areas such as the definition of directives, cost policy, acquisition of information and application of new technological experiences.

Efforts were channelled into developing strategies to combat identified problems. Predominant has been the exchange of information, cooperation on shared projects and inter-professional training of personnel. Meetings played a central role in the sharing of experiences and training, and conferences were organised by international organisations [by AES (Audio Engineering Society) on the archiving of audio material, a session on preservation held by IASA (International Association of Sound and Audiovisual Archives), and meetings organised by FIAT/IFTA (Fédération International des Archives de Télévision/International Federation of Television Archives) on digital archiving]. There were specific shared projects on digital preservation at a European level such as PRESTO (in the context of which three large European companies cooperated: BBC, INA, and RAI). In addition, the setting up of work and study groups has been conducive to a continuous exchange of information by means of tools typical of the Web (newsletter, forum) but also the sharing of useful choices to find appropriate solutions to specific problems.

More complex is the relationship with bodies external to broadcasting. The situation is twofold: on the one side there are companies which have started cooperating with outside agencies to find a solution to the problem of digital preservation, mainly with government agencies (this is the case with the BBC which is cooperating with the UK National Preservation Office), with archives (in the case of TECHE RAI), and also IT specialists to solve problems relating to mass storage or “facility houses” specialised in the preservation of media. Some companies choose not to have relations external to the broadcasting industry, believing that this a specialised sector.

The beneficial effort of cooperation is matched by the internal activities of companies to define policies for record management. All companies, although with different results, have

implemented preservation policies translated into the definition of standard procedures (RAI), in multi-annual preservation programmes with the allocation of remarkable economic resources (BBC) and the issuing of internal directives on archiving (SFDRS). In general, the development of these policies involved the whole organisation from employees to managers while in others it has been entrusted to the specific archival units (BBC information and Archive department, TECHE RAI). In some cases cross-company working groups have been set up, in other instances external resources have also been used.

In addition to management policies all companies created and implemented strategies and practices for digital preservation – adopting solutions developed in house under the responsibility of internal units. These dealt with a range of topics from the activation of detailed working programmes on requirements (format, genre, age, condition) of the record material, the recovery of damaged material, the definition of standards for formats, and use of metadata systems. Both policies and strategies are regularly updated following four different approaches: periodically (in general on a three-year basis), daily according to needs, on demand without any timetable, and simultaneously with the development of new strategies and/or technologies.

Selection

All broadcasting companies have implemented policies to select records for preservation, although the general trend is of preserving the majority of produced records, while paying special attention to official documents and materials relating to the production of any type of programme

Selection criteria take into account archival but also technological and practical aspects. The two main elements guiding the selection process are the re-use value of the selected documentation for the production of new programmes and preservation for historical purposes. Technical aspects relating to the deterioration of records or their formats, or legal aspects imposing long-term preservation also play a role in the selection procedures. These criteria are regulated by internal directives, which set the classification and management procedures for retention schedules.

These latter two aspects (classification and retention schedule) generally involve the whole organisation and occasionally the archives department who manage the procedures. Schedule maintenance and management follows two main types: in most cases the archive department is responsible, while in some it is the document-producing units. Schedule implementation is entrusted to expert personnel in the company, again predominantly archivists.

None of the interviewed organisations have adopted a control policy on the reliability and exhaustiveness of selected documents, and in general mention is made of an insufficiency from this point of view. In the cases where there is a policy, controls are carried out by internal working groups composed of skilled personnel assessing the quality of selected records and the consistency of the information.

Preservation

The upkeep of the preservation process differs from company to company, but could be said to follow two distinct approaches: some carry out the whole preservation process in house while others, in addition to using their own unit, outsource part of the preservation process.

In the second instance, organisations prefer to outsource most of their preservation activities, keeping only the quality control function within the company. Others carry out most of the process in house, and outsource only the activities concerning the migration to new media or

conversion into different formats. The outsourcing option in both cases is part of a cost reduction policy.

In all companies expert personnel carry out preservation activities. These people are to be found at all levels of the organisation and include managers, employees, archivists and technicians with tasks specific to their skills and training.The training of personnel is considered of fundamental importance. Training can take many different forms: field research-work with specific case studies; consultation of specialised journals and web-sites; participation in European projects promoting the exchange of information and experiences among archivists working for different broadcasters; participation in training seminars and meetings organised by European or international organisations (FIAT, IASA, EBU); and in-house training.

