

## **Information systems and the Internet: towards a news counter-revolution?**

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### **ABSTRACT**

The explosive evolution of the Internet into a ubiquitous infrastructure influences the generation, dissemination and use of information. From a historical perspective it redefines issues that have been central to the news and information industry since the seventeenth century. One such issue is periodicity. The practicalities of news media and news as a commodity have resulted into the periodical appearance of news and, by extension, of all actual information. Integral to periodicity is control of information production by institutions or other authorized channels. With the advent of the Internet we are reverting to an a-periodical information system characterized by personalization and direct contact between information provider and information user. Rather than relying on the institutional status of the propagation channels, we are increasingly evaluating information quality by the integrity, up-to-datedness and reliability of its source. Moreover, we are able to complement or corroborate information by linking different sources together in compound representations. The extent and complexity of the Internet make search intermediaries necessary. These collect and collate information either ad hoc (responding to a user query) or as part of wider documentation projects. These projects re-introduce institutionalization but the autonomous, intelligent mechanisms used by such intermediaries promote personalization in information retrieval and facilitate decentralization of information supply into a cottage industry. In addition to a-periodicity, directness and wider availability of information, decentralization provides a new social and technical context for precedent and case-based approaches in designing.

### **1 THE DEMOCRATIZATION OF INFORMATION**

In recent years the Internet has known a rather unexpected explosive growth coupled to a surprisingly broad social acceptance of its significance. Despite the initial poverty of its initial content, the Internet has been evolving into a new infrastructure, as ubiquitous and affordable as the telephone and cable television. The phenomenon can be interpreted as a consequence of the wider democratization of computing technologies but only partially. The extensive presence of publishers and broadcasters on the Internet and their involvement in new communication applications testifies to the technological and cultural potential of the Internet with respect to the generation, dissemination and utilization of information.

The content of the Internet and the freedom to access this content has always been a matter of contention. Questions concerning the appropriateness of certain types and sources of information for specific groups of Internet users, including censorship of political information from abroad, have been widely publicized and debated. Attempts to legislate for such matters have yet to impose stringent controls on information supply and dissemination. The Internet is still a free forum practically

anyone can use and abuse in numerous ways. Nevertheless, the excitement stemming from the possibilities of the medium cannot obscure the relative poverty of its content.

Most computerized information that is available today on the Internet, on CD-ROM or other carriers derives predominantly from the digitization of analogue documents. This is an obvious necessity for the preservation and dissemination of existing data, as well as for its processing by computerized techniques. Digitization of existing documents contributes to the democratization of information, despite hindrance from copyright laws and similar overprotective structures. Most limitations — including copyright, censorship and taxation—are due to the transfer of the logic and structure of analogue documents to the computer. By treating digital information in the same manner as its analogue counterpart we fail to realize the differentiation computerization brings to the transmission and retrieval of information what has been called the distinction between atoms and bits [Negroponte, 1995 #219].

Hypermedia and multimedia are the first step towards true digitization of information. They aggregate information using ad hoc links that improve efficiency, thereby also improving comprehension by bringing together pre-existing partial documentation. In their existing forms hypermedia and multimedia are surprisingly rigid and unimaginative. Yet, they support transposition of qualities and modalities of one medium over another. Practical distinctions, such between in-depth analyses and richer sensory presentations that contrast newspapers to television tend to disappear in the computer. The same material can be processed in different ways, as text, audio, video or any combination of the three, at an abstraction level appropriate to the user query (Negroponte 1995). In a sense, the selectivity and flexibility of intelligent receiving mechanisms compensate for the passivity of the receiver.

As hypermedia and multimedia develop into fuller compound representations, comprehensiveness and coherence become a matter of structure rather than ad hoc associations devised by the compiler of the information system. In contrast to conventional databases, this structure cannot rely on rigid prescription. Information on the Internet is supplied irregularly by different sources representing a variety of overlapping viewpoints. The formation of a compound representation from this information and its retrieval are based on one of the main technological advances of the Internet, autonomy of the carriers and processors of information.

