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Mapcuratorship in Transition

**Report on the 9th conference of the Groupe des Cartothécaires de
LIBER**

26-29 September 1994, Zürich, Switzerland

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This report will give a summary of the conference. That is, the papers read will be summarized to sketch some of the developments and the ensuing discussions -which took up half of the conference time- will be reported. Though some attempt has been made to state conclusions it is hoped that this document may lead to further fruitful discussions between map curators and colleagues in general.

Introduction

All around the world there is a development to automate or digitize information. Not only because information is more speedily given, but also so because the information contents can be manipulated and more easily transferred to places other than where it was originally produced or stored. At the same time there lurks the possibility that more traditional sources of information will be discarded or looked upon as becoming obsolete. History teaches us that no invention is perfect and that only later posterity may perceive that obsolete artifacts, media or technologies even in modern times can and will have their usefulness.

People working in libraries, archives and documentation-centres have been from time immemorial guardians of historical and cultural records. They see it as their task to provide the information they manage in the right format to their customers and as speedily as they can. But they see it also as their duty to preserve the information they have gathered in the best possible way in order that future clients or generations can profit from it. Even when they are forced to follow the developments towards new media they must ask themselves how their

changing working-practices will influence the availability and use of information.

When we are involved in a time of transition it is very easy, for feelings of security, to choose for tradition or for modernization. That is, one can totally rely on the traditional holdings, because they are known best, because more of them are accessed, because one knows how to handle them, how to care for them, how to write about them and promote them. However such an approach may let the materials that are preserved evolve into museum pieces. On the other hand one can easily fall for the magic of new technologies, as they seem to promise to solve a lot of the traditional problems of space in stockrooms, access, promotion and usability.

It is very difficult to try to find a balance between the one approach and the other. Society may require us, as curators of part of its historical and cultural heritage, to approach these new technologies and products with caution. When they hold promise we have to investigate their possible uses. But we also have to try to apply these new technologies to our traditional holdings and, if possible, to integrate them with our traditional practices.

As developments in Europe are uneven, what better possibility is there than a conference where colleagues can meet, get information and discuss the influences these changes can have on us and our working-practices.

Reader

To foster discussions during the conference the Board of the Groupe des Carthécaires de LIBER (GdC) and the Swiss Organizing Committee (SOC) thought it wise to issue a reader to the participants one month before the conference actually took place. Because the articles in the reader concern many aspects of the topic and because those not present during the conference may wish to read up on these matters the titles are reproduced here. Some of the articles were taken from journals, some from Internet sources.

Competencies for electronic information services / John Corbin. In: The Public-access Computer Systems Review 4, no. 6 (1993) p. 5-22 [10 p.].

What is a map? / I. Vasiliev ... [et al.] In: The Cartographic Journal, journal of the British Cartographic Society, Vol. 27, December 1990, p. 119-123.

Cartography, GIS and maps in perspective / M. Visvalingam. In: The Cartographic Journal, journal of the British Cartographic Society,

Vol. 26, June 1989, p. 26-32.

Accessing the world of digital spatial data / by Mary L. Larsgaard. In: Information Bulletin Western Association of Map Libraries, Vol. 23, no. 3, June 1992, p. 188-207. Includes 14 p. dictionary of technical terms.

Glossary [of terms and definitions for spatial digital data]. Appendix to: Content standards for digital geospatial metadata (June 8) / Federal Geographic Data Committee, 1994. The standards are available from anonymous FTP server fgdc.er.usgs.gov in directory `gdc\metadata` or can be requested by electronic mail on gdc@usgs.gov.

Exploring the impact of digital cartographic data on map librarianship using data use models / by Ming-Kan Wong. In: Bulletin 173, September 1993, SLA Geography and Map Division, p. 2-14.

Configuration of computers in map libraries / by Robert S. Allen. In: Bulletin 173, September 1993, SLA Geography and Map Division, p. 15-23.

"Automation and map librarianship: three issues" / by Christene Kollen & Charlene Baldwin. In: Bulletin 173, September 1993, SLA Geography and Map Division, p. 24-36.

