



# The Need for an Open Hypertext Protocol (Reporting on behalf of the OHSWG)

S. Reich & H. C. Davis, Multimedia Research Group, The University of Southampton, UK  
{hcd, sr}@ecs.soton.ac.uk

## A Little History

Early hypertext systems were monolithic and closed, but newer systems tend to be open, distributed, and support collaboration. While this development has resulted in increased openness and flexibility [11], integrating or adapting various different tools, such as content editors or viewers was a tedious task. Many developers were implementing essentially similar components, simply for the benefit of having their own platform on which to experiment with hypertexts.

At the Second Workshop on Open Hypermedia Systems (OHS) held in conjunction with the '96 ACM Hypertext Conference [14] the Open Hypermedia Systems Working Group (OHSWG) was formed, and its main focus was interoperability between OHS's [15]. The group felt that the community had reached a level of maturity and stability such that it was possible to abstract the common features of the various systems, and to propose to move towards one of the major goals of any open system: interoperability.

## Why Interoperable hypertext Systems?

Everyone benefits if hypertext systems are interoperable; end-users, content providers and developers.

From an end-users' point of view for example, interoperable systems would allow the use of hypertext functionality in a standardised way, similar to features such as cut/copy/paste that are so common in today's systems [12]. Furthermore, users would be better able to choose between different vendors of hypertext applications because basic functionality e.g., for navigation, would

be supported by all systems. And finally, consumers would be able to re-use others hypertexts, i.e., the anchors, links, tours, trails, etc. that have been authored, often with a lot of effort, in a similar way that people exchange book-marks today.

Content providers would benefit in that their products could be re-used on multiple platforms and systems. Hence, interoperable hypermedia systems would form the foundation that would allow information re-use [5]. Not only would this decrease costs but also it would improve the usability and thus the quality of hypertexts.

Developers on the other hand benefit from standards by being able to re-use tools and components. So some might specialise in writing scalable high performance servers; others might specialise in implementing feature-packed clients. Also, integrations or adaptations would only have to be done once [11]. Furthermore, the increased availability of standard tools would result in a proven and stable platform on which developers could prototype and evaluate their new tools.

## Interoperation Using An Open Extensible Protocol

With these motivational factors in mind, the OHSWG promoted research towards interoperability in OHS's. One of the key achievements of the working group has been the development of a standardised, yet open and modular protocol, called the Open Hypermedia Protocol (OHP) [1,3]. OHP fills the gap between the many existing standards for document mark-up (such as html) and document delivery (such as http) by providing

a protocol dedicated solely to communicating information about hypertext objects [3]. OHP allows client programs to communicate with linkservices about the creation and manipulation of anchors, links and nodes and it allows users to work within specified contexts which limit the source of the anchors and links that might be applied to a document.

OHP recognizes that hypertext may be about more than point and click navigation around documents, and can be extended to the various hypertext domains including, spatial and taxonomic hypertext. Prototypical implementations for the simple navigational domain have been demonstrated at several occasions including recent ACM Hypertext conferences.

Technically, the protocol uses XML to encode its messages, i.e. there is a document type definition (DTD). The definition is independent of the communication layer, although the prototypes so far implemented use plain TCP/IP sockets for communication. It is however, envisaged that other communication mechanisms such as RMI or CORBA's IIOP are to be used for communicating OHP and test implementations exist [9].

With OHP as the vehicle for addressing the ambitious goal of interoperability in OHS many research issues have been raised. These include the following [3]:

- The domain of the protocol: based on various application scenarios it has become clear that different domains such as navigational hypertext, taxonomic hypertext or information retrieval, will have to be served by specialized protocols (which could share a common basis).
- The underlying common data model: the OHSWG has proposed an inclusive yet extensible data model which attempts to represent the link models assumed by most existing (navigational) hypertext systems. However, it does not attempt to model systems with particular features such as transclusions in Xanadu.
- The assumed architecture (infrastructure): The issue of a reference architec-

ture has been put onto the agenda of open hypermedia research and proposals thereof exist (see e.g. [6,8,10]).

Furthermore, the goal of achieving interoperability has led to the disclosure of a multitude of interfaces and hence the partitioning of OHS's into a set of interacting components. These are referred to as Component-based Open Hypermedia Systems (CB-OHS) [11].

### **A Set of Open Protocols**

Already in the first draft of OHP [2] the need for a standardised document management for OHS's has been raised. Also, proposals for a reference architecture for CB-OHS's include the need for a document management protocol to be used in conjunction with OHP [6,8,10].

The Hypertext Transfer Protocol (HTTP, [1]) had originally been designed to incorporate functionality for manipulating hypertexts. A "LINK" request for instance, would have allowed clients to create a relationship between a set of URIs. However, these features have never been commonly implemented by Web servers or clients, and in any case, they would only have allowed very basic manipulation of hypertexts.

