Appendix

Section 1: Programme of the workshop on hypermedia and hypertext standards, 22–23rd April 1993, Amsterdam

April 22nd, 1993

OPENING SESSION

09.00 Opening by Workshop Chairman Prof. Charles Oppenheim, University of Strathclyde (UK)

09.10 Welcome by Mr. G. Heine, Commission of the European Communities (CEC), DG XIII/E, OII initiative (Open Information Interchange) of the IMPACT 2 programme

09.30 Multimedia and Hypermedia: Model and Framework
- Lawrence A. Welsch, NIST (National Institute of Standards & Technology), Gaithersburg, MD (USA)

SESSION I

Structure-related hypertext/hypermedia standards and applications

10.45 Review of "Structure" Standards – SGML, DSSSL, SPDL, SDIF, ODA, HYPERODA, SMSL, MHEG, HYTIME, etc.
- Martin Bryan, The SGML Centre, Churchdown, Glos (UK)

11.15 *SGML/HYTIME*
- Les Carr, The Image & Media Lab, University of Southampton (UK) Experimenting with HyTime Architectural Forms for Hypertext Interchange
- Martin Bryan, the SGML Centre, Churchdown, Glos (UK) Standards activities in the area of Hytime, DSSSL and SMSL (Standard Multimedia Scripting Language)
- Michael Popham, Computer Unit, University of Exeter (UK), Use of SGML and HyTime in UK Universities

12.15 *ODA/HYPERODA*
- Angela Scheller, GMD – Fokus, Berlin (D), The Open Document Architecture (ODA) and its HYPER ODA extensions

13.35 *MHEG/AVI*
   - Mario A. Casanova,
     Catholic University of Rio de Janeiro/IBM Brazil (Brazil)
        An Architecture for Hypermedia Systems Using MHEG Standard Objects Interchange
     Reference Model for the Development of Guidelines in Using Coding Standards
   - Lawrence A. Welsch, NIST Gaithersburg, MD (USA)

SESSION II

14.15 Rolling your own with the Text Encoding Initiative (TEI)
   - Lou Burnard, Oxford University Computer Centre (UK)
14.35 Summary of trends and developments from Session I, including trends in applications
   - Angela Scheller, GMD — Fokus, Berlin (D) and
   - Noreen Mac Morrow, University of Strathclyde (UK)
15.00 DISCUSSION
     Chairman: Prof. Charles Oppenheim

April 23rd, 1993
Contents-related hypertext/hypermedia standards

SESSION III

09.00 State-of-the-Art regarding the various "contents" standards related to text, images, sound and video and their use in AVI's Services
     (ISO/IEC JTC SC 29 (24, 28))
   - Joseph Fromont, CCETT (France)

SESSION IV

09.45 Expert reviews regarding Contents Standards
   - Joseph Fromont, CCETT (France)
     MPEG, JPEG, JBIG, GDID, AVI
   - Isobel Pring, Digital Vision International, London (UK)
     Video Standards and the End-User
   - Dr. Ingolf Grieger, University of Stuttgart (D)
     Future directions of standards in graphics, images and text processing

   Typical Applications (reports by demonstrators) proceeded by an introduction and video demonstration
   - Huib Broekman, Holland Business Audiovisuals (NL)
     Effective Communication with interactive media
14.00 Summary of trends and developments from session IV

– Noreen Mac Morrow, University of Strathclyde (UK)
14.20 FORUM AND DISCUSSION chaired by Prof. Charles Oppenheim
The forum will feature the speakers of all sessions

INTERMEZZO: report about CEC supported studies

Section 2: Biography and career history of the speakers

Hubertus Johannes Dinandus Broekman

Hubertus Johannes Dinandus Broekman started his multimedia career as a consumer electronics service engineer (radio and TV), editor at the NTS (Dutch TV, broadcasting organization) and medical electronics (service engineer). In 1967 he has founded Holland Business Audiovisuals B.V.