Report on THE MAP LIBRARY IN TRANSITION : a joint conference sponsored by the Congress of Cartographic Specialists Associations and the Geography and Map Division of the Library of Congress, October 18 & 19, 1993, 10 p. From: MAPS-L (Maps and Air Photo Systems forum, an American discussion list on Internet).

The state of map libraries and archives / [statement by the CCISA]. 2 p. From: MAPS-L (Maps and Air Photo Systems forum, an American discussion list on Internet).

Exploring the Internet / Tony Addyma. In: *Serials : the journal of the United Kingdom Serials Group*, Vol. 7, No. 2, July 1994, p. 133-141.

What a tangled web they wove ... / Kurt Kleiner. In: *New Scientist*, 30 July 1994, p. 35-39.

Conference

The conference was held in Zürich on September 26-29, 1994, and was attended by 64 participants from 17 countries.

For the first time a keynote speaker was invited from the U.S.A. because the European colleagues wanted to know how the advancement of the new technologies and media had been incorporated into the American map collections and how they had fared.

Though there had been participants from Central and Eastern Europe in former conferences, there never had been so many as this time. This was mainly due to a very generous gift of the 'Institut für Technologie' in Zürich, which made it possible for 9 colleagues from Estonia, Hungary, Poland, Russia and Slovenia to attend. In this way the integration of Europe is well served and the necessary exchange of information is promoted better. It is curious to see how unevenly the new technologies invade our offices. Only 16 of the participants had e-mail at their disposal and 4 of them came from Central and Eastern European countries!

During the conference 14 papers were read on various topics and there were 7 hours of discussions. In addition there were 6 demonstration stands on digital maps, 6 poster displays, and a video concerning the renovation and planned extension to Det Kongelige Bibliotek in Copenhagen. Though the programme seemed overcrowded almost all the participants attended every meeting and session, showing how much they are involved with the matters at hand.

National progress reports

Since 1988 it has been usual for National Progress Reports to be read. They show developments within a country in the interval between the bi-annual conferences. Their contents are concerned with activities of map curator groups, education, automation, acquisition and collection development, conservation and restoration, conferences and symposia, exhibitions and important publications. During this conference some 14 reports were read. They will be published in *ERLC: The LIBER Quarterly*. These sessions have become a very good means of

having a general overview of developments all over Europe.

Papers

Our American guest, Patrick McGlamery from the Homer Babbige Library of the University of Connecticut, as keynote speaker started with an eye-opener: "We are map librarians, and, like it or not, we are in the forefront of library information technology". Following on from a brief history of map printing he showed how far advanced into new technologies map producers are. We have reached the point in spatial information evolution where the amount of spatial information available outstrips the ability to represent it cartographically. This makes producers of spatial information adopt digital techniques more quickly and more widely than in other fields of publication, putting them some years ahead of other publishers. The fundamental nature of spatial information, and mapping, has changed.

At the same time the functions of the map library have changed. Free access to information is a fundamental freedom in the U.S.A., but the burden and responsibility of distributing this information has shifted from the producers to the libraries. Use also changes. With traditional materials only one person, at one place, at one time can use a specific map. A digital map is accessible from many places simultaneously with limitation posed upon it only by network software and producer constraints. These digital sources pose new problems: user abilities, network abilities and fiscal abilities.

As map librarians we have to work from our traditional strengths, i.e. to collect, to describe and to access. But we must be careful not to become computer laboratory managers as the information can only be accessed through more or less sophisticated tools. If possible the responsibility for providing sophisticated tools, like geographic information systems (GIS), must be laid with the users. Our main role will still be to provide access to spatial information in analogue or digital form and the question is in how far we will aid users in accessing this information.

Next Professor Ernst Spiess of the Department of Cartography of the ETH, Zürich, Switzerland, discussed some problems with the use of electronic atlases. For a map library the diversity of products poses the problem of how far to go in offering the users the necessary facilities for the consultation or use of these materials. In view of the expensive equipment and high level of competency of the personnel and the large amount of assistance involved, the libraries might have to charge clients for their services like a commercial organization. One of the problems that has to be addressed in digital maps is their high resolution. In this hard copy maps are as yet unsurpassed. The use of electronic atlases brings forward another problem that is already inherent in traditional requests to map libraries.

