Information (and documentation) in the multiverse

Summary
The possibility of a link between the concept of information as a fundamental constituent of the physical universe and its usual connotation in documentation is noted. Seeking such a link is arguably the most intriguing problem for all the 'science of information'.

Keywords
Information theory; information physics; nature of information

The LIDA (Libraries in the Digital Age) conference held every year in Dubrovnik on the Croatian coast has many unique features. Among these is admirable concept of asking a senior figure in the library/information professions or academe to speak at some length on a topic chosen by them. At the LIDA conference just past (June 2005), the guest was Bob Hayes, Emeritus Professor at the University of California.

Hayes chose to use most of his session to speak about a current project, up to now unpublished. He is seeking to 'explain' information itself, in all its guises, understanding it to be the a measure of the complexity of organisation of a system, or possibly the organisation itself. This basic idea is by no means new, and Hayes was able to point to a number of giants on whose shoulders he was standing, including Shannon, the originator of the original information theory, and Richard Feynman the physicist, from whom he drew ideas of levels of complexity in the physical world. Nonetheless, Hayes' ideas of careful definition of domains at various levels, and ways of assessing their complexity, are certainly a new take on the issue, and will hopefully be published in full at some stage.

Most striking to me was the way in which Hayes' 'information as complexity' appeared to span the gap between information in the 'mindless' physical universe and information as the product of human thought, encapsulated in documents. This is certainly not the only such attempt at such a grand 'theory'; the speculations of Tom Stonier (1990, 1992) are a clear predecessor. Indeed, Shannon's formalism itself appears to apply equally to information in the physical or biological world, to communication signals, and to content-bearing documents, although its applications to questions of meaning and knowledge have proved disappointing.

It seems particularly timely to seek some means of reconciling the varied meanings of the word 'information' (see, for example, Bawden 2001). Whether these simply reflect the fact that the same English word is used to refer to things which are only loosely, if at all, related, or whether there is some deep underlying linkage is still an unsolved, indeed largely unaddressed, issue. What is clear is that the idea of information as a fundamental constituent - some enthusiasts would say *the* fundamental constituent - of the physical universe is gaining ground (see, for example, Leff and Rex 1990, and for a recent more popular account, von Baeyer 2004). Nor are such claims put modestly; the 'tag line' of a scientific paper by one of the leading proponents of such views was 'The structure of the multiverse is determined by information flow' (Deutsch 2002). In similar expansive vein, the physicist John Wheeler has argues that information, in a sense, creates the universe - 'it from bit' - and in which conscious information-processing observers play a key role - a 'participatory universe' (see, for example, various articles in Barrow, Davies and Harper 2004).

The establishment of a link between this most fundamental aspect of information (to say nothing of the burgeoning field and concepts of genetic information) and the kind of information - human-generated, meaning-bearing - which is encapsulated in documents is surely one of the most challenging tasks for all the sciences which claim an interest in some aspect of this multi-faceted concept. In general terms, this link can be established by use of catch-all idea of organisation, pattern, complexity, etc., but putting these on a clearer, and more formal, footing is a task which several, including Stonier and Hayes, have attempted, without as yet clear success.

If, ultimately, it turns out that we are using the same word to refer to different things, and there is no true deep linkage, then at least we will understand our own perspective better. We will, as T.S. Eliott would tell us, arrive back where we started, and know the place for the first time. The search will still have been worthwhile.

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