Autonomy is a key issue in search intermediaries, a commodity abundantly present on the Internet. Due to its extent, complexity and constantly changing content and structure, the Internet promotes the use of search intermediaries in a manner analogous to asking the librarian for the place where books on a particular subject can be found. These intermediaries catalogue the Internet by means of autonomous intelligent agents that retrieve and scan existing documents in order to compile indexes and guide searches. The fundamental difference between these agents and conventional means such as a card-based library index lies in the autonomy of the agents. Autonomy allows for permanent up-to-datedness but perhaps more significantly for advanced interaction with the Internet user (Turkle 1995; Leonard 1997)

Using the same mechanisms as search intermediaries an individual user can achieve personalization of the information that is available on the Internet. The vast

quantity of this information in combination with the abundance of uninteresting and unoriginal items (including cyclical references between different sites) makes selectivity on the Internet a priority for any serious application. Autonomous agents transform the filters that achieve the required selectivity into active, dynamic receivers capable of pursuing and identifying the appropriate information rather than waiting for it to arrive. The flexibility of such mechanisms opens up possibilities for personal exploration of a gigantic, potentially all-encompassing information super-system. These possibilities will arguably redefine education, entertainment, mass media and publishing (Negroponte 1995). For design disciplines they present unique opportunities for the direct integration of distributed collections of design data and parts (Coyne and Lee 1997; Tuttle, Regli et al. 1997), as well as for the utilization of verifiably appropriate precedents and cases (Schmitt 1997). The emerging characteristics of design information systems include:

- Information retrieval becomes an unobtrusive, localized and responsive background to design activities (Koutamanis 1995).
- The user is taking the initiative in collecting and selecting information.
- The role of institutionalization and centralization in the generation and dissemination of information is diminishing.
- Rather than relying on centralized, institutional propagation channels, we are increasingly employing distributed, original sources of information. This permits the development of specialized, up-to-date and highly reliable information providers, as well as the transformation of online design documentation into design precedents.
- As a consequence of the above, periodicity, a cornerstone of information dissemination since the seventeenth century, is being challenged as an outdated bias.

## 2 PERIODICITY IN ARCHITECTURAL PUBLICATIONS

Despite the current emphasis on planning, management and other organizational aspects, building remains an irregular business. The high fragmentation of the building industry, the extensive use of skilled and semiskilled labour, the unstable relation between supply and demand and the multitude of actors and factors involved mean that a building may take any number of years to design and build. During this period normally very little gets published on its design and construction. What may reach the news are debates on the necessity of a building, its location and brief, its form, as well as expectations and achievements relating to innovation and performance. For the majority of buildings and unrealized designs, however, there seems to be little space in newspapers, magazines, on the television and even in the specialized media.

Failure to appeal to and reach peers and/or the general public can be attributed to the character of the particular designs and buildings, such as lack of innovation or limited social, political or cultural relevance. Personal relations between the makers of

the building and the media are frequently more significant than the building itself, especially for specialized publications. It is no accident that most prominent architects of today are conscious of the importance and the ways of the media. While such issues cannot be ignored, timing is another significant factor of newsworthiness in architecture. Failure to coincide with the publishing schedules of periodical architectural publications or a mismatch with their themes may lead to oblivion: only very rarely does a building enter the history of architecture if it has not appeared in architectural news.

Architecture and building are not favoured subjects of the news industry. Beyond the customary weekly architectural columns, newspapers, television and weekly or fortnightly publications are interested in the products and processes of the building industry only if they have a strong connection with wider issues, such as the economy, employment, technology or culture. And even then, they are generally presented as a result of such matters or as a mere footnote. Lesser interventions, such as a single building in an urban context, are mostly ignored by the general media, even though they may have consequences as far reaching as each individual component of a master plan.