While some people's interest is restricted to consulting maps and extracting a few specific details, others are looking for maps or map components which they may use as a base for their own mapping projects. The latter also implies delicate problems of copyright. Producers usually do not allow the data to pass on to third parties, but buying the digital data sets entails enormous amounts of money. He then went on to describe some of the uses of certain digital databases and electronic atlases.

Göran Bäärnhielm of the Map Department of the Kunglige Biblioteket, Stockholm, Sweden, showed the functions of the bi-lingual National PC Atlas of Sweden. The PC Atlas is intended to be an introduction to GIS, to support the digital processing of maps and spatial data in schools and libraries and to be a supplement to the Atlas books as well as a stand-alone system. It contains, amongst other features, a search system for most of the official map series of Sweden. The maps are represented as rectangular frames against the background of a more or less sophisticated base map. One can also search for entries from the annual cartobibliography of Sweden produced by the Kunglige Biblioteket, and these can also be represented by rectangular frames. One can also locate toponyms and display various statistical data at the municipality, county and national level. The users are not expected to know anything about GIS, so simplicity rather than flexibility has been a guideline. There are three levels of use. The first is simply 'read and browse'. It is based on ready made 'pages', which are turned over by clicking a button. The second level is for the more advanced user, who can change variables and areas, select diagram types, etc. At the third level one can modify the scripts controlling the programme and make one's own PC Atlas.

Lorenz Hurni of the Bundesamt für Landestopographie sketched the transition in Switzerland from analogue to digital topographical maps. The original print-ready films of the national map series 1:25,000, 1:50,000, 1:100,000, 1:200,000, 1:500,000 and 1:1,000,000 have been scanned separately (colour by colour) and geocoded in order to create 'pixel maps' with a resolution of 508 dpi. The data sets are available in separate layers or combined in one colour file per sheet. Connected to this is the project "CADCARTO", which aims at the updating of existing analogue maps by digital means. "DHM25" is a digital height model which describes the topographic surface (elevations only). It consists of a basic model and a matrix model. "Vector200" is an automatically vectorized data set and consists of the line and area elements, the symbols and toponyms of the 1:200,000 series. Most data sets are available in several formats. There are several more base map or thematic map projects in the specification or evaluation phase. The data sets have been produced for professional use. Possible applications range from basic data for GIS and cartographic applications to scientific modelling.

Hans-Ulrich Zaugg described the function of GEOSTAT within the Swiss

Federal Statistical Office. It maintains with its GIS infrastructure a specialized user communications team which concentrates on data diffusion, advice and information in this field. Therefore it maintains a close contact between data owners and data users and has institutionalized an exchange of information and of experience on geographic and spatially relevant data and information systems. GEOSTAT contains a federal GIS database of geocoded, spatially relevant data sets coming from varying, mostly governmental sources. Services offered to official, research and private customers include dissemination of raw digital data in various formats, custom analysis of specific data and data combinations, presentation of data and an analysis of results in the form of customized computer plots, as well as the generation of statistical data tables for specific, but traditionally insoluble spatially defined and related questions. Further significant enhancements may include innovative data such as satellite imagery or environmental information. The ability to guarantee free or reasonably priced data access to anybody will be the most difficult part in future. Copyright and property issues on digital data will further slow down or in certain cases stop the efforts to prepare data for public use. Circumstances may force the office to shift their emphasis from data supply to function rather as an information centre providing free information about what geocoded digital data is, as well as how, on what terms, for which price, and where it is available. Public libraries and official services will have to work together and share resources in this field of common interest.

Bob Parry of the Department of Geography of the University of Reading, United Kingdom, suggested that map libraries need to acquire digital mapping in order to make new spatial data sets available to their users, attract new kind of users and provide new opportunities for visualizing spatial distributions. This creates many problems for a university map collection in setting up an electronic library and wanting to use the kind of stand-alone digital map packages on hard disk and CD-ROM currently being acquired by many UK map libraries. He examined their value within the context of traditional map library use, and their contribution towards the future role of map collections in an information society. Self-contained electronic atlases and other map packages may seem very convenient and an easy accessed digital complement to conventional resources, but each has its limitations and the more flexible and sophisticated the packages become, the longer is the learning curve for both curators/librarians and users. Though there is a possibility, because of electronic communication technology, that users will not need to visit a map room any more, that would be unwise. An ability to understand and interpret spatial images must remain part of the stock-in-trade of the map curator.

