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Grant application form (pre-proposal) 2004
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Registration form (basic details)

1a. Details of applicant

-Name, title(s): Lynda Hardman, Prof. Dr., MBCS, CEng
-Male/female: female
-Address for correspondence: CWI, Kruislaan 413, Postbus 94079, 1090 GB, Amsterdam

-Preference for English correspondence: no preference
-Telephone: 020 592 4147
-Fax: 020 592 4312
-E-mail: Lynda.Hardman@cwi.nl
-Website (optional): http://www.cwi.nl/~lynda

-Doctorate (date): March 1998
-Use of extension clause (see Notes): no

1b. Title of research proposal

Effectively Conveying Information through Meaningful Presentations

1c. Summary of research proposal

The Web has fundamentally changed the way we access information, both in our private life and in our role as scientists. While extensive research has focussed on retrieving information on the Web, little has been done to structure and present search results effectively.

In traditional media, such as newspapers and scientific articles, collecting the raw material is an initial stage of a complete information dissemination process. The majority of the work goes into structuring the information, emphasizing the most important information, making relationships to related information explicit and presenting the results in an effective way to the reader.

While computers are used as information rendering devices, they currently provide little intelligent support for the highly complex task of creating meaningful presentations. The challenge for computer science research is thus to transform the computer from a passive rendering device to an active participant in the process of conveying information effectively to the end-user.

Conventional wisdom (in document engineering) assumes the independence of content, structure and graphic design. While this separation of concerns has well-understood advantages from an engineering perspective, in most practical situations content, structure and graphic design are interdependent. To elevate the computer to an active participant in the resolution of these interdependencies, we require a re-examination of the document engineering assumption.

In order to deal with these interdependencies we need to capture, organise and analyse knowledge from appropriate professions. This includes techniques for creating comprehensive and meaningful structures of information, which need to be distilled and incorporated into a computational environment.

Our approach thus leads to two scientific challenges:

- to realise a paradigm shift where document engineering is enhanced to the extent that it is able to steer the presentation creation process;

- to provide a sound scientific basis to elicit knowledge from existing communication theory.

The information revolution we are currently part of will not be complete before we have grasped the science to make full use of the computer's potential as a comprehensive and intelligent interface to massive amounts of information.

Keywords

Multimedia Information Systems, Document Preparation (Hypermedia/Multimedia, Markup languages),
Electronic Publishing, Information Interfaces and Presentation, Hypermedia Presentation Generation

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1d. NWO Council area

EW

1e. Host institution (if applicable)

CWI

Research proposal

2. Description of the proposed research

The Web has initiated a wave of research activities, many of which are centred around finding relevant information on the internet. Finding relevant information alone, however, is insufficient to satisfy our needs. The retrieved information should be organised and visualized in a manner suitable for effective human consumption. This problem is illustrated by current generation search engines, which deploy advanced techniques for finding relevant Web pages, but do little more than presenting the results as a ranked list of links.

Contrast this with traditional media, such as newspapers and scientific articles, where collecting the raw material is only the initial stage of the complete information dissemination process. The majority of the work goes into structuring the information, making explicit relationships to background information, highlighting important information and presenting the results in an effective way.

While computers have become *de facto* information processing machines, they currently provide little intelligent support for such tasks. **The challenge for computer science research is to transform the computer from a passive rendering device to an active participant in the process of conveying information effectively to the end-user.**

The creation of effective presentations has traditionally been carried out by highly skilled people. They are trained to balance many different, potentially contradictory, interests (e.g. the use of company colours vs. legibility). Computers are not yet able to generate presentations because most of the relevant theories that analyse the way humans perform such tasks cannot be directly translated into the formal and rigid computational models used to steer computers. The goal of this research is, to the extent that it improves automated presentation generation, to capture knowledge from appropriate design professions, to distill it and to incorporate it into a computational environment.

In addition, the overall research goal requires the re-examination of the traditional document engineering paradigm: that content, document structure and graphic design can be determined independently of one another. The field of document engineering was originally developed for predominantly text-based information. Retaining the independence of the three key aspects of a presentation does not allow the required highly flexible construction of presentations composed of relevant pieces of (multimedia) content. By discarding this simplifying assumption we need to provide a replacement that allows the expression and resolution of these interdependencies.

Our approach thus leads to two different but related scientific challenges:

- to realise a paradigm shift where document engineering is enhanced to the extent that it is able to steer the presentation creation process;
- to provide a sound scientific basis to elicit knowledge from existing communication theory.