Main tasks: overall management, writing scenarios and scripts, creative director and production coordinator of films, multi-image productions, video productions, conventions, dealer meetings and product launches.

Research: leader of the research team that developed the INFOTOUCH software (since 1986).

His academic career includes communication psychology Université Internationale de Lugano (extension department) 1967–1992, as well as communication psychology Pacific Western University Los Angeles (extension department) since 1992.

Martin Bryan

Martin Bryan is an independent consultant in the use of SGML and related standards based in Churchdown, Gloucestershire (UK). Since 1986 Martin Bryan has acted as one of the British Standards Institute representatives on the ISO committees developing standards for text and office systems. As author of one of the earliest in-depth studies of the use of SGML, *SGML – An Author's Guide to the Standard Generalized Markup Language*, Martin Bryan has been actively involved in teaching users of the standard around the world. He also monitors activities in other standards committees working in fields related to hypermedia and multimedia.

Prior to setting up his own company, Martin Bryan was the SGML Products Manager for Sema Group, Europe's earliest developer of SGML-based products. Prior to this his 25 years of working for the printing and publishing industry have seen him working as the Software Documentation Manager at Quorum Technical Services in Cheltenham, a software tester and documenter for Linotype-Paul in Cheltenham, an editor at the National Computing Centre, a print buyer for Her Majesty's Stationary Office and an apprentice compositor.

Lou Burnard

Lou Burnard was born in 1946 and educated at Balliol College, Oxford. After a brief spell teaching English language and literature, he took up computing in the early seventies, and has worked at OUCS since 1974, as an operator, programmer, consultant, and many other wonderful things. He has worked on IT applications in the humanities, on database design and development, and also on free text retrieval systems, and currently regards SGML as the logical fusion of all these interests. His main current responsibilities include the Oxford Text Archive, the British National Corpus, and the TEI, of which he has been European Editor since 1989.

Leslie Carr

Leslie Carr gained a BSc in Computer Science at the University of Southampton, where he joined the Image and Media Lab to undertake research in "Structured Text & Hypertext". He has produced a structured hypertext environment based around the latex Markup system, and is now working on the provision of author support within Hypertext development environments.

Marco Antonio Casanova

Marco Antonio Casanova has a PhD in Applied Mathematics from Harvard University (1979), an MSc in Computer Science from the Pontifical Catholic University of Rio de Janeiro (1976), and a BSc in Electronic Engineering from the Military Institute of Engineering (1974). He joined the IBM Brazil Scientific Center in November 1982, where he is now Research Manager. From 1980 to 1982, he was Assistant Professor at the Department of Informatics of the Catholic University in Rio, where he also acted as Graduate Program Coordinator during 1981−82.

He is author of the book "*The Concurrency Control Problem for Database Systems*", published by Springer-Verlag, and co-authored the books (in Portuguese) "*Principle of Distributed Database Systems*", "*Logic Programming and Prolog*" and "*Fundamentals of Multimedia Systems*". He has also published several technical papers in international scientific journals. His academic interests include database management systems, multimedia systems and logic programming.

Joseph Fromont

Joseph Fromont has been engineer at the CCETT (Joint research center for broadcasting and telecommunications) since 1981.

He worked firstly to the design of a system for creating TELETEL-type applications, then to the conceiving and design of an ergonomical system for multimedia interactive applications. Then, he dedicated himself to the RAVI (Representation for AudioVisual Interactive applications) works, known as the AFNOR standard

NF Z62040, for which he has coordinated the experiments and industrial developments since 1986 and the specifications progresses since 1991 until the adoption of the AFNOR standard.

He is in charge of a professional activity concerning the specifications and standardization of audiovisual interactive applications and services which leads him to participate in CCITT study group I and VIII and ISO-JTC1/SC29/WG12-MHEG.

Ingolf Grieger

Ingolf Grieger is university lecturer in the Department of Aerospace Engineering at the University of Stuttgart. He is the author of one book on "Graphische Datenverarbeitung" and numerous papers in the field of computer graphics and the use of graphics standards in education and research.