Hans Zimmermann of the Bundesamt für Raumplanung in Bern, Switzerland explained the possibilities of the INFOPLAN system. This is a GIS for federal planning purposes or spatial phenomena. The data for the objects are organized

in a database and the spatial facts can be represented cartographically. Digitized maps as well as scanned maps, aerial photographs or satellite images can function as background. The maps and the database are connected in such a way that a direct mutual random selection becomes possible. The main purpose of INFOPLAN is to combine and visualize in any possible combination planning information from different sources. Because of this objective actual object-information is more important than the highest accuracy.

Before discussions took place Patrick McGlamery took us on an Internet tour, during which we visited on line his CD-ROM player MAGIC (Map and Geographic Information Circulation) in the University of Connecticut, and afterwards viewed a scanned old map of Paris held in one of the other American university libraries. Though this was a short visit it made participants eager to research this new technology for possible future use.

The next day Niklaus Bütikofer of the Swiss Federal Archives in Bern addressed the problems of archiving electronic information. Archives must continue to be available, usable, understandable and authentic over long periods of time. Use of digital technology liberates the information itself from the storage medium. But this information is not only a set of data, this information is an aggregation of data, context and processing functions. In this view archivists cannot confine their actions to storage media, rather they have to consider whole systems, including context and devices that are able to read and display the data on the storage medium in an adequate manner. Digital maps distributed on removable storage media (e.g. on CD-ROM) will probably only be of transitory relevance and soon will be superseded by online GIS, which are centrally managed and continuously updated. Usually such systems are a-historic because they do not keep the history of their data and they have no adequate means to retain evidence of information authorship. Authenticity as well as historicity are important as users, now and in the future, want to know who has produced the information that is read on a screen and when the information has been produced. Moreover, they want to be sure the information is the same information that the author originally produced, and the same information a colleague made reference to in his footnote. When confronted with these issues archives and libraries have the following options: 1) do nothing; 2) transfer GIS, when abandoned, to archives; 3) acquire regular 'snapshots' or history files; 4) charge producers by law or by payment to preserve their systems. It is clear that only options 3 and 4 are valid.

Next Karl Böhler of the ETH-Bibliothek, Zürich, Switzerland, tried to give an insight into the maintenance and archival storage of digital data. Coming to grips with new technologies becomes more and more of a challenge, even for librarians. Whatever the suppliers of software-products claim, the installation of software and peripherals on a common desktop computer is often a difficult task. Through some examples he showed how to avoid compatibility problems and

drew attention to widespread installation traps. Further consideration was given to maintenance of hard- and software, change of device, scanning of documents, decay of data backups and archival storage of digital information.

Martin Gubler of Märsstetten and Thomas Klöti of the Stadt- und Universitätsbibliothek, Bern, Switzerland, explained how colour microfilm can be an intermediate solution for scanned images. Objects like maps and plans can be photographed with computer controlled cameras, high precision lenses and the high resolution colour film. With this combination it is possible to routinely produce micro-copies with a resolution of approximately 140-180 lpmm (line-pairs per millimetre) and a warranted dye stability of over 200 years. Thus the colour microfilm functions as an 'inter-original', replacing the original artefact for conventional or digital processing. The uniform size of the microfilm copies also makes possible the use of standardised Photo-CD at low costs. In the digital world the 24 x 36 mm colour microfilm copy represents an inexpensive and virtually forgery-proof database of at least 30 Mb per image. Thanks to its independence of specific digital systems the microfilm inter-original is successfully able to meet any future and hitherto unknown challenge.

