Electronic Publishing
or
Electronic Information Handling?

André Heck

Observatoire Astronomique, Strasbourg, France

Abstract

The current dramatic evolution in information technology is bringing major modifications in the way scientists communicate. The concept of 'electronic publishing' is too restrictive and has often different, sometimes conflicting, interpretations. It is thus giving way to the broader notion of 'electronic information handling' encompassing the diverse types of information, the different media, as well as the various communication methodologies and technologies. New problems and challenges result also from this new information culture, especially on legal, ethical, and educational grounds. The procedures for validating 'published material' and for evaluating scientific activities will have to be adjusted too. 'Fluid' information is becoming a common concept. Electronic publishing cannot be conceived without link to knowledge bases nor without intelligent information retrieval tools.

---

1 A New Culture

It is a truism to say that we are undergoing nowadays a kind of 'revolution' in information technology (Heck 1995a) with far-reaching impacts. As far as communication is concerned, many consider we are currently living in a period which is as important for mankind as the 15th century that saw Gutenberg's invention of the movable-type printing process.

But the phenomenon is much broader. It is acknowledged also by business gurus in the sense that now, *'Money is no more everything'* and *'Information and, better, access to information are more than ever becoming something'*. Thus, in a recent book, Peter F. Drucker (1993) pointed out a power shift from the entities with financial resources towards persons or organizations who will have, not necessarily the knowledge itself, but who will know how to access it and how to handle it. The financial wizard George Soros who is also involved in ventures such as the *International Science Foundation* (http://www.isf.ru)

Preprint submitted to Elsevier Science *5 July 1995*

declared in a keynote address at an Internet Society conference that he considered the current connectivity 'a critical component for the Open Society which was the basis for political and economical stability as well as organizational and individual success and self-fulfillment in the 21st century' (Rutkowski, 1994).

A new culture is taking place and this context must be taken into account, which is not always the case when electronic publishing is tackled.

2 In Our Community?

An extensive literature on this evolution is already available and it is not our intention to review it here in detail. Let us just mention that, besides numerous papers in computer-related journals, the new concepts have been introduced in our community by a number of conferences such as the ADASS (Worrall *et al.* 1992; Hanisch *et al.* 1993; Crabtree *et al.* 1994), ALD (Murtagh & Heck 1988; Heck & Murtagh 1992), and WAW (Egret & Heck 1995) ones, as well as books (Albrecht & Egret 1991; Egret & Albrecht 1995; Heck & Murtagh 1989, 1993; Murtagh & Heck 1987) on methodologies and technologies on data collection, evaluation and distribution, as well as on communications, networking and information extraction.

The World-Wide Web (hereafter WWW or 'the web') is currently the most efficient way of sharing electronic information. It has been quickly and well assimilated by the astronomy community (Egret & Heck 1994, 1995; Heck & Egret 1995).

It is a magnificent communication tool that has been called the 'fourth media' (*Internet World*, April 1995) and which is *de facto* a fantastic cross-disciplinary, cross-educational and cross-social meeting ground. It is a highly dynamic domain evolving rapidly. The explosion of electronic documents is actually not a bed of roses as a new medium, new facilities and new possibilities bring in naturally new questions, new challenges and new problems. There is plenty of work ahead on the grounds of ethics, law, security, fragility, education, and so on (Heck, 1995b). We shall tackle only a few points here.

3 Electronic Publishing?

Electronic publishing (EP) is often misunderstood and interpreted in various, sometimes conflicting, ways (Heck 1992b, 1992c). There is still also too often a timorous attitude in view of what is possible with the current development of technologies and methodologies. Additionally we should be careful about too much extrapolating of old, deeply-rooted habits to new methodologies and communication tools.

In 1991, Strasbourg Astronomical Observatory hosted the first international colloquium on desktop and electronic publishing (Heck 1992a). Since then, concepts, methodologies and technologies have substantially evolved. In our understanding, 'publishing' is making information public. Thus documents on the WWW have to be considered as 'publications'.

4 The Future of Traditional Publishing

A question that is often asked is the following one: *'Is the WWW the end of classical publishing on paper?'*. A corollary to that question would be another one: *'What is the future of the traditional publishers?'*. On this last point, and according to what is already visible on the web, some of our publishers are already moving at full steam towards their views of EP (refer e.g. to the following URLs, respectively for Cambridge University Press, Elsevier, and Springer-Verlag: http://www.cup.cam.ac.uk, http://www.elsevier.nl, http://www.springer.de).