Specialized architectural and building publications usually have longer editorial periods. Weekly or fortnightly periodicals are rare and generally destined for a national audience of several disciplines relating to building and construction. These periodicals often concentrate on the relations between these disciplines and other parties involved in the design, construction and management of the built environment. Items like legislation, practice codes, new building components and subsystems form the staple of weekly architectural and building publications. Presentations of new designs often serve as illustration of technical innovations and developments.

Discussions of designs and buildings as self-contained artefacts are usually reserved for monthly specialized publications. These represent the core of national and international information carriers on architecture and building. Every self-respecting country prides itself on at least one monthly publication primarily meant for architects and related building professions but also with a possible appeal to the wider public, especially for popular issues such as interior decoration. Longer periods, e.g. bimonthly or quarterly, are generally due to lack of sufficient audience or diversification resulting from competition with similar publications.

Most monthly publications are thematic and object-oriented. It is customary to devote each edition to a particular subject, such as a building type, a stylistic tendency or a geographic region. Each subject is normally treated on the basis of integral accounts of distinct entities, usually recent buildings. In the absence of a specific theme, the publication comprises such individual accounts, possibly linked by their dates. Moreover, the publisher or the author often re-uses the building presentations in another publication, e.g. a book, either partially or as a discrete, integral unit.

Annual publications are probably as important as monthly in their attempt to crystallize architectural developments and achievements of a clearly identifiable period of time. The typical annual architectural publication purports to be an overview of a year's production in a country, company or school of architecture. Coherence and

comprehensiveness give such overviews significant persuasive power, despite the mild absurdity of their arbitrary span of time and limited capacity. Being a static product, annual publications are an exceptional activity of the news industry that flies in the face of its relying on and promoting constant change as the source of regular news. Their static character may relate to the public's preference for stability in certain types of information. As with train and flight timetables, we attempt to ignore variation and change when it comes to collections of basic resources, such as available building components or building codes, and accept the validity of a catalogue for a fixed period. The producers of such resources appear to acknowledge this anxiety by e.g. fixing prices and guaranteeing availability of components they manufacture or distribute for the period that the catalogue remains valid.

The periodicity of architectural and building publications reveals the practicalities of the news industry, and in particular publishing schedules, limited capacity and the necessity to produce a steady flow of news in order to retain audience attention. These do not match the rhythms of building production. The mismatch is not unique to architecture. Also other areas which we normally associate with a continuity and density that agree with those of the news industry, such as politics, suffer from the decontextualizing and deconstructive effects of periodicity. Periodic publication means that information on a building is extracted from its context and re-ordered in a partial framework, such as the theme of a specific publication. Its remaining aspects are disregarded, as are buildings excluded from the publication because they were deemed less important and could not be accommodated in the space of the publication. Moreover, the information of each edition ultimately suffers the same fate, as it disappears from public attention as soon as the subsequent edition appears. The basic economics of the news industry dictate that information must be made periodical, that each period and edition must be treated as being equally important and that every item is time-bound (Sommerville 1996).

In architectural publications the effects of periodicity are reinforced by their thematic structure. A building commissioned and designed in a particular year but completed in another year may fail to appear in the annual overviews of either year or appear in both. The work of an American architect in Europe may be claimed or ignored by both continents. Major exponents of a stylistic tendency may dominate a particular edition with indifferent products, while more significant projects by lesser figures are excluded. Moreover, information that fails to appear in the core periodicals may be lost forever. A quick scan of periodicals and other, a-periodical publications such as monographs, reveals that they all refer to basically the same collection of buildings. They also use the same documentation, as routinely provided by the designer or as used previously by the same authors or publishers.

Arbitrariness of publication criteria is not the only problem associated with periodicity limitations. In a world increasingly concerned (at frequently obsessed) with the completeness, precision and accuracy of information, the omission of buildings that can serve as precedents or cases reduces the reliability of explicit architectural knowledge. The most comprehensive architectural catalogues cannot claim to be exhaustive or offer but the most essential information from a particular viewpoint,

ranging from the least textual and pictorial data for locating and identifying a building to abstract, often meaningless statistics. The lessons that can be learned from lesser and less known designs, either as individual precedents or as the complete stock of available cases, are forever lost to a profession that has the reputation of repeating the same mistakes by stubbornly insisting on the same processes of re-creation and re-invention.