Jan Smits of the Koninklijke Bibliotheek, Den Haag, The Netherlands discussed some problems and possible solutions when describing digital maps with ISBD and Unimarc. Developments are such that we are not only responsible for accessing analogue maps but also digital maps are requiring our attention. Some even think we might have to go a further step and also have to consider spatial data sec. Then we shall not only have to understand the qualities of finished products but also grasp at the potential of continuously updated (technical and contents) databases. So far, when discussing the problems of cataloguing digital material, we have not gone much further than looking at the ISBDs. The ISBD is a vehicle to give form and structure to a description in such a way that, when represented, it can be understood beyond the reach of a specific language. It can make a specific item more identifiable. However to be able to use the description for cataloguing purposes and in OPAC surroundings we have to adapt the MARC-formats. To analyse the map's contents better, especially where generic material is concerned and to be better able to retrieve the information requested we have to evaluate the possibilities the MARC-formats may allow. For this 'coded information' is invaluable. However, the revision cycle of internationally accepted standards is rather slow due to the need of consultation. To keep up with developments in the practical field we have to get to learn to use the electronic communication networks to be able to amend parts of the MARC-formats more quickly.

Will we be a library or a laboratory? Chris Perkins of Manchester University, United Kingdom, posed some questions about the implications of spatial data provision. How have libraries adapted to the digital transition, and what strategies might be adopted in the future? Why has so much been written in the

last five years about incorporating digital mapping into conventional collections, and yet so little achieved by most collections in active transformations of their services? He evaluated these issues in the light of the nature of digital products, library experience in delivering spatial data, and a more detailed analysis of the implications for different library practices. The problems of whether and how to acquire digital spatial data, and the implications for archiving and storage were considered. Further bibliographic description and retrieval were evaluated and the implications for user services discussed. He compared four different scenarios for the future. Innovation of new technologies will be uneven across space and cultures, and a more critical appraisal of the implications of moving from a library to a laboratory based system will be needed.

Andrew Tatham of the Royal Geographical Society, London, United Kingdom, wondered whether the map curator can adapt. Map curators must have knowledge of available cartographic materials, of users' needs and capabilities, and of the necessary processes for ensuring that the users' needs can be met by the available material. Though knowledge of each of these categories is needed also for digital materials, the new technological changes require a completely different spectrum of this knowledge. The resources required by the map curator are significantly different too. While the chain connecting the real world with the map users' image of the real world survives whatever material is used to construct the links, the user is now able to grasp and control the chain much nearer to its start. Consequently, the map curator is no longer providing the user with someone else's selection and presentation of data, but with the data itself - and with the means by which the user can select and present the data to inform or mould an image of the real world. The question is whether or not the map curator wants to have the necessary confidence to make the different response demanded by the technological changes, that is, does the map curator want to be counted as a dealer in information or a dealer in artifacts. The solution of this problem lies in how far map curators want to limit themselves in embracing the new technologies and how able they are to forge links with other departments within their organisations which also have to work with these new technologies.

During the last day of the conference Jadwiga Bzinkowska of the Jagiellonian University Library, Krakow, Poland, read a paper concerning the introduction of the VTLS (Virginia Tech Library System) in 11 Polish university libraries, and in her library in particular. Three VTLS modules are installed already (AFAS, cataloguing and OPAC) and within an unspecified time modules for circulation control and journal indexing will be installed. The next phase will be the installation of a module for special collections, including cartographic materials. The system incorporates functions to communicate with Internet sources. In the near future they will also consider scanning images which can be provided through the same computer system. Furthermore she discussed the new mapping

plans in Poland and the setting up of an integrated spatial information system.

All the papers will be published in *ERLC: The Liber Quarterly*.

Discussions

It was planned that discussions would take place in language groups or thematic groups, but after the first session it was decided to have only plenary sessions. The report that follows is based on concise written reports by Andrew Fagg, Andrew Tatham, and Margareta Lindgren, and the critical remarks of the reviewers Christopher Fleet, Andrew Tatham, and Monique Pelletier. Experiences in contacts with purveyors or producers of spatial data show that spatial information, because of its vastness and need of organisation, has been more quickly digitized or automated than any other kind of information except administrative data. This puts geomatics far ahead of any other field of science with which libraries, archives and related bodies concern themselves. It seems that involvement in computer applications depends partly on whether map collections include large scale data (e.g. cadastral maps) or only traditional cartographic materials at scales of 1:25,000 and smaller, except for town plans. The problems do not seem to arise so much in stand alone data sets, but more in remote access databases of basic data sets (such as cadastral, topographical, geological series, etc.) which are constantly updated and which have an undefined applicability.