The first question can be answered by another one: *'Did radio or television lead to the disappearance of newspapers and magazines?'*. Of course, there have been some questions and some needed readjustment as another medium became available, but the major newspapers are still there. A new communication vector does not kill the existing ones. It calls however for specific products tailored to the new techniques, in the same way that, on TV, they did not show images of newspapers or broadcast people reading magazines.

It is obvious that hypertext and hypermedia (which are closer to the mental structure of many people) build the natural technique for documents made available on the web.

5 Evaluation – Recognition – Validation

The traditional media will have to leave a slot for the newcomer which will progressively reach its deserved importance and naturally become part of the *evaluation* process, i.e. the assessment of activities for individuals and organizations. Funding institutions, expert committees, learned societies, and so on, will have to get ready for it.

The phenomenology of publishing is not only motivated by the need of sharing information, but also strongly conditioned by *recognition*, a necessity that should not be underestimated. Recognition is sought for getting positions (grants and salaries), for obtaining acceptance of proposals (leading to data collection), and for achieving funding of projects (allowing materialization of ideas). The general *evaluation* process applied for financing research and that conditions the need for *recognition* will have to be unavoidably adapted to the emergence of the new electronic media.

This implies of course another step: the adaptation of *validation* procedures ('refereeing' material) or *quality assurance* (not to be confused with 'quality control'). As was already pointed out at the 1991 DTP Colloquium (Heck 1992b), it has become increasingly difficult to distinguish between the so-called grey literature and the formal one. Thus reliable validation procedures are more than ever necessary... if the same cycles validation-evaluation-recognition are kept, together with their underlying philosophy, culture, and subsequent policies.

However are these really compatible with the very dynamic nature of electronic handling of information (EHI)? It will be difficult for people to refrain from putting on line finalized electronic documents without waiting for the unavoidable delays in approval and release (on paper or on a server). How will this be compatible in turn with the copyright policies and the financial aspects (subscriptions, invoicing of downloads, ...)? I did not find satisfactory answers to these questions in the EP literature or in the EP plans which I am aware of.

6 Creativity and Fluidity

The earlier comparison with TV falls short when it is realized that each electronic-network user can become *ipso facto* an author/creator on the web. A phenomenon that has to be appreciated is that, independently from any validation procedure, servers and web documents of persons and organizations with notoriety and reputation will be visited regularly with preference and confidence, so disrupting the current chronology of preprint-submission-publication.

Unfortunately, most of what can be read about EP relies still implicitly on fixed information, not taking into account that we have entered for good the era of *fluid information*, i.e. a material that can be continuously updated, upgraded, enlarged, improved, modified, and so on. This new concept implies of course the subsidiary ones of *document (in)stability* and of *document genetics*: beyond its own permanent possible evolution, a document can give birth to subsidiary ones, first linked to itself; the relevance of some of these can then supplant with time that of the original document that would virtually 'die'.

Here we have a real challenge to the conventional approaches of information handling and to the usual legal policies (copyright, ...) and financial ones (subscriptions, ...). Forgetting this 'fluidity' aspect would be equivalent to staying with CD-ROMs that are frozen repositories of fixed information or *vice versa.*

Finally, beyond permament authoring and omnipresent connectivity (that will become ever easier thanks to the wireless technology) to continuously updated resources, EP and EIH cannot be conceived in my opinion without links upwards and downwards to knowledge bases, coupled to intelligent information retrieval tools. Putting all these components together in an appropriately working system will be the most efficient way of taking all advantages from the currently available methodologies and technologies dealing with the electronic shape of information.

Mentalities, habits and policies will have to adjust themselves progressively, with the usual human delayed reaction time. Each step contributing to the enlargement of virtual libraries will bring us every time closer to the original Ted Nelson's (1981) vision of a virtual encyclopaedic library (Xanadu project).

7 Epilogue

We did not aim at exhaustivity in this paper, but merely at bringing up a few points still waiting for fully satisfactory handling as of today. More can by found in the references listed below as well as on-line through the personal URL http://cdsweb.u-strasbg.fr/~heck

References

[1] Albrecht, M.A. & Egret, D. (Eds.) 1991, *Databases & On-Line Data in Astronomy*, Kluwer Acad. Publ., Dordrecht, xiv + 274 pp. (ISBN 0-7923-1247-3)

[2] Crabtree, D.R., Hanisch, R.J. & Barnes, J. (Eds.) 1994, Astronomical data analysis software and systems III, *Astron. Soc. Pacific Conf. Series* **61**, xxvi + 542 pp. (ISBN 0-937707-80-5) (see also the URL: http://cadcwww.dao.nrc.ca/ADASS/adass_proc/adass_proc.html)