To achieve general and sound results, we hypothesize that:

1. effective presentation is only possible to the extent that one can formally describe and re-use the context of information delivery;
2. the formalism should accommodate ambiguous, incomplete and contradictory viewpoints;
3. explicit modelling is required to provide a sound basis;
4. progress in this area requires a tightly coupled theory-experiment cycle.

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An initial requirement for communicating information is that the relationships among the underlying domain knowledge are known. Expressing this domain knowledge for computer manipulation is being tackled by many other research groups and this proposal builds on their results. A domain model by itself is, however, insufficient. Part of the research is to identify the other types of knowledge we need to capture. A system for conveying information effectively requires knowledge about how users understand information in presentations. Our sub goals are thus to capture knowledge on different types of human communication that can be applied to effective communication of information. Explicit models of discourse and graphic design can be used to create better presentations in general. These also need to be guided by user-specific requirements and preferences. Examples of three types of knowledge that need to be made explicit are the following:

Discourse   Theories of communication (for example Grice's maxims) state that information should be relevant, correct, sufficient and not excessive.

Graphic design   Information visualisation is a key element to convey information. Ranging from simple charts to intricate 3-D VR environments.

User   Often the user model is a reflection of the knowledge of the subject-matter domain but needs to be extended to capture preferences in terms of discourse and graphic design.

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Cost estimates

3a. Budget

	200y	200y+1	200y+2	200y+3	200y+4	TOTAL
Staff costs: (in k€)						
Applicant	59	61	62	64	66	312
Post-doc	103	106	108	111	113	541
PhD student (Promovendus)	36	74	78	79	39	307
Support staff	0	0	0	0	0	0
Non staff costs: (k€)						
Equipment	3	3	3	3	3	15
Consumables						
Travel and subsistence	8	11	11	8	8	46
Other	0	0	25	0	0	25
TOTAL	210	255	288	265	229	1.247

3b. Have you requested any additional grants for this project either from NWO or from any other institution?

No

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Curriculum vitae

4a. Personal details

Title(s), initial(s), first name, surname: Prof. Dr. L. Hardman MBCS, CEng
Male/female: female
Date and place of birth: 29-09-1960 Glasgow, UK
Nationality: British
Native country parents[1]:   UK

4b. Master's ('Doctoraal')

University/College of Higher Education: Glasgow University, UK
Date: July 1982
Main subject: Mathematics and Physics (Bachelors with Honours)

4c. Doctorate

University/College of Higher Education: University of Amsterdam
Date: March 1998
Supervisor ('Promotor'):   Prof. dr. ir. A.W.M. Smeulders
Title of thesis: Modelling and Authoring Hypermedia Documents

4d. Work experience since graduating

1999-present	tenured term	Head Multimedia and Human-Computer Interaction group, CWI
1992-1998	fixed-term	Researcher in Multimedia and Human-Computer Interaction group, CWI
1990-1991	tenured term	OWL (Office Workstations Limited), Edinburgh, UK
1987-1989	fixed term	Scottish HCI Centre, Heriot-Watt University, Edinburgh, UK
1985-1987	tenured term	OWL (Office Workstations Limited), Edinburgh, UK
1983-1984	fixed term	Artifical Intelligence department, Edinburgh University, UK
1982-1983	tenured term	ICL (International Computers Limited), Scotland, UK

4e. Person-years of research

5 (post doctorate 1998-present)
11 (pre doctorate 1987-1998)

4f. Brief summary of research over last five years

The development of the Amsterdam Hypermedia model, Hardman's PhD thesis 1998, allowed the expression of a document format that went beyond existing temporal-based multimedia and link-based web pages to a richer document structure allowing a combination of these. The work was highly influential in the development of the W3C (World Wide Web Consortium – the organization behind the World Wide Web) recommendation SMIL (Synchronized Multimedia Integration Language). In addition, the separation of concerns such as timing and structuring led to the inclusion of temporal information in other languages (in particular SVG and XHTML) within W3C.

The creation of a document format alone is insufficient. A means of creating the format is required through an authoring system. Theoretical work contributed to the development of CMIFed – a hypermedia document editor.

In conjunction with the work in the W3C SYMM (Synchronized Multimedia) working group, it became clear that rich, declarative document formats are useful for expressing information to an end-user. This allows choices of temporal-based information for showing processes and link-based information for allowing user-based selection. From an authoring perspective, however, even with tool-based assistance, an authoring environment based purely on the specification of the (low-level) components of the document is insufficient.