The leading words in the discussions were those highlighted by Andrew Tatham: LIMITS and LINKS. To what degree of sophistication should map collections integrate new technologies and digital spatial data and where can they find support within their own institutions or in co-operation with other institutions. The co-operation of producers in disseminating digital spatial information was seen as vital, though it was recognised that in this there are financial constraints on national mapping agencies as cost-recovery becomes more and more an important incentive. Irrespective of this it was felt that producers should improve the quality of their products by ridding them of errors and bugs. This could be done when map curators who use their products reviewed and criticized them. However, producers should tag digital data, which would improve the possibility of cataloguing the information contained. One problem in the relationship between producers and map collections and their users is the variation among different copyright acts in Europe. Government policies should address this problem, not only by reviewing national copyright acts but also by inter-European comparisons, as electronic information recognises national borders even less than analogue information. Maybe it is possible to extend copyright to the areas of preservation and access, though of course this would need separate funding.

Another problem stems from the different legal deposit acts. Though Sweden,

Finland, Denmark and France recognize digital information within their acts they are as yet a minority in Europe. It would be wise to review existing regulations in all European countries for the benefit of map curators. If governments want national libraries and national archives to play a role in this field they must provide extra funding as initial investments cannot be financed from present budgets.

There are but few examples of sharing data. In the United Kingdom CHEST (Combined Higher Education Software Team) was formed to obtain data and software and supply it at low costs to higher education institutions. CHEST acquires data (e.g. Bartholomew 1:250,000 UK data) and software (e.g. Arc-Info) for educational and research purposes. It is government funded, negotiates purchases and makes copyright deals. In general shared acquisition should be determined by user groups. The institutions should be networked and have high power hardware and software to be able to manipulate geodata. Distributed licenses have the advantage that they are cheaper than multiple single licenses, as the licensee may be defined as a single institution. To be able to share digital resources participating institutions need compatible standards, or have standards created by default. Patrick McGlamery said that many universities in the U.S.A. have obtained a free software package (Arc-View or Arc-Info) from ESRI to enable them to use the digital data sets. Maybe European libraries could discuss this matter with ESRI. When CD-ROMS are involved networking should always be considered. The Netherlands feel the sharing of data is unlikely because all universities have different research interests. Sharing digital data sets could be integrated with co-operative collection development policies, though there are different functions in this for university libraries and national libraries. Another controversy is whether one should own data or whether one should subscribe to it. Producers will either restrict access to data on networks or restrict users to certain data sets, and will wonder how the use of digital data is monitored or controlled by libraries. Of course it is possible that licenses are payable per 'loan' as with 'performing rights'. If the producers are not willing to license their digital data sets libraries can act as mediators between users and producers.

Legal obligations make it necessary, some feel, that data should be uncorrupted, hence they should be archived in analogue formats. Others feel that digital data sets should be archived digitally. Archiving the data is or should be based on legal obligations or national rules. Unfortunately archives only acquire digital data if they are mandated to do so. In many countries the problems of archiving digital data are not really addressed. In Denmark topographical digital data is transferred to Det Kongelige Bibliotek but with constraints on how it can be used. In France there is a specific extension to the legal deposit act. From 1995 onwards the Cartoteca de Catalunya will have deposit of digital data from the Institut Cartographic de Catalunya. A leading sentiment is that there should be clear political, centrally administered decisions concerning commercial use

and public domain access. Some feel that governments should set up a new central institution with enough hard- and software, and a clearly defined legal statement of tasks and the position towards data producers. A confrontation and solution will indeed soon be necessary as products as well as scientific demand are expanding rapidly. It might be desirable that governments follow the U.S. government which decreed the Contents Standards for Digital Spatial Metadata (see under 'Reader') which helps at least to put form and structure to metadata describing the vast amounts of digital spatial data sets. This process could be guided by CEN/TC 287 (Comité Européen de Normalisation/Technical Committee 287): Geographic Information and CEN/TC 211: Geographic Information.