The use of digital preservation and information management standards is not common among broadcasters. About one half do not use standards and prefer to operate according to internally set criteria. The other half recognise that standards provide added value in the digital preservation process and wish for more standardisation in the future, not only in the implementation of common policies but in the use of formats and technologies. This second group uses standards which are predominantly exclusive to the broadcasting sector, consisting mainly of the recommendations of international organisations (EBU and IASA standards) for films, audio and video media (although video preservation is less standardised). Among the most used formats are IMX format in broadcasting quality; MPEG4 for browsing; MP3 for audio browsing; and PCD Kodak for photographic material. The process of converting material to different formats varies from company to company – some companies deem it unnecessary to convert because the present formats are believed to be stable. One company is however converting the material from analogue to analogue video and digital video while other broadcasters convert only on the basis of record usability criteria.

All the interviewed companies had developed a document management system. The systems implemented vary and depend on three factors that are highlighted in all questionnaires: the level of companies' awareness of the definition of strategies; the availability of funds to invest; and the level of training, skill and experience of operators.

The technologies used at this stage of digital preservation depend on the type of record. Printing to paper is generally used for administrative and management documents (contracts, programmes, schedules) produced with word processing tools – most of these are also kept online on hard disks or on the server. Most databases are preserved online and contain descriptive metadata relating to context, archival and technical information (this is due to the need for rapid retrieval of information that is used on a continuous basis).

Material generated for the production of programmes is treated in a different way. The material is made up of audio and video media, films, pictures and posters. Generally, images and sounds may have been produced as analogue information or in print and so the material is subjected to a digitalisation process according to different procedures and criteria depending on the type of material. The material is moved to different media (optic or magnetic) directly or after a certain (undetermined) period of retention online. The variety of media might include both well-known and widely used media (videotape, Betacam, CD or DVD) or, in some cases, more specific ones (LTO, Linear Tape-Open and DLT, Digital Linear Tape).

The implementation of metadata for the description of digital information, and processes of storage and preservation, is a fundamental part of the system these digital information archives and the organisations invest substantial human and financial resources into this. The departments responsible for archiving have structures for metadata and indexes for

digital information. The solutions adopted are twofold – some have already built a metadata system resorting to internal resources, while others are using well-known standards such as P/META, SMEF (Standard Exchange Media Framework), EBU BWA (European Broadcasting Union, Broadband Wireless Association) for audio or are planning to use new standards such as EBUvideo metadata format as soon as it is available. The task of managing the migration of this information into long-term storage is entrusted to the archival department, which carries out the task with its own skilled personnel.

Very little information was received on migration. There seems to be no specific plan of migration to new formats in the broadcasting sector, perhaps because the material produced is still too young or the existing formats are found to be reliable. However, in the future it is likely that this will become one of the most demanding problems, chiefly when new standards are implemented.

Access

All companies believe that access to information is an indispensable tool. All have adopted an adequate system to access archived information. Two different aspects of this issue are taken into account: access by internal personnel and access by external users.

In the first instance are those organisations that do not have systems in place to allow external users direct access to the records. Small steps, however, have been made to allow online access to selected information. This information refers to material produced in the development of programmes, and is made up of photographs and audio and video records.

The second demands the retrieval of information and audio/video records in order for them to be re-used for the production of new programmes by all departments in the organisation. This type of access is generally managed by means of detailed procedures, which enable internal personnel (and contractors in some instances) to enter the database through specific passwords allowing different levels of access.

The problem of manipulation of information is not considered since it is very difficult to tamper with these types of documents. The problems companies must face in relation to access to information deal mainly with copyright and security, and both are linked to a non-authorised re-use (or pirate use) of information which would entail an economic loss to broadcasters.

Future choices are directed toward access for external users. All companies intend to increase access by installing better systems and improving the search opportunities with new solutions. From this point of view, particular attention is paid to some groups of users, such as students or institutions. This should occur in the not too distant future – one of the broadcasting companies is ready to implement an on-line facility of key-frames, storyboard for video, followed by low-resolution full-motion video.

Compliance Monitoring

All companies have implemented monitoring systems for their record preservation processes. Companies with a more advanced document management system have executed systematic and exhaustive initiatives. This was made possible due to the launching of monitoring projects (for example, a special project to monitor compliance in the BBC regions).

The monitoring actions, at different levels, follow internal criteria and directives. There are no controls carried out by external institutions or supervisors. The departments involved are those responsible for document management (archival department). The timing of the monitoring actions depends on the type of verification and can range from checks on a periodical basis (ranging from 1 to 10 years) to daily monitoring directly on documents used. Periodical monitoring deals with the compliance of production and preservation processes with company's policies and strategies (yearly), and control of the preservation status of media and quality of content of information (annual or multi-annual). Daily random checks are also made on materials processed to monitor quality and deterioration of media. No real shared strategies exist among companies on monitoring criteria and processes and each broadcaster has developed a monitoring system to meet its own needs.