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[1] NWO monitors the inflow of new staff into the research field on the basis of criteria set out in the Wet SAMEN (Employment of Minorities (Promotion) Act). Information will be used only for the purpose for which it is provided. For more information about this legislation (in Dutch only), please visit www.wetsamen.nl

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Instead, a completely new approach was needed where the author is elevated to a position of specifying the ingredients of a presentation and the detailed specifications left entirely to the machine.

In addition to the difficulties of authoring any single presentation for a particular platform, the number of forms of computers has increased, with the corresponding desire to display a web page on, for example, a mobile phone, a hand-held device or a desk-top high-resolution screen. This diversity of target platforms means that some way of tailoring the information to the device is needed. Work has been carried out to automatically generate presentations for different device characteristics.

In parallel with this work, the Semantic Web has been developing, allowing the combination of existing Web document engineering techniques with more knowledge-intensive approaches. The current state of the research is that a number of projects are investigating aspects around the core issues:

- what types of metadata are required for multimedia (IEEE-MM publication in press);

- how can results of database queries be expressed as meaningful presentations (TI Topia project);

- how the user be included more explicitly in the process (NWO ToKeN2000 CHIME project);

- what are good presentation generation approaches (NWO NASH project);

- how can we capture knowledge on discourse structures and modalities and incorporate this into the presentation generation process (NWO ToKeN2000 I2RP project).

As current projects are beginning to show results, it is becoming clearer what the exact problems are that need to be tackled. These problems are large and their solution requires a complete re-examination of the document engineering approach.

4g. International activities

Program chair ACM Hypertext 2003
Editorial board of New Review of Hypermedia and Multimedia since 1993
Program committee member of ACM Hypertext in 1994, 1997, 1999; ACM Multimedia in 2001; Hypermedia track chair of WWW9, 2000
Reviewer for ACM Hypertext, ACM Multimedia, IW3C2 WWW conferences; IEEE MM, IEEE TSE, Journal of Systems and Software and other journals; reviewer for British and Austrian research funding agencies; reviewer for EU IST project Vizard.
Member of EU DELOS network of excellence.
Cooperation with Jane Hunter, DSTC, Australia; Marc Davis, Stanford, USA; Wendy Hall, Southampton, UK.

4h. Other academic activities
Part-time professorship (Multimedia and Internet Computing) at the Technical University of Eindhoven.
Supervision of masters students Twente HIO 1998, UvA 1997, 1998, 2000, TU/e 2003.
Supervisor of PhD students:
2000 - Susanne Loeber (NWO, DYNAMO, TU/e)
2002 - Stefano Bocconi (NWO ToKeN200 I2RP)
2002 - Anne Nigten (V2_, LINST, UK)
2002 - Joost Geurts (NWO, NASH)
2002 - Martin Alberink (TI, Topia)
2002 - Katya Falkovych (NWO, ToKeN2000 CHIME)
2002 - Martin Alberink (TI)
2003 - Yulia Bachvarova (NWO ToKeN200 I2RP)

4i. Scholarships and prizes

Bursary award in 1978 for Glasgow University (7th out of several hundred).

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<div style="background:#888">**List of publications**</div>

5. Publications:

Note: In this field, conference articles, such as ACM Multimedia and IW3C2 WWW, are highly prestigious and generally more highly regarded than many journal publications. These are denoted in bold in the main list.

Key publications

- Jacco van Ossenbruggen, Joost Geurts, Lynda Hardman and Lloyd Rutledge. Towards a Formatting Vocabulary for Time-based Hypermedia. *In:* The Twelfth International World Wide Web Conference (pages 384-393), ACM Press, Budapest, Hungary, May 20-24, 2003
- Jacco van Ossenbruggen, Joost Geurts, Frank Cornelissen, Lloyd Rutledge and Lynda Hardman. Towards Second and Third Generation Web-Based Multimedia. *In:* The Tenth International World Wide Web Conference (pages 479-488), ACM Press, Hong Kong, May 1-5, 2001
- Lynda Hardman, Jacco van Ossenbruggen, Lloyd Rutledge, K. Sjoerd Mullender and Dick C.A. Bulterman. Do You Have the Time? Composition and Linking in Time-based Hypermedia. *In:* Proceedings of the 10th ACM conference on Hypertext and Hypermedia (pp. 189-196), Feb 21-25, 1999, Darmstadt, Germany
- Lynda Hardman, Dick C.A. Bulterman and Guido van Rossum. The Amsterdam Hypermedia Model: Adding Time and Context to the Dexter Model. *In:* Communications of the ACM, 37(2), pp. 50-62, Feb 1994
- Lynda Hardman, Dick C.A. Bulterman and Guido van Rossum. Links in hypermedia: the requirement for context. *In:* Fifth ACM Conference on Hypertext Proceedings (Hypertext '93) (pp. 183-191), ACM Press, Seattle, Washington, November 14-18, 1993
- Lynda Hardman, Guido van Rossum and Dick C.A. Bulterman. Structured Multimedia Authoring. *In:* ACM Multimedia (pages 283 - 289), 1993, Anaheim, CA