Map evidence is essential and will continue to be so. There is as yet no distinct form in which we can archive digital data. A solution could be to make raster scans or vectorize the data to make them independent of hard- and software. In the United Kingdom some digital data is being archived on microfilm (SIM = Survey Information on Microfilm). But the problem is pressing. Between now and the year 2000 many official organisations in many countries will stop providing large scale mapping in analogue formats. Map curators are wondering how we will preserve historic data sets for future generations. And how can we replicate the services which we have performed in the past? What kind of service do the producers offer in this transition to digital data. The Ordnance Survey made an interim offer of providing microfilms. But in the longer run this is not economically viable. The sentiment in the United Kingdom is that the Ordnance Survey should be responsible for archiving their data, as is the British Geological Survey. The producer should keep track of obsolete data. For large scale mapping it is hard to trace who will be or is responsible for archiving. In spite of all this criticism we have some confidence that producers have an historical consciousness, though we think this is more so the case with producers of thematic materials than with producers of topographic materials.

The state of the process concerning archiving and related problem in various countries is as follows:

Belgium: The Institut Géographique National is starting to produce digital data sets. However in solving these problems they are severely hampered by the new federal structure.

Denmark: A new society has been formed to which the Working Group for Mapcuratorship has been invited.

Finland: The National Board of Survey as well as the Geological Survey are investigating this problem.

France: This matter is an area of study for the Conseil National de l'Information Géographique' (CNIG) which will publish the *Annuaire du Secteur de l'Information Géographique en France*. The first SPOT data (satellite images) are fading. Very expensive transfers have begun under the responsibility of the publishing company SPOT Images, which provides both recent and old data. A special group has established a Code de Pratique loyale en matière d'édition cartographique, concerned with digital cartography.

Germany: As far as participants know large scale analogue maps will still be produced in the digital age.

Netherlands: The map curators will initiate discussions with producers, the cartographic society and other bodies involved.

Norway: The National Archives may create some regulations. Furthermore a Mapping Council will be founded in which landscape historians participate. They hope to learn from experiences in the United Kingdom.

Poland: The Polish Society for Spatial Information is looking into this problem.

Russian Federation: 6 organisations including the National Survey, the Geological Survey, the Space Agency are concerned with these problems. Map librarians are starting to get involved with the process.

Slovenia: Governmental mapping institutions are changing to digital production processes, but they are doing so independently from each other.

Spain: The Institut Cartografic de Catalunya will see whether they

can foster communication with the Institut Geografic Nacional and the Biblioteca Nacional.

United Kingdom: See above. As a result of the conference about 'The future history of our landscape' it was decided that a high-level national group needed to be formed, and this is currently examining the situation.

United States: The National Archives of the U.S.A. and Canada issued a discussion paper on this. However management of information is not so much a federal care anymore, but is more and more delegated to the individual states and provinces. Participants wonder what the position of ICA (International Cartographic Association) is on this. Maybe LIBER should contact them and see what they can come up with.

Though WWW (World Wide Web) puts no constraints to the type of data which can be viewed there are difficulties in certain aspects. There are poor data standards and format descriptions and there is little access at present to national topographic or thematic databases. However, librarians can play a role in identifying digital data sets and can identify 'experts' on this new data. Some participants think that there is a certain demand for digital data but there is not yet an actual urge by libraries to provide it on a larger scale. Though spatial information may be fully digitized libraries sometimes feel they are rather on the fringe of these developments, not actually going through parallel developments. Some think that at the moment it cannot be judged in detail how complex the problems of introducing digital data in libraries will be. If map collections take part in disseminating digital spatial data they can choose from two possibilities: either delivering metadata (bibliographical lists, information selection, providing handbooks and guidance into the information market) or (depending on individual resources) buying/subscribing to data sets and providing direct access to users up to a certain extent.

A problem is electronic files in a GIS-environment. Map curators must realise themselves that, for example census-files of 1980, are meant to be linked with maps of 1980 to show a true historical image. If in future a map of 2020 is used then linkage between the two files could be difficult and the conclusions could be less valid.