Digital Preservation Costs

All interviewees were familiar with the amount of funds made available by their company for preservation activities. Not all organisations have a specific budget for digital preservation, however, where there is it commonly amounts to about 1% of the total company budget. For the BBC it equates to €10 million per year with €35 million allocated for archival activities as a whole, where €4 billion is the total company budget. In all cases these allocations are identified through an accurate cost and benefit analysis based on previous experiences and the results of various initiatives.

Funds come from allocations made in the company's budget and in only one case did they come from an external source (government contribution allocated to the MEMORIAV association in the case of SFDRS). Funds are generally allocated in specific budget items and attributed directly to internal units, in some cases the archive departments (TECHERAI) or offices responsible for their management (Division for royalties and licences for SFDRS).

No specific resources are allocated to deal with the problems of investing in digital preservation, apart from those obtained from the government for special projects. All interviewees mentioned this shortcoming and underlined the need for common policies supporting the effort the industry has been making in the last few years. However dissatisfaction is matched, for the majority of the interviewees, by the will to actively cooperate to define common standards. An interesting proposal was made by one of the interviewees on the possibility of creating a central facility devoted to the preservation of the European Broadcast Archives. The idea is that of setting up of a facility to which all broadcasters owning media collections can delegate the preservation activities of their archives in a cost-effective manner.

Future Outlook

There is a general hope amongst the interviewees that the digital preservation system implemented by their companies can prove to be efficient over a long period of time, although some essential problems must be solved such as electronic delivery and mass storage. This will hopefully lead to changes in the policies and strategies of digital preservation in the next 5-10 years.

An adequate cost policy is believed to be a central focus for the development of new strategies and activities. Some companies have already identified and allocated the resources for digital preservation for the next 10 years although, for some, these resources need to be periodically assessed and revised in view of the use of new technologies (for

example, the use of mass-storage robotics), and the expansion of record acquisition plans (digitisation of film in high resolution). One of the interviewees voiced the need for more rationalisation in expenditures to reduce production costs. It was felt that in the future more economic resources should be concentrated on digitisation of film, digital multimedia access, mass storage, and electronic delivery.

The necessity of preserving an increasingly quantity of records and information is strictly linked with the need for improving and expanding access and search opportunities. From this point of view it is desirable to achieve a more detailed documentation of media (for item-level access), for an automatic indexing at the item level, and to create item-level metadata and support item level access, browsing and retrieving. Increased cooperation within the broadcasting sector is more necessary than a relationship among different sectors. Efforts are being made and some of these companies are already working to create an EU network of excellence in broadcasting media preservation.

Chapter 8: Conclusions

There is an excellent level of awareness in the broadcasting sector on the importance of long-term preservation of digital information. Recently the production of digital information in broadcasting has grown exponentially. It now has a fundamental role in the production of programmes, with a quantity of hour/product reaching several thousand hours per year. This quantity of produced material, and the variety of different forms of this new documentation, has increased the demand for digital preservation policies and strategies in the archival management plans of broadcasters.

In addition, the high re-use value attributed to digital information for the production of new programmes and the high risks of loss linked to its fragility (with serious economic and historical losses) proved to be a good catalyst for companies to identify adequate solutions for long-term preservation, not just independently, but with a common effort between broadcasters.

This cooperation ranges from simple exchanges of information and experiences, to the definition of common cost policies, and the identification of shared strategies to find technical solutions, standards and guidelines. A relevant contribution comes from the initiatives promoted by sectoral international organisations and the launching of specific projects within the European Union.

The most important collaborative efforts are concentrated in three areas:

- A cost policy leading to increased resources invested in digital preservation;
- Appropriate training initiatives to have internal skilled personnel equipped to face future challenges; and,
- Constant attention paid to technological innovation and standard development (strategies, formats, and metadata).

Broadcasting companies are generally proactive in facing the question of digital preservation. Most interviewed companies developed an internal document management system, preferring in-house solutions, and are actively participating in the research and development of digital preservation. At present companies are focusing their attention on three main topics: definition of metadata systems adequate to contain large quantity of data supplementing documentation; implementation of new and more powerful tools to have access and retrieve information; and the identification of standard formats for information delivery.

In spite of the progress made, there are still many risks to address and questions to be answered. In the future a possible contribution to solving these problems could come from sectors external to broadcasting. Among the most urgent problems are mass storage, media obsolescence and data migration. The only way forward is increasing research and experimentation activities. Only through this can we obtain adequate solutions to the many unsolved problems in long term digital preservation.