### 3 ARCHITECTURAL INFORMATION SYSTEMS: AUDIENCES AND APPLICATIONS

The issues outlined so far, periodicity and the structure of computerized information, relate to stereotypes commonly used in the definition of professional Internet applications. It appears that projected uses of the Internet and similar environments are often digital reproductions of established professional practices. The appeal of such uses relies more on the prestige of adding technological innovation to stereotypes and less on the efficiency and effectiveness that could be achieved by reforming the established practices along computational lines. A main flaw of attachment to stereotypes is that established practices and their practitioners are not the best audience for the new technologies of the computer and the Internet.

The proposition that the real cultural divide in information and communication technologies is generational (Negroponte 1995) is verified daily by personal experience. What at first sight may seem an oversimplification is arguably a general rule that, despite its exceptions, signifies not only lack of computer literacy but also a deep resistance to change, even in areas and circles that can profit from computerization. Architecture and building are hampered by the application of outdated and inadequate technologies, poor communication and organization, and the general absence of the new, sharper tools needed for the growing complexity of the built environment, its design and management (Colquhoun 1981). As a result, practice and academia are espousing information and communication technologies, even though many individuals still ignore or dispute their relevance. Common to most descriptions of proposed and realized uses of the Internet is a combination of technological exhibitionism and conservative, frequently prosaic perception of architectural problems and their solutions. Such inadequate descriptions are often attributed to lack of understanding: many designers and a large proportion of proposal and policy writers are at best occasional users of the Internet, drawn to it merely by the availability of new technologies. A closer examination reveals two main types of real Internet audience:

1. Non-professional users (hobbyists) exploring the emergence of a (sub)culture and its transformation into a social infrastructure. The technically minded portion of this audience is a major contributor to the development of the Internet (Leonard 1997). However, as their enthusiasm and activity is not matched by knowledge or understanding of architecture and buildings, their contributions are largely superficial, e.g. index sites, simple pages on architects and similar reprocessed information (Bridges 1996). Nevertheless, this type represents a

potential audience also for new architectural ideas and products that will be disseminated through the Internet, possibly as part of a new lifestyle (Negroponte 1995). These will probably be created by the second type of audience:

2. Young researchers and professionals attempting to link exploration to utility by developing experimental applications that highlight properties of new media, usually in relation to some domain problem, but also inventing new issues on the way. It is this type of audience that shifts emphasis from availability of technology to applicability under specific circumstances. Academic research into information and communication technologies in architecture depends largely on these younger generations who are responsible for adding most items of interest to the otherwise generally sterile presentations of academic institutions. However, they have yet to make their mark in practice for reasons that can be attributed to lack of understanding of and real interest in the computerization of information and design among the older generations.

These two types of audience form the Internet public for architecture and building. It is not the public of pre-existing publications, in the same way that the book-reading public did not become the newspaper public (McQuail 1987). This new public is using the Internet as an information and communication space with a structure and purpose different to these of analogue information carriers and media. Firstly, the Internet audience can also be the information supplier, through an own web site or by submitting items to newsgroups, lists or just sending e-mail to other individuals. Secondly, for the first time since the news revolution, personalization and the informal structure of the Internet allow the public to take the initiative in exploring the world. Thirdly, information dissemination on the Internet frequently assumes the character of a communication reminiscent of the oral news distribution prior to the news revolution. The informality that characterizes the Internet could signify the emergence of a new elite that will dominate information generation and dissemination. It could also explain the lack of real interest in the Internet among the older, powerful elites who finance, program and constrain the development of information technologies. These elites dominate by transmitting information among its members orally and avoiding unwanted exposure and publicity, so as to monopolize valuable information that gives them an advantage over others (Tuchman 1978; Brown 1989).

