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An Overview of Information Design on Web-Based Media

ABSTRACT

"Information Design is the defining, planning and visualization of the contents of a message with the intention of achieving particular objectives in relation to the needs of the target users" (International Institute for Information Design). It is an area of communication design that is particularly concerned with understanding users and their responses to textually and visually presented information. The process of information design may include planning, collecting, editing, organizing, structuring, and presenting information through concern with communication purpose, context of use, and how users should search, find, retrieve, perceive, process, comprehend, and utilize or transform information into actions easily, accurately, and effectively. However, as communication shifts from print to digital media, the array of information and the user's ability to selectively interact with it changes structurally. Due to the differences in purpose and media attributes, the information design of a web site can't simply borrow design principles or methods from traditional communication design alone. As a result, this article discusses the discipline and current practice of information design in web-based media, and how these traditional design principles in print media should be reconsidered to fit the new context and requirements.

Keywords: Information Design, Information Architecture, Web-based Media

INTRODUCTION

From the perspective of information origination, the main objective of information design is to provide clear and appropriate communication, with thoughtful prioritization, through context definition, and identification of relationships or interrelationships, as well as awareness of language barriers [1]. From the perspective of information use, a successful information design means that its users can find what they need, understand what they find, and use what they understand appropriately [14].

A major shift in information design consideration is the range of symbolic forms and their passive or active nature. The medium of the web requires interactivity from the user. A turn-taking is going on in which the user selects or directs and the web site responds. This is significantly different from print in which all is given at once. Representation methods for information can be textual, diagrammatic, visual, or combinations of these methods. To these basic forms the web adds movement and sound in all their variations. Contents may be organized along a continuum from simple linear to complex non-linear structures (see Figure 1). In addition, information design is inevitably context-driven. When communication context is shifted, the array of information and the users' ability to interact with it changes structurally. Therefore, in web-based media where a new context is offered, information presentation needs to be considered in terms of media affordance – different from print or interface design on product or software.

Since web-based media is increasingly used as a new communication channel by more and more technologically literate people, information becomes the essence of most web sites. This is not limited to information and education web sites where information is the main element offered, but also includes commercial, community, company or institution web sites where products or services in their business context are the main element. While not originally intending to search for information, individuals inevitably find that they need some information related to the product or service to help them make a decision before purchasing, or they need specific information to help them perform an intended task.

	Information design in print media	Information design in electronic media
Representational plane	• Page layout	• Graphic user interface
Organization and representation of information	• Information structure — linear • Spatially constructed	• Information structure — linear and multipath, hierarchy, web, and matrix • Spatially and temporally constructed
Operational plane	• Reader-driven • Non-interactive • One-way communication • Static	• Reader / context or object-driven • Interactive / non-interactive • One / two-way communication • Static / dynamic
Representational forms / methods	• Passive • Static • complete – all is present • Spatial hierarchical arrangement • Movement is real	• Passive / active – layered with sound, motion, roll-over • Static / dynamic – change from one form / value to another or change value within the same variable – change from one variable to another – varies by speed, duration, and rhythm • Incomplete (appearance / disappearance) – only some is revealed • Spatial / temporal hierarchical arrangement • Movement is instantaneous and virtual • Customized • Responsive (response to user's interaction)

Figure 1 *Differences between Information Design in Print and Hypertext Media*

As a result, it is particularly important for information designers to recognize that in web-based media both function and information are equally important; they need to support each other. Web users need certain information to use functions provided on a particular web site; at other times they use web functionality to access or retrieve information. More importantly, information designers need to keep in mind that in web-based media users can guide their own reading based on a pre-defined navigation system based on hypertext links that connects nodes of information in associated webs which enables non-linear content to become accessible through interactive choice.

Furthermore, many web sites provide search engines to enable users to electronically retrieve needed information as well as other information based on search queries. These fundamentally change the way users interact with information. World Wide Web is relatively new compared to other well-established communication channels with which most users feel more familiar. While navigating through this overloaded information resource located within a new and unfamiliar context, novice users often find themselves lost among hypertext links, have difficulty finding the information they need, and have trouble using or understanding the information search system on the web site.

Consequently, in order to support user search behaviors within the unique attributes of the media, the process of information design - planning,

collecting, writing, editing, organizing, structuring, presenting, managing and maintaining information – for this particular context needs to be conducted differently, using a new set of design rules or principles. Information design principles that originated from publishing and graphic design need to be thoughtfully adapted to fully support this new context. Additionally, information designers need to be aware of the user's internal thinking process while perceiving and using information, as well as the user's mental models of how information should be categorized, structured, and presented.