-International (refereed) journals

- Jacco van Ossenbruggen, Lynda Hardman and Lloyd Rutledge. Hypermedia and the Semantic Web: A Research Agenda. *In:* Journal of Digital Information (volume 3, number 1), August 2002
- Frank Nack and Lynda Hardman. Denotative and Connotative Semantics in Hypermedia: Proposal for a Semiotic-Aware Architecture. *In:* New Review of Hypermedia and Multimedia (vol. 7, pages 7-37), 2001
- Frank Nack, Menzo Windhouwer, Lynda Hardman, Eric Pauwels and Michèle Huijberts. The Role of High-level and Low-level Features in Style-based Retrieval and Generation of Multimedia Presentations. *In:* New Review of Hypermedia and Multimedia (volume 7, pages 39-65), 2001
- Lynda Hardman, Patrick Schmitz, Jacco van Ossenbruggen, Warner R.T. ten Kate and Lloyd Rutledge. The Link vs. the Event: Activating and Deactivating Elements in Time-Based Hypermedia. *In:* New Review of Hypermedia and Multimedia (volume 6, pages 89-109), 2000
- Lynda Hardman, Jacco van Ossenbruggen, Lloyd Rutledge and Dick C.A. Bulterman. Hypermedia: The Link with Time. *In:* ACM Computing Surveys, December 1999
- Lynda Hardman, Marcel Worring and Dick C.A. Bulterman. Integrating the Amsterdam Hypermedia Model into the Standard Reference Model for Intelligent Multimedia Presentation Sytems. *In:* Computer Standards and Interfaces (volume 18, number 6-7, pages 497-508), 1997
- Dick C.A. Bulterman and Lynda Hardman. Multimedia Authoring Tools: State of the Art and Research Challenges. *In:* Computer Science Today: recent trends and developments (Edited by Jan van Leeuwen) (volume 1000, pages 575-591), Lecture Notes in Computer Science, Springer-Verlag, 1995
- Lynda Hardman, Guido van Rossum and Aart van Bolhuis. An Interactive Multimedia Business Game. *In:* Journal of Intelligent Systems (volume 5, number 2-4, pages 139-150), 1995
- Lynda Hardman, Dick C.A. Bulterman and Guido van Rossum. The Amsterdam Hypermedia Model: Extending Hypertext to Support REAL Multimedia. *In:* Hypermedia Journal, 5(1) pages 47-69, July 1993
- Lynda Hardman. Evaluating the Usability of the Glasgow Online Hypertext. *In:* Hypermedia Journal

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(volume 1, number 1, pages 34-63), 1989

-National (refereed) journals
Not applicable.

-Books, or contributions to books

- Lynda Hardman and Dick C.A. Bulterman. Document Model Issues for Hypermedia. *In:* Handbook of Multimedia Information Management (Edited by William I. Grosky, Ramesh Jain and Rajiv Mehrotra) (pages 39 - 68), Prentice Hall, 1997
- Lynda Hardman. Experiences in Authoring Hypermedia: Creating Better Presentations. *In:* Designing User Interfaces for Hypermedia (Edited by W. Schuler, J. Hannemann and N. Streitz) , Springer, 1995

-Other
2003

- Frank Nack, Amit Manniesing and Lynda Hardman. Colour Picking - the Pecking Order of Form and Function. *In:* Proceedings of the eleventh **ACM International Conference on Multimedi**a, ACM Press, Berkeley, USA, November 2 - November 8**,** 2003
- Joost Geurts, Stefano Bocconi, Jacco van Ossenbruggen and Lynda Hardman. Towards Ontology-driven Discourse: From Semantic Graphs to Multimedia Presentations. *In:* **Second International Semantic Web Conference (ISWC2003)** (pages 597-612), Oct. 20-23, 2003, Sanibel Island, Florida, USA