Appendix 1: Interview Instrument

ERPANET Case Study

Administrative Section
Interview Details
Organisation Details
Disclosure/Privacy Information
Tracking of Activities
Perception and Awareness of Digital Preservation

We would like to begin by asking you a few questions about your general impressions of digital preservation, and the impact that it has on the _____ sector. We will use the term 'digital information' throughout to refer to all forms of digital data, records and information.

1. Is there a general awareness in the _____ sector that the long-term preservation (more than five years) of digital information is an important issue?

2. To what extent does the sector recognise the importance of preserving digital information in the long-term?

3. What are the main problems associated with digital preservation in the _____ sector?

4. From what sources have you heard about the issues surrounding digital preservation?

5. What values does digital information have in the _____sector beyond the original purposes for which it was created?

Understanding How Digital Preservation Affects Your Organisation

We would like to focus on how some of these digital preservation issues affect your own organisation

6. What type of information is digitally preserved in the short and the long term in your organisation?

7. What are the reasons that digital information is preserved in your organisation:
   - ❑ Legal requirements
   - ❑ Financial requirements
   - ❑ Business requirements (e.g. document important decisions and activities)
   - ❑ Historical value
   - ❑ Other (Please specify)

8. What risks is your organisation under if digital information is not preserved in the long-term?
   - ❑ Legal risks
   - ❑ Financial risks
   - ❑ Business risks
   - ❑ Historical value
   - ❑ Other (Please specify)

9. Has the organisation conducted a risk analysis and/or business needs analysis with regard to the preservation of information? If yes, can you indicate the main results?

Actions Taken: Policies, Strategies, Standards and Practices Developed

The questions in this section aim to explore some of the actions that the organisation has undertaken to deal with the preservation of electronic records. It will examine the above as well as selection, preservation, storage, and access activities.

Policies, Strategies, and Standards

10. Is there any collaborative effort across the _____ sector to tackle common digital preservation issues?
    - ❑ Conferences
    - ❑ Newsletters
    - ❑ Journals
    - ❑ Common Institutions
    - ❑ Collaborative Projects
    - ❑ Other (Please specify)

11. Has your organisation attempted to find information external to the sector regarding preservation?
    If yes, please indicate the sources
    - ❑ Government agencies
    - ❑ Higher education institutions
    - ❑ Archives
    - ❑ Libraries
    - ❑ Museums
    - ❑ IT Specialists
    - ❑ Other (Please specify)

    Please specify the kind of information provided and how useful it proved to be.

_____
_____
_____
_____

12. Do you cooperate with other institutions in the research and development of policies, strategies, and standards? In what way?

13. How useful is this common effort in applying it to your organisation's own needs?

14. Do you have any specific organisational policies that relate to the preservation of information?

15. Who (and what) was/is involved in the creation of these policies?
    - ❑ Management
    - ❑ Employees
    - ❑ Special task force in the organisation
    - ❑ Results of internal analyses (e.g. risk analysis)
    - ❑ External sources, models, advice
    - ❑ Other (Please specify)

16. Do these policies apply across the entire organisation?
17. How are these policies implemented?
18. Has your organisation developed preservation strategies, standards, and practices and implemented them?
    - ❑ Yes
    - ❑ No

    If YES, Please specify.

_____
_____
_____
_____

19. How were they introduced and implemented (e.g. by department, with training)?

20. How, and under whose responsibility have these been established?
    - ❑ External Advice/Sources/Models

- ❑ Survey of information resources
- ❑ In-house solutions developed
- ❑ Other (Please specify)

21. How often are your preservation policies and strategies updated and renewed?

Selection of Digital Information for Preservation

22. Do you have a selection policy, or classification and retention policy that determines what information in your organisation is to be preserved?
    - ❑ Yes
    - ❑ No

    If YES, Please specify.

_____
_____
_____
_____

23. Is your classification and retention schedule linked and implemented across the organisation?

24. Who is responsible for the maintenance and implementation of these schedules?

25. How do you ensure that selected information is complete, accurate and identifiable?

Preservation of Digital Information

26. Does your organisation take care of its preservation activities itself, or are these outsourced?
    - ❑ Outsourced
    - ❑ In-house

    If outsourced, what reasons were behind this decision, and who carries out the preservation activities?

_____
_____
_____
_

27. Are there specific individuals in your organisation responsible for the preservation of digital information?

28. What positions do these people hold in the organisation, and what are their responsibilities and competencies?

29. What type of training or advice is available for them?

30. Is your organisation aware of any external standards, best practices, and guidelines available on preservation?
    - ❑ Yes
    - ❑ No

    If YES, Please specify.