Many studies and practices have been investigated within this area in an effort to establish new theories, principles and methods to make online information more accessible and usable to its intended audiences. These studies include:

- Information architecture for the web [15]
- Information visualization [3]
- Information foraging [12]
- Information scent [4]
- Information retrieval and information filtering [9]
- Web data-mining [13]
- Models of human navigation [2]
- Content management and metadata schemas [7]
- Writing for the web [16]
- Readability and scannability of web contents [11]
- Legibility of text and image on computer screen [10].

INFORMATION DESIGN AND INFORMATION ARCHITECTURE

Information Design and Information Architecture are virtually the same practice in that they address design through clarity and organization of information, and aim to make information effectively and pleasantly usable for its intended audiences in a certain context or situation while successfully conveying its communication purpose. The term "Information Design," originated by the British Information Design Society, has been widely used among design practitioners. However, the practitioners of information design may have quite different views of the profession or even different names for it such as information graphics, presentation graphics, scientific visualization, signage, interface design [8], as well as information architecture, the common term widely used in web design practice.

In current practice, the term "Information Design" is usually used as a broad term for the design of information in various media. In a general

sense, it may be described as the design activity that determines how to categorize, structure and present the given information. Currently, the term "Information Architecture" is more widely accepted as a term to describe the design of information particularly for web-based media since its idea and principles were made popular by Rosenfeld and Morville's book "Information Architecture for the World Wide Web" [15]. The practice of information architecture for the web focuses on the organization and structure of specific information. It may not pay much attention to detail levels of how information is visually represented or displayed on each web page which is often determined by a user interface designer and/or graphic designer.

Note that the term "Information Architecture" described in this research particularly relates to the practice of web design, which is the primary focus of the study. However, this research does not extend to cover the topic of "Web Architecture" or "System Architecture." These terms are associated with web engineering or software development for web production processes; they attend to the structure of the web system and its components such as browser, internet, web server, database, mainframe, protocol firewall, and domain firewall.

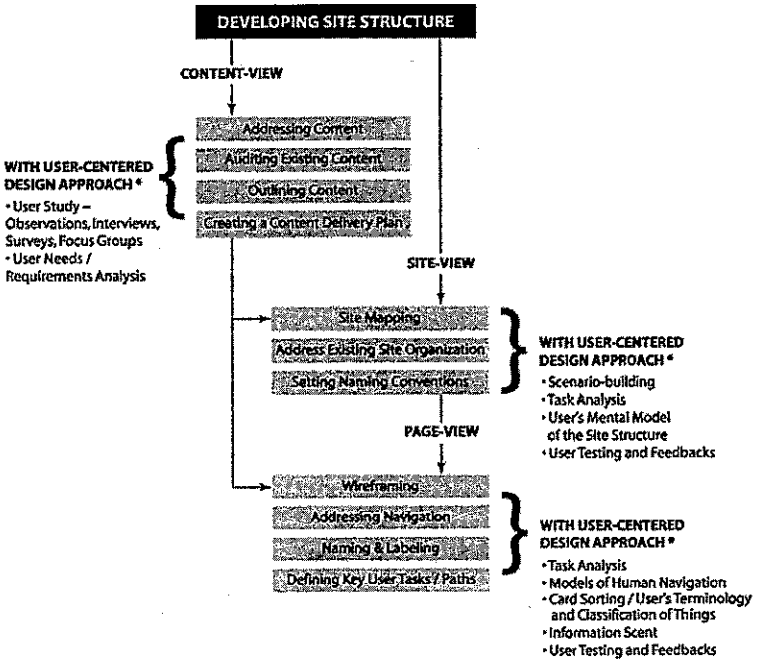

Figure 2 *An Example Process of Information Architecture on the Web with User-centered Design Approach (Extended from the original diagram "Developing Site Structure" depicted in the book "Web ReDesign: Workflow that Works" by Kelly Goto and Emily Cotler, 2002) [6] *Indicates the new additions extended from the original diagram*

INFORMATION ARCHITECTURE FOR THE WEB

Information architecture is a particularly important process in web site design since it refers to the structure or organization of the web site by determining how each web page relates to another in order to help users find and use the information and functions effectively. It is fundamentally concerned with a human information processing model, user mental models, human navigation models, user task flow, and the information searching system. Its process is mainly involved with content analysis and planning, organizing web content, allocating web functionality, developing web structure or architecture, determining web navigation system, and search techniques, as well as designing the labeling system, and providing cues to help users orient themselves.