Grieger's research interest includes computer-aided geometric design and three-dimensional interactive computer graphics, especially on the basis of graphics standards. He studied aeronautical engineering at the Technische Hochschule Stuttgart (now University) where he earned a Diplom degree. He obtained his doctor degree from the University of Stuttgart in 1972. After inaugural dissertation on Computer-aided Design with Geometry Cells in 1986 he is university lecturer (Privatdozent) for Computer Graphics since 1987.

Grieger is since the beginning of standardization in graphics member of standardization committees. Presently he is chairman of the DIN committee NI 24 Computer Graphics and Image Processing as well as convener of the committees ISO/IEC JTC 1/SC 24/WG 4 Language Bindings and Registration of Computer Graphics Standards.

Noreen Mac Morrow, M.Phil., BBS

A graduate in Business Studies from Trinity College, Dublin, Noreen is currently a lecturer in the Department of Information Science, at the University of Strathclyde. Her main areas of teaching and research are hypertext and hypermedia systems, information policy and ergonomics. Current research focuses on the integration of hypermedia systems with other forms of information retrieval in organizations.

She has co-directed several hypertext projects within the department and is the author of a number of papers in this subject area. In conjunction with Solon consultants (London) she has worked for the European Parliament, for DECTA (the Developing Countries Trade Agency) and for the European Foundation for Living and Working Conditions. Under the auspices of the British Council she has lectured in a number of countries including Mexico, Brazil, India, Australia and Spain. She is Associate Editor of Hypermedia, an international journal on hypertext and related areas published by Taylor Graham.

Professor Charles Oppenheim, BSc, PhD, DipInfSc, Cert Ed, FIInfSc, FLA, AUMIST

Charles Oppenheim is Head of the Department of Information Science, University of Strathclyde, Glasgow, UK. Prior to taking this appointment, he was Business Development Manager, Reuters Ltd. He has experience in both the information industry and academic institutions, having worked for Pergamon Infoline, Derwent Publications and The City University, amongst others. He is a Fellow of the Institute of Information Scientists and a former Vice Chairman of its Council and is a former Chairman of the UK Online User Group. He is Vice President of Aslib and is also currently on Aslib Branch Council. Furthermore, he is a Fellow of the Library Association. He is a frequent contributor to the professional literature, a well known public speaker and member of the editorial board of a number of professional journals. He has been on the organizing committee for a number of international conferences. He is one of four UK representatives on the European Commission's Legal Advisory Board. His professional interests include: patents, copyright, data protection, information policy, online information and CD-ROM, chemical information handling, financial information and the dynamics of the information industry.

Michael G. Popham

Before joining the SGML Project, Michael Popham worked as a technical author for British Gas and as an Analyst/Programmer for Price Waterhouse Management Consultancy. He holds a BA in English and American Literature, an MLitt in Linguistics and an MSc in Computer Science.

Isobel Pring

Isobel Pring is managing director of Digital Vision International Ltd and Director of the European DVI® Developers' Group. She began working in the information industry in 1985. In 1988 she became deputy editor of Interactive Media International, also working on single-client multimedia studies. In 1987 she created Digital Vision, a publishing and consultancy company specialising in the development of multimedia and European markets.

In addition to the Developers' Group, Digital Vision publishes the *European Multimedia Bulletin*, a monthly newsletter on multimedia; *Digital Vision*, a bimonthly newsletter on Intel video products; and the *Digital Vision Directory*. Isobel is also editor of ITEM, Image Technology in European Museums and Art Galleries.

Angela Scheller

Angela Scheller holds a degree in computer science. Initially she was involved in the implementation of a system- and hardware independent graphics system and

the development of an SGML system for interchange of scientific documents including text, graphics and images. Since 1988 she is responsible for the project area "Data and Information Structures for Distributed Applications" at the Institute for Open Communication Systems of GMD Berlin. She has been active for many years in the field of standardization with emphasis on multimedia document interchange formats. She is the editor of the Geometric Graphics Content Architecture for ODA as well as for the HyperODA extension for non-lineair structures. Within the German standards body DIN she chairs the committee for "Document Processing and Interchange" and is the head of the German delegation for ISO SC 18 "Document Processing and Related Communication".