2002

- Arnold W.M. Smeulders, Lynda Hardman, Guus Schreiber and Jan-Mark Geusebroek. An integrated multimedia approach to cultural heritage e-documents. 4th Intl. Workshop on Multimedia Information Retrieval, in conjunction with ACM Multimedia 2002. December 6, 2002
- Susanne G. Loeber, Lora M. Aroyo and Lynda Hardman. An explicit model for tailor-made eCommerce web presentations. *In:* Workshop on Recommendation and Personalization in eCommerce (2nd International Conference on Adaptive Hypermedia and Adaptive Web Based Systems), May 29-31, 2002, Malaga, Spain
- Jacco van Ossenbruggen and Lynda Hardman. Smart Style on the Semantic Web. *In:* Semantic Web Workshop, WWW2002, May 2002

2001

- Joost Geurts, Jacco van Ossenbruggen and Lynda Hardman. Application-Specific Constraints for Multimedia Presentation Generation. *In:* Proceedings of the International Conference on Multimedia Modeling 2001 (MMM01) (pages 247-266), November 5-7, 2001, CWI, Amsterdam, The Netherlands
- Lloyd Rutledge and Lynda Hardman. The Rise and Fall of Multimedia Authoring. *In:* Proceedings International Conference on Media Futures (pages 17-20), May 8, 2001, Florence, Italy

2000

- Lloyd Rutledge, Jim Davis, Jacco van Ossenbruggen and Lynda Hardman. Inter-dimensional Hypermedia Communicative Devices for Rhetorical Structure. *In:* Proceedings of the International Conference on Multimedia Modeling 2000 (MMM00) (pages 89-105), November 13-15, 2000, Nagano, Japan
- Lloyd Rutledge, Brian Bailey, Jacco van Ossenbruggen, Lynda Hardman and Joost Geurts. Generating Presentation Constraints from Rhetorical Structure. *In:* Proceedings of the **11th ACM conference on Hypertext and Hypermedia** (pages 19-28), May 30 - June 3, 2000, San Antonio, Texas, USA

1999

- Lloyd Rutledge, Lynda Hardman and Jacco van Ossenbruggen. Evaluating SMIL: Three User Case Studies. *In:* Proceedings of **ACM Multimedia**, November 1999, Orlando, Florida, USA
- Lloyd Rutledge, Lynda Hardman and Jacco van Ossenbruggen. The Use of SMIL: Multimedia Research Currently Applied on a Global Scale. *In:* Proceedings of Multimedia Modeling 99 (MMM 99) (pages 1-17), World Scientific, Ottawa, Canada, October 4-6, 1999

- Dick C.A. Bulterman, Lloyd Rutledge, Lynda Hardman, Jack Jansen and K. Sjoerd Mullender. GRiNS: An Authoring Environment for Web Multimedia. *In:* ED-MEDIA 99 - World Conference on Educational Multimedia, Hypermedia & Educational Telecommunications, June 19-24, 1999, Seattle, WA, USA
- Lloyd Rutledge, Jacco van Ossenbruggen, Lynda Hardman and Dick C.A. Bulterman. Anticipating SMIL

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- Lloyd Rutledge, Jacco van Ossenbruggen, Lynda Hardman and Dick C.A. Bulterman. Mix'n'Match: Exchangeable Modules of Hypermedia Style. *In:* Proceedings of the **10th ACM conference on Hypertext and Hypermedia** (pages 179-188), February 21-25, 1999, Darmstadt, Germany
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1998

- Lloyd Rutledge, Jacco van Ossenbruggen, Lynda Hardman and Dick C.A. Bulterman. Structural Distinctions Between Hypermedia Storage and Presentation. *In:* Proceedings of **ACM Multimedia** (pages 145-150), ACM Press, November 1998
- Lloyd Rutledge, Lynda Hardman, Jacco van Ossenbruggen and Dick C.A. Bulterman. Implementing Adaptability in the Standard Reference Model for Intelligent Multimedia Presentation Systems. *In:* The International Conference on Multimedia Modeling (pages 12-20), October 12-15, 1998
- Lloyd Rutledge, Jacco van Ossenbruggen, Lynda Hardman and Dick C.A. Bulterman. Practical Application of Existing Hypermedia Standards and Tools. *In:* **ACM Digital Libraries** (DL'98) (pages 191-199), June 1998
- Warner R.T. ten Kate, Patrick J. Deunhouwer, Dick C.A. Bulterman, Lynda Hardman and Lloyd Rutledge. Presenting Multimedia on the Web and in TV broadcast. *In:* 3rd European Conference on Multimedia Applications, Services and Techniques, May 26-28, 1998, Berlin-Germany
- Dick C.A. Bulterman, Lynda Hardman, Jack Jansen, K. Sjoerd Mullender and Lloyd Rutledge. GRiNS: A GRaphical INterface for Creating and Playing SMIL Documents. *In:* **Seventh International World Wide Web Conference**, April 14-18, 1998, Brisbane, Australia
- Lloyd Rutledge, Jacco van Ossenbruggen, Lynda Hardman and Dick C.A. Bulterman. Addressing Publishing Issues with Hypermedia Distributed on the Web. *In:* ICCC/IFIP Conference - **Electronic Publishing '98** (pages 78-93), April 20-22, 1998