In a more complex web site, its process may also include creating the web architecture blueprint, content mapping, web page inventory and architecture style guide. Besides taking information design principles from printed media, its main principles are rooted in database design, information retrieval with strong influence from Human-Computer Interaction, library science, technical writing, and psychology in terms of how people organize concepts and categories [2].

To organize content on the page, the information architect groups and orders information, as well as reveals the organizational structure to the users. This process involves chunking and grouping information and using a logical classification scheme. Since studies [11, 16] have shown that people's

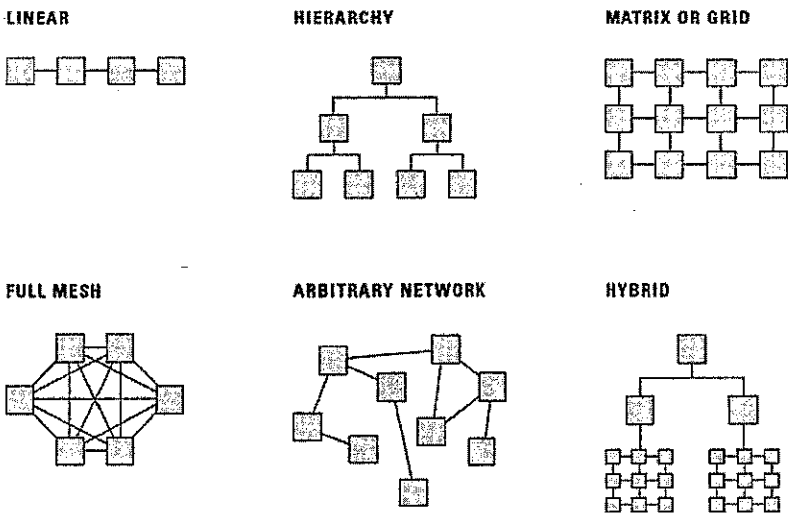

Figure 3 *Organization Structures of Web Site (Redrawn from the original figure "Common Topologies for a Web Site" depicted in the book "Usability for the Web: Designing Web Sites That Work" by Tom Brinck and others, 2002) [15]*

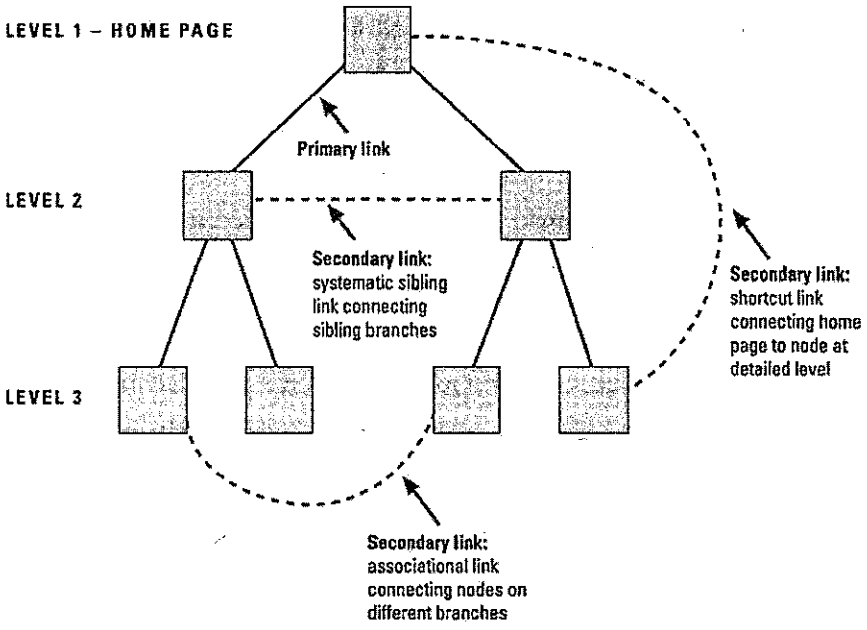

Figure 4 *An Example of Web Navigation System (Redrawn from the original figure in "Guidelines for Designing Web Navigation" by David K. Farkas and Jean B. Farkas, Technical