_____
_____
_____
_

31. Are these specific to your sector?

32. Where did you learn about them? Please specify your sources.

33. Which of these standards, practices and guidelines do you use?

34. What technologies do you use for preservation? For the following list of current techniques, please specify which ones you use and for what kind of information.

Technique	Specify Type/Technology Used	Information Preserved
Print to Paper		
Scanning		
Save on Disk		
Save on Other Media		
Emulation		
Migration		
Microfilm/Microfiche		
Other		

35. On what grounds were these techniques chosen? Please specify your answers.
    - ❑ External Advice
    - ❑ Trials and Evaluations
    - ❑ Recommendations
    - ❑ Intra-sectoral standards available
    - ❑ Other

    Please provide as much information as possible about why these decisions were taken.

    _____
_____
_____
_

36. What data formats do you use for preservation?
    - ❑ Standard data formats
    - ❑ Others

    Please specify for both answers

    _____
_____
_____
_

37. Do you convert the information to be preserved into other data formats for technical (or other) reasons?

38. What metadata do you use to describe both your digital information and the processes of storage and preservation? Does it follow any standards available (Dublin Core or others)? Can you provide a copy of the metadata set?

39. Is the collection and production of metadata automated?

40. Who is responsible for the transfer of information into long-term storage?

41. How often (if undertaken) does digital information migrated or refreshed?

Storage of Digital Information

42. Do you have a particular storage area for digital information to be preserved?
    - ❑ Yes
    - ❑ No

    If Yes, how is this organised and equipped?

_____
_____
_____

43. Do you keep redundant copies of the digital information to be preserved for safety (or other reasons)?

Access to Digital Information

44. How is information protected from inadvertent or unauthorised access and manipulation?

45. Does your preservation solution allow direct access to the digital information stored (i.e. are they stored in an executable format)? If no, how is the access provided?

46. What access issues does your organisation face?
    a. Copyright
    b. Privacy Issues
    c. Access Security and Privileges
    d. Others (Please specify)

47. How does your organisation intend to provide access to digital information into the future?

Digital Preservation Costs

48. Did your organisation attempt to undertake a cost benefit analysis concerning its investments in preservation?

49. Has this analysis been assessed in light of your actual preservation activities? Did it prove to be accurate?

50. To which section of the budget are the economic resources for your preservation programme allocated?

51. What percentage of the organisation's budget is spent on preservation? Can you compare that to some other area of the organisation's activity?

52. Is the organisation attempting to address amortisation issues in the preservation budget?

53. Are there available sources of funding within the _____ sector allocated for digital preservation issues?
    - ❑ Yes
    - ❑ No

    If Yes, please specify

    _____
    _____
    _____
    _____

54. Are you satisfied with these cross-sector services?

55. If no, what would you like to see available? [i.e. what would you think could best be solved in common in your sector?] Would you be willing to engage financially in such information?

56. Are there other external sources available for digital preservation activities, (e.g. government grants, cross-sector funds)?
    - ❑ Yes
    - ❑ No

    If Yes, please specify

_____
_____
_____
_____

Monitoring of Actions

After having identified what has been undertaken in your organisation with regard to preservation activities, we would like to find out about how these efforts have been monitored.

57. Is the preservation process audited on a regular basis?
58. Is compliance to policies, standards, and strategies audited on a regular basis?
59. Is compliance to other requirements (legal, business etc.) audited on a regular basis?
60. How often are checks made to the preserved material, (e.g. for signs of deterioration)?
61. Please specify the criteria used for these audits.
62. Who performs these audits? (e.g. Internal/External)

Future Requirements

We would like to ask about the areas in which there is a need for additional attention in your organisation and the sector as a whole.

63. How long do you predict that your current preservation policies, strategies, and solutions will meet your organisation's preservation needs?
64. Is the amount of money allocated for preservation going to change in the future? Will it need to be changed?
65. If more funds were available, what could/would they be used for?
66. What conclusions has your organisation come to about its preservation efforts? Are these satisfactory?
67. What preservation efforts are remaining to be addressed within your organisation?
    - ❑ Further data to be preserved
    - ❑ Revision and adjustment of preservation policies and strategies
    - ❑ Additional resources dedicated to preservation
    - ❑ Technological solutions
    - ❑ Other (Please specify)
68. Would you like to see more cross-sectoral or intra-sectoral activity with regard to preservation?
69. Are there any other areas in which you would like to have more information made available on digital information? Where do you expect this information to come from?

Thank you very much for your valuable contribution.

erpanet

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