Also, as a document management protocol HTTP suffers some deficiencies such as the lack of support for addressing parts of data ("give me the last 10 seconds of a two hour video file") or the lack of support for authoring and versioning which has already been proposed as an extension [13].

The OHSWG therefore wants to promote additional interfaces. For instance, there is a proposal for a content specification protocol [7] which defines document management services over WANs and which could be used in conjunction with the existing OHP.

### **Summary and Conclusion**

Hypertext systems have come a long way from monolithic, closed systems to component-based open hypermedia systems (CB-OHS's). We believe that the current work on interoperability, in particular the revelation of interfaces and subsequent definition of individual interacting components will

ultimately lead to interoperable systems. These will benefit the end-users as consumers of hypertexts, the content providers as producers of hypertexts and finally also the system developers themselves.

### On-Line Resources

The Open Hypermedia Systems Working Group pages are available as  
<<http://www.ohswg.org/>>.

### Acknowledgements

The work reported here was undertaken by members of the OHS community, including Ken Anderson, Jon Griffiths, Kaj Grønbaek, Jörg Haake, Wendy Hall, Ian Heath, Dave Millard, Pete Nürnberg. Kasper Østerbye, Andrew Pam, Dave DeRoure, Antoine Rizk, Lloyd Rutledge, Richard Taylor, Randy Trigg, Jim Whitehead and Uffe Wiil. ♦

### References

1. Berners-Lee, T., Fielding, R. T., and Nielsen, H. F. Hypertext transfer protocol - [http/1.0](http://1.0). Tech. rep., Internet RFC 1945, May 1996.
2. Davis, H., Lewis, A. and Rizk, A. OHP: A draft proposal for a standard open hypermedia protocol. In [14], 27–53.
3. Davis, H. C., Millard, D. E., Reich, S., Bouvin, N. O., Grønbaek, K., Nürnberg, P. J., Sloth, L., Wiil, U. K., and Anderson, K. M. Interoperability between hypermedia systems: The standardisation work of the OHSWG (Tech. Briefing). In *Proceedings of Hypertext '99, Darmstadt, Germany* (Feb. 1999).
4. Durand, D. G. Hypertext-related standards efforts. *SIGLINK Newsletter* 6, 2 (June 1998), 13-15.
5. Garzotto, F., Mainetti, L., and Paolini, P. Information reuse in hypermedia applications. In *Proceedings of Hypertext '96, Washington D.C. (1996)*, pp. 93-104.
6. Goose, S., Lewis, A. and Davis, H. OHRA: Towards an Open Hypermedia Reference Architecture and a Migration Path for Existing Systems. In *Journal of Digital Information (JoDI)*, Vol. 1, No. 2, 1997
7. Griffiths, J., Reich, S., Davis, H. The ContentSpec Protocol: providing Document Management Services for OHP. In *5<sup>th</sup> Workshop on Open Hypermedia Systems, to be held at HT'99, Darmstadt, Germany, Feb. 1999*.
8. Grønbaek, K. and Wiil, U. K.: Towards a Common Reference Architecture for Open Hypermedia. In *Journal of Digital Information (JoDI)*, Vol. 1, No. 2, 1997.
9. Millard, D. E., Reich, S., and Davis, H. C. Reworking OHP: the road to OHP-Nav. In *4<sup>th</sup> Workshop on Open Hypermedia Systems (OHSs) at Hypertext '98*, pp. 48-53. Available as Technical Report No. CS-98-01 from the Dept. of Computer Science Aalborg University Esbjerg, Denmark.
10. Nürnberg, P. J. and Leggett, J. J.: A Vision for Open Hypermedia Systems. In *Journal of Digital Information (JoDI)*, Vol. 1, No. 2, 1997.
11. Nürnberg, P. J., Leggett, J. J., and Wiil, U. K. An agenda for open hypermedia research. In *Proceedings of Hypertext '98, Pittsburgh, PA (1998)*, pp. 198-206.
12. Pearl, A. Sun's Link Service: A Protocol for Open Linking. In *Proceedings of Hypertext '89, Pittsburgh, Pennsylvania (1989)*, 137–146.
13. Whitehead, J. E. World wide web distributed authoring and versioning (WEBDAV): An introduction. *ACM StandardView* 5, 1 (Mar. 1997), 3-8.
14. Wiil, U. K., and Demeyer, S., Eds. *Proceedings of the 2<sup>nd</sup> Workshop on Open Hypermedia Systems, Hypertext '96, Washington, D.C., March 16-20. Available as Technical Report No. ICS-TR-96-10 from the Department of Information and Computer Science, University of California, Irvine (1996)*.
15. Wiil, U. K. Open Hypermedia: Systems, Interoperability and Standards. In *Journal of Digital Information (JoDI)*, Vol. 1, No. 2, 1997.