Another vexing problem is how far we should decide to transfer existing analogue cartographic materials to digital formats, with special regard to old or antiquarian maps. Scanning these maps should mean that the digitised images

could provide additional possibilities for using the information which is incorporated in the image. As old/antiquarian maps are not true representations of reality in so far as that they have no reference to specific projections or geographic grid systems it will be hard to use them as overlays for other old or modern cartographic representations. Though it might be possible to refer certain features on a map to a geographic grid system this will never be true for the whole. Some participants question whether the librarian/archivist should have a role in this process. Or should we let the user decide the use of the information contained in old maps? If the user desires sophisticated means to manipulate the information, should the library provide the means or should the user provide them? Furthermore some fear that digitising these old maps might detach them from their cultural/historical context when the image is 'distorted' by digital means. When we want to scan maps we have to keep in mind that microfilm gives the reader a higher resolution and thereby a higher quality image. Maybe a good compromise would be the Swiss solution of providing a microform 'inter-original' which the user can scan if required. This always will give good results as the scanning can be done with current technology, preventing constant file-transfers to new releases of soft- and hardware, with possible loss of information. The Bibliothèque Nationale de France scans part of its collection through existing colour microfiches. However, the funding Ministry decides what kind of documents should be scanned. They have special goals in mind when funding this scanning:

- to preserve/conservate certain categories of items;
- to make these images available for certain categories of use;
- to create those images for researchers who work in a digital environment.

Besides substituting with digital maps for conservation reasons some think that, if scanned, the images presently only can be used as window-frames with catalogue entries in order that the user gets a concise idea about the contents of the map, because the resolution cannot compete with the resolution of the originals.

One of the duties of a map curator is to advise users what they can do with a map (and what they cannot) and this is also true in the digital age. Transition to the digital age means upgrading existing knowledge by more or less formal training. The more sophisticated the digital products, the more training is involved. We should keep up with developments within the science of

cartography without becoming cartographers ourselves. We should know what kind of knowledge programmes and GIS can generate for our users without being GIS-specialists. Some countries already have training programmes running. In France the staff of the Bibliothèque Nationale de France follows training in new technologies with the Institut Géographique National by exchange of staff. Belgium and Catalunya are setting up similar programmes. The Russian Federation is setting up preparatory courses for staff. In the United Kingdom GIS-courses on different levels are offered in the universities. We think that cartographical departments in universities and cartographical societies should play a large role in the transfer of knowledge. The NCGIA (National Centre for Geographic Information and Analysis, U.S.A.) creates core-courses for librarians which are available over Internet. We could also use Internet to evaluate programmes and GIS, as sometimes is done by American colleagues on the listserver MAPS-L.

The last point of discussion, but not the least important, was the user. Librarians select certain sources for specific user groups, defined by types of requests. This is not different with digital material than with analogue, but presupposes a definite collection development policy. This means that, for example, Internet sources must be well evaluated before they are presented to the user. However when electronic sources fit our collection profile we must find ways to promote the availability and possible uses of these sources. Also we must, if necessary, train users in the use of these electronic sources. It is felt that the biggest role in the transition is played by the user, as our development relies largely on user demands and not so much on what we think is important. But it may be one of our tasks to formulate reasons why certain digital sources provide better answers than certain analogue materials.

To fulfil this role the words LINKS and LIMITS surface again. We have to have or create links with colleagues in map collections, GIS laboratories and with the producers to be able to survey and evaluate what is offered. At the same time we must formulate the role of map collections again and find out which limitations will provide the best services for our special group of users. The institutional role of the map collection and the diversity of its users will affect how easy this will be. Though international discussion enlighten us it is felt that national centres are needed which bring together map curators, producers, and users, in order to discuss these matters more thoroughly and come to specific conclusions.

During the LIBER-meeting the participants came to the following conclusion concerning networking metadata of digital maps:

"... The Board of the Groupe des Cartothécaires de LIBER will send a request to the national/regional Working Groups for

Mapcuratorship through the office of the National Correspondents with the following content:

- to ask one institution in each country/region to make available part of a gopher/WWW Home page for the purpose of creating and maintaining a list of digital cartographic products produced in the respective countries/regions;
- to create together with producers descriptions of all digital cartographic products produced in the respective countries/regions;
- to include on the gopher/WWW Home page information concerning lists in other countries/regions;
- NOT to prescribe a standard form of description;
- to distribute through the office of the Secretary to all correspondents on which gopher/WWW Home page this information can be viewed."

I would like to express my thanks to all authors who provided abstracts or full texts of their papers. This made it easier to summarize their presentations during the conference. I also would like to thank all reviewers for their contributions. I hope this document reflects the essence of the discussions which have taken place during this conference.