Given this audience, we have to admit that the current content of the Internet is generally disappointing, especially when compared to the potential of the technologies involved. Nevertheless, we can also recognize the emergence of applications that appeal to the new audience of digital architectural information and interact with it in the framework of electronic democratization without being limited to privileged infrastructures and closed domains. These applications include:

1. *Preservation and dissemination of information.* This admittedly old-fashioned application area represents one of the main foci of public interest in the Internet. The perception of the Internet as a gigantic library containing the answers to all questions agrees with the expectation that it will play an important role in

education, as a background to school activities or as a virtual museum for both entertainment and adult education. Anticipating the future role of the Internet, institutions are making their digital collections of architectural images, three-dimensional digital models, building components and digitized texts accessible via the Internet. The content and form of these collections is almost always the same as on other media, notably CD-ROM, the previous popular carrier of large quantities of information. Availability through the Internet adds to the collections by unifying information from diverse geographic locations and owners. The user can retrieve and use data distributed over a number of sites without practical or conceptual problems. A consequence of this is a healthy disregard for centralization, even in the activities of institutional custodians of architectural information.

2. *Retrieval support*: Inescapably related to the computerization of information is the development of retrieval mechanisms for identifying relevant data in the distributed, heterogeneous environments of the Internet. The low recall (the ratio between the number of relevant documents retrieved and the number of all relevant documents in the information system) and precision (the ratio between the number of relevant documents retrieved and all documents retrieved as a result of a particular query) afforded by conventional natural language retrieval in such environments has led to a number of attempts to improve retrieval performance, usually on the basis of indexes (i.e. lists of links). Such indexes are too inflexible and labour-intensive (even when compiled and kept up-to-date by bots) to provide a long-term solution. It is probably only now, with the tremendous amounts of untapped information hidden in any computer and the frequently excruciatingly slow and cumbersome queries and browses, that we realize the potential of controlled vocabularies, i.e. polyhierarchical, cross-referenced taxonomies of domain terms and concepts (BAL 1982; GAHIP 1990). In the new context of the Internet this rather old type of search intermediary is applied initially to scholarly resources, such as bibliographies, catalogues and other reference material. From there it is naturally progressing to the actual information referred to in the resources and proving its utility to a wider audience. Moreover, language control is seen not as a restrictive approach but as a coherent and consistent organization of relevant knowledge that improves access to and exploration of extensive, distributed databases in a unifying fashion (Koutamanis 1995).
3. *Compound representations*: The physical distribution of related data and the variety of media types on the Internet necessitates integration of information in well-structured, coherent, comprehensive representations. Especially autonomous, demanding applications, such as the use of on-line databases of components in digital drawings and models or the on-line control (constraining) of design documentation with respect to building codes and regulations, require modular, multilevel representations that permit identification of parts and aspects at various abstraction levels from ready-made components and details (local configurations of components) to local and global patterns of spatial arrangement (Koutamanis 1997). Such identification within a design representation and on the



Internet facilitates design control and the re-use of existing knowledge in precedents and cases.

4. *Precedents and cases*: For a number of years academic research and education has been exploring precedents and cases as an encapsulation of re-usable, malleable design knowledge. Such ideas are not yet popular in practice. The infusion of new designers exposed to these ideas in their studies could propagate the applicability of cases and precedents beyond the already accepted periphery of details, local assemblies and subsystems. Justification of design decisions on the basis of existing designs and elaboration of known, relevant solutions into new designs has two main prerequisites. The first is compound, multilevel representations that accommodate different roles for the various types of precedent and case-based processes. The second is facilities for the synchronous registration and asynchronous transmission of design decisions and descriptions. Such facilities would generate the information needed for extensive databases of precedents and cases and for comprehensive compound representations, which in turn would provide the re-usable modules for new designs and their representations.