Lawrence A. Welsch

Lawrence A. Welsch is the manager of the Office Systems Engineering Group (OSE) at the National Institute of Standards and Technology (NIST), where he is involved in directing research and developing applications for a variety of electronic publishing applications for electronic publishing systems and standards, including page description and text markup languages. Dr. Welsch is developing an open systems architecture for multimedia standards development. Prior to joining NIST, Dr. Welsch designed computer systems for AT&T. He has a PhD in artificial intelligence (AI) from Rutgers University.

Section 3: Definitions

DVI   Intel's Digital Video Interactive video compression technology.

GIF   Protocol for interchange of raster graphic data. The Graphics Interchange Format defines a protocol intended for the on-line transmission and interchange of raster graphic data in a way that is independent of the hardware used in their creation or display (de facto industry standard).

Compuserve Incorporated has granted a limited, non-exclusive, royalty-free license for the use of the Graphics Interchange Format in computer software.

The Graphics Interchange Format (GIF) is defined in terms of blocks and sub-blocks which contain relevant parameters and data used in the reproduction of a graphic. A GIF Data Stream is a sequence of protocol blocks and sub-blocks representing a collection of graphics. In general, the graphics in a Data Stream are assumed to be related to some degree, and to share some control information.

HyTime   SGML-based standard for hypermedia documents (ISO 10744). HyTime (Hypermedia/Time-Based Structuring Language) is a standardised infrastructure for the representation of integrated, open

hypermedia documents. It was developed principally by ANSI committee X3V1.8M, and was subsequently adopted by ISO (JTC1/SC18/WG8).

The HyTime standard specifies how certain concepts common to all hypermedia documents can be represented using SGML. These concepts include:

- association of objects within documents with hyperlinks,
- placement and interrelation of objects in space and time,
- logical structure of the document,
- inclusion of non-textual data in the document.

An "object" in HyTime is part of a document, and is unrestricted in form — it may be video, audio, text, a program, graphics, etc.

IIF Image Interchange Facility (ISO 12087-3). The Image Interchange Facility (IIF) is part of the first International Image Processing and Interchange Standard (IPI), which is under elaboration by ISO/IEC JTC1/SC24/WG7. It comprises both a data format definition and a gateway functional specification.

The main component of the IIF is the definition of a data format for exchanging arbitrarily structured image data. The IIF defines a format that can be used across application boundaries and that can easily be integrated into international communication services. Besides the definition of a file format, there are definitions of parsers, generators, and format converters to enhance open image communication.

The IIF approach clearly distinguishes between the image structure (a data type-oriented description of the image), image attributes (expressing colourimetric and geometric semantics), the sequential data organisation (managing data partitioning and periodicity organisation), and the data encoding/compression. The syntax specification and the data encoding of syntax entities use ASN.1 and the Basic Encoding Rules respectively. For the compressed representation, the following standards are referenced: JBIG, facsimile Group 3 and 4, JPEG, and MPEG.

JPEG Compression Standard for continuous-tone still images. JPEG is a standardised image compression mechanism. JPEG stands for Joint Photographic Experts Group, the original name of the committee that wrote the standard. JPEG is designed for compressing either full-colour (24 bit) or gray-scale digital images of "natural" (real-world) scenes. JPEG does not handle black-and-white (one bit/pixel) images, nor does it handle motion picture compression.

JPEG is "lossy", meaning that the image you get out of decompression isn't quite identical to what you originally put in. The algorithm achieves much of its compression by exploiting known limitation of the human eye, notably the fact that small colour de-

tails aren't perceived as well as small details of light-and-dark. Thus, JPEG is intended for compressing images that will be looked at by humans. If you plan to machine-analyse your images, the small errors introduced by JPEG may well be a problem for you, even if they are invisible to the eye (CCITT/ISO JTC1/SC2/WG10).