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- Lloyd Rutledge, Jacco van Ossenbruggen, Lynda Hardman and Dick C.A. Bulterman. A Framework for Generating Adaptable Hypermedia Documents. *In:* Proceedings of **ACM Multimedia** (pages 121-130), ACM Press, Seattle, Washington, November 1997
- Lloyd Rutledge, Jacco van Ossenbruggen, Lynda Hardman and Dick C.A. Bulterman. Cooperative use of MHEG and HyTime in Hypermedia Environments. *In:* Actes de la 4e conférence internationale Hypertextes et Hypermédias - réalisations, outils & méthodes (pages 57-73), Paris, September 1997
- Lloyd Rutledge, Jacco van Ossenbruggen, Lynda Hardman and Dick C.A. Bulterman. Generic Hypermedia Structure and Presentation Specification. *In:* **ICCC/IFIP Conference - Electronic Publishing '97**, April 1997
- Jacco van Ossenbruggen, Lynda Hardman, Lloyd Rutledge and Anton Eliëns. Style Sheet Support for Hypermedia Documents. *In:* The Proceedings of the Eighth **ACM Conference on Hypertext and Hypermedia** (pages 216-217), ACM Press, Southampton, UK, April 1997
- Marcel Worring, Carel van den Berg, Lynda Hardman and Audrey Tam. System Design for Structured Hypermedia Generation. *In:* Visual Information Systems (Edited by C. Leung) (number LNCS 1306), Springer-Verlag Lecture Notes in Computer Science, 1997

1996

- Marcel Worring, Carel van den Berg and Lynda Hardman. System Design for Structured Hypermedia Generation. *In:* Visual Information Systems '96 (pages 254-261), 1996, Melbourne

1995

- Lynda Hardman and Dick C.A. Bulterman. Using the Amsterdam Hypermedia Model for Abstracting Presentation Behavior. *In:* Electronic Proceedings of the ACM Workshop on Effective Abstractions in Multimedia, November 4, 1995, ACM Multimedia 1995 Workshop, San Francisco, CA
- Lynda Hardman and Dick C.A. Bulterman. Authoring Support for Durable Interactive Multimedia Presentations. *In:* State of The Art Report in Eurographics '95, August 29 - September 1, 1995
- Lynda Hardman, Jacco van Ossenbruggen and Dick C.A. Bulterman. A HyTime-Compliant Interchange

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Format for CMIF Hypermedia Documents. August 1995 Note: VU/CWI

- Lynda Hardman and Dick C.A. Bulterman. Towards the Generation of Hypermedia Structure. *In:* Proceedings of First International Workshop on Intelligence and Multimodality in Multimedia Interfaces, July 1995, Edinburgh, UK

1989

- Lynda Hardman and Brian S. Sharratt. User-Centred Hypertext Design: The Application of HCI Design Principles and Guidelines. *In:* Hypertext: State of the Art (Edited by Ray McAleese and Catherine Green) (pages 252-259), 1989, York, UK

1988

- Lynda Hardman. Hypertext Tips: Experiences in Developing a Hypertext Tutorial. *In:* People and Computers IV, Proceedings of Fourth Conference of the British Computer Society Human-Computer Interaction Specialist Group (Edited by Dylan M. Jones and R. Winder) (pages 437-451), September 1988, Manchester, UK
- Deborah M. Edwards and Lynda Hardman. Lost in Hyperspace: Cognitive Mapping and Navigation in a Hypertext Environment. *In:* Hypertext: Theory in Practice (Edited by Ray McAleese) (pages 105-125), March 1988, Aberdeen, UK

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Signature

I hereby declare that I have completed this form truthfully:

Name: Lynda Hardman

Place: Amsterdam

Date: 31st March 2004

Please submit the application to NWO in electronic form (<u>pdf format is required!</u>) using the Iris system, which can be accessed via the NWO website (www.nwo.nl/vernieuwingsimpuls).