[3] Drucker, P.F. 1993, Post-capitalist society, Harper Business, New York, 232 pp. (ISBN 0-88730-620-9)

[4] Egret, D. & Albrecht, M.A. (Eds.) 1995, Information & On-Line Data in Astronomy, Kluwer Acad. Publ., Dordrecht, in press

[5] Egret, D. & Heck, A. 1994, WWW in astronomy and related space sciences, in *Second Internat. WWW Conference: Mosaic and the Web*, in press (see also the URL: http://zaphod.ncsa.uiuc.edu/Astronomy/egret/egret.html)

[6] Hanisch, R.J., Brissenden, R.J.V. & Barnes, J. (Eds.) 1993, Astronomical data analysis software and systems II, *Astron. Soc. Pacific Conf. Series* **52**, xxx + 584 pp. (ISBN 0-937707-71-6)

[7] Heck, A. (Ed.) 1992a, Desktop publishing in astronomy and space sciences, World Scientific, Singapore, xii + 240 pp. (ISBN 981-02-0915-0)

[8] Heck, A. 1992b, An introduction to the colloquium, in *DeskTop Publishing in Astronomy and Space Sciences*, Ed. A. Heck, World Scientific, Singapore, 3-8

[9] Heck, A. 1992c, Electronic publishing: a key to advanced information retrieval?, in *Astronomy from Large Databases II*, Eds. A. Heck & F. Murtagh, *ESO Conf. & Workshop Proc.* **43**, 51-62

[10] Heck, A. 1993, Electronic publishing & advanced information retrieval, in *Astron. Data Analysis Software and Systems II*, Eds. R.J. Hanisch, R.J.V. Brissenden & J. Barnes, *Astron. Soc. Pacific Conf. Series* **52**, 121-132

[11] Heck, A. 1995a, Facets and challenges of the information technology evolution, in *Information & On-Line Data in Astronomy*, Eds. D. Egret & M.A. Albrecht, Kluwer Acad. Publ., Dordrecht, in press

[12] Heck, A. 1995b, About the WAW conference ... and more generally on the WWW practice, in *Weaving the Astronomy Web*, Eds. D. Egret & A. Heck, *Vistas in Astron.* **38**, in press

[13] Heck, A. & Egret, D. 1995, WWW in astronomy and related space sciences, in *Third International World-Wide Web Conference: Technology, Tools, and Applications* (http://cdsweb.u-strasbg.fr/~heck/www95.html)

[14] Heck, A. & Murtagh, F. (Eds.) 1989, Knowledge-Based Systems in Astronomy, *Lectures Notes in Physics* **329**, Springer-Verlag, Heidelberg, ii + 280 pp. (ISBN 3-540-51044-3 & 0-387-51044-3)

[15] Heck, A. & Murtagh, F. (Eds.) 1992, Astronomy from large databases II. Haguenau, 14-16 September 1992, *ESO Conf. & Workshop Proc.* **43**, x + 534 pp. (ISBN 3-923524-47-1)

[16] Heck, A. & Murtagh, F. (Eds.) 1993, Intelligent information retrieval: the case of astronomy and related space sciences, Kluwer Acad. Publ., Dordrecht, iv + 214 pp. (ISBN 0-7923-2295-9)

[17] Murtagh, F. & Heck, A. 1987, Multivariate data analysis with astronomical applications, *Astrophys. Sp. Sc. Library* **131**, D. Reidel Publ. Co., Dordrecht, xvi + 210 pp. (ISBN 90-277-2425-3 for hardbound version) (ISBN 90-277-2426-1 for paperback version) (ISBN 90-277-9154-6 for source programs floppy disk)

[18] Murtagh, F. & Heck, A. (Eds.) 1988, Astronomy from large databases. Scientific objectives and methodological approaches. Garching, 12-14 October 1987, *ESO Conf. & Workshop Proc.* **28**, xiv + 512 pp. (ISBN 3-923524-28-5)

[19] Nelson, T.H. 1981, Literary Machines, Mindfull Press

[20] Rutkowski, A.M. 1994, The present and future of the Internet: Five faces, in *Networld + Interop '94 Conf.* (http://info.isoc.org/interop-tokyo.html)

[21] Worrall, D.M., Biemesdorfer, C. & Barnes, J. (Eds.) 1992, Astronomical data analysis software and systems I, *Astron. Soc. Pacific Conf. Series* **25**, 551 pp. (ISBN 0-937707-77-9)