#### 4 A-PERIODICITY AND INSTITUTIONALIZATION

The development of the Internet into a design information infrastructure counters (or possibly displaces) effects of the news revolution that have been dominating information generation, dissemination and use. Decentralization of information storage and information supply means that practically everyone can make information available without the mediation and control of existing institutional channels. The resulting heterogeneous, distributed cottage industry of information is unified by compound representations and intelligent search intermediaries that inform and educate the user. The unparalleled potential of this environment is turning the Internet into a primary information infrastructure that absorbs several existing entertainment and educational facilities and activities.

The combination of information with entertainment and educational purposes gives the Internet a character that reinforces these developments. Despite its being largely textual, the Internet retains much of the informality, freedom and speed of oral news transmission. Still, we should not ignore the elitist technocratic tendencies — reminiscent of the coffeehouse and society culture of the seventeenth century — that are replacing the initial, probably more elitist academic sphere. It is perhaps telling that attempts to introduce paid professional information services are hampered by cost and limited circulation, similarly to early attempts at weekly news publications (Dahl 1952), even though they represent a major incentive for the development of the Internet.

Closely related to such tendencies is institutionalization through professionalization. Currently more and more Internet pages, much like advertising folders, are created by professional designers. The insertion of intermediate steps between information generation and dissemination reduces directness and paves the way towards institutionalization and periodicity determined by the working rhythms

and financial interests of the intermediaries. If we add to that factors such as ownership and control of distribution media (an important but often neglected detail: the Internet is wired, unlike e.g. wireless radio), we can expect that social, financial or other alliances could lead to new institutional structures. In this respect it is not surprising that broadcasters and publishers are so keen on the Internet.

Regardless of the evolution of the Internet, we should expect (and demand) an all-encompassing information infrastructure that forms a responsive and yet unobtrusive background to our computational activities, including designing. A background role for the Internet suits decentralization, personalization and a-periodicity. It also requires selectivity on the basis of objective warrants, as well as by the qualities of the source. As information appears irregularly, when the original sources judge that something important or interesting has occurred, recipients of information have to decide how far to trust it on the basis of the reliability and credibility of the source. Selectivity will be facilitated by the diversification of information structures into different types of multimedia carriers, similarly to the diversification of information in e.g. books and periodicals on the basis of distinct information types and descent from different media (McQuail 1987).

The Internet and its technologies can alleviate some of the most detrimental effects of periodicity. In particular, they dispense with the necessity to summarize in order to meet the limited size of an edition or to appeal to a wider public. Instead, the primary sources can be made available at different levels of specificity that correspond to the depth of an investigation. For example, building regulations need not be minimal, cryptic documents. Instead, we can justify the principles and values chosen in codes and regulations by referring to on-line documentation on the data that formed the background to the choices. Such information is not bound by specific periods. As soon as changes occur, the content of the primary and linked documents is automatically updated in a transparent manner, i.e. together with an explanation of what has happened and why. As a result of decentralization, information becomes eponymous, i.e. credited to persons (the primary source), rather than to the institution that distributes it. In other words, information providers are again speaking to the public instead of *for* it.

The development of an a-periodical information infrastructure is a basic factor in the evolution of architectural design. As a connecting tissue for the fragmented building industry and architectural market, it promises an actual, up-to-date information super-system that potentially includes all relevant information, from building components and legal specifications to full descriptions of the latest designs and buildings. Linking such information dynamically to design and decision support systems provides integration of external information in a new design, as well as of new designs (in part or as a whole) in larger databases of cases and precedents. The picture that emerges is that of a rich environment for architectural research, education and practice.

Perhaps more significantly, an a-periodical, dynamic information environment can lead to profound changes in architectural thinking. In particular, it challenges the normative levels of thinking and their a priori, fixed abstraction and summarization of

information in favour of precedent and case-based approaches, which allow designers to make informed, transparent decisions. Part of this decision-making is explicit registration of performance and process characteristics. This facilitates design control and evaluation, as well as re-use of existing knowledge in a bottom-up fashion that promotes change as a result of improvement possibilities rather than publishing schedules.

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