MHEG   Standard for hypermedia document representation. MHEG stands for the Multimedia and Hypermedia Information Coding Experts Group. This group is developing a standard "Coded Representation of Multimedia and Hypermedia Information", commonly called MHEG. The standard is likely to be published in two parts – part one being object representations and part two being hyperlinking.

MHEG is suited to interactive hypermedia applications such as on-line textbooks and encyclopaedia. It is also suited for many of the interactive multimedia applications currently available (in platform-specific form) on CD-ROM. MHEG could for instance be used as the data structuring standard for a future home entertainment interactive multimedia appliance.

MHEG objects (which may be textual information, graphics, video, audio, etc.) may be of four types:
- Input object (i.e., a user control such as a button or menu);
- Output object (e.g., graphics, audio visual display, text);
- Interactive object (a "composite" object containing both input and output objects);
- Hyperobject (a "composite" object containing both input and output objects, with links between them).

MPEG   Standard for compressed video and audio. MPEG (Moving Pictures Expert Group) is the name of the ISO committee which is working on digital colour video and audio compression, and by extension the name of the standard they have produced (ISO JTC1/SC2/WG11).

MPEG defines a bit-stream representation for synchronised digital video and audio, compressed to fit into a bandwidth of 1.5 Mbit/sec. This corresponds to the data retrieval speed from CD ROM and DAT, and a major application of MPEG is the storage of audio visual information on this media. MPEG is also gaining ground on the Internet as an interchange standard for video clips.

The MPEG standard is the three parts-video encoding, audio encoding, and "systems" which includes information about the synchronisation of the audio and video streams. The video stream takes about 1.15 Mbit/s, and the remaining bandwidth is used by the audio and system data streams.

ODA   ODA standard is concerned with the open interchange of documents (T.410/ISO 8613 (parts 1 to 8)).

Note: the current version of ISO 8613 names the standard as Office Document Architecture and Interchange Format, while CCITT recommendations refer to "Open" rather than "Office" (CCITT/ISO JTC 1/SC18/WG3).

The ODA standards are part of a group of related standards concerned with documents, their content and how they may be conveyed between systems. SGML (Standard Generalized Markup Language) and various related standards are other members of this group.

Through the standards, a wide range of documents, from simple text-only documents such as office memoranda and letters, to complex documents such as technical reports may be encoded. These complex documents may contain text, raster graphics, computer graphics and may well require complex layout specifications.

The ODA standards support a very wide range of features and tend to be abstract in nature, hence industry experts have clarified the concept by defining Document Application Profiles (DAPs). These subsets provide support for document interchange between similar systems, which have a more restricted range of features. These DAPs will be published as ISO standards known as International Standardized Profiles (ISPs).

QuickTime   File format for the storage and interchange of sequenced data, with cross-platform support (proprietary).

A QuickTime (Apple Computer, Inc.) movie contains time based data which may represent sound, video or other time-sequenced information such as financial data or lab results. A movie is constructed of one or more tracks, each track being a single data stream.

A QuickTime movie file on an Apple Macintosh consists of a "resource fork" containing the movie resources and a "data fork" containing the actual movie data or references to external data sources such as video tape. To facilitate the exchange of data with systems which use single fork files, it is possible to combine these into a file which uses only the data fork.

RIFF   File structure for multimedia resources. RIFF (Resource Interchange File Format) is a family of file structures rather than a single format. RIFF file architecture is suitable for the following multimedia tasks:
– Playing back multimedia data,
– Recording multimedia data,
– Exchanging multimedia data between applications and across platforms.
A RIFF file consists of a number of "chunks" which identify,

delimit and contain each resource stored in the file. RIFF is a proprietary standard developed by IBM and Microsoft.

The definitions have been taken from:

Adie, C. (ed.): A Survey of Distributed Multimedia. Research, Standards and Products. RARE Technical Reports. Amsterdam: RARE, 1993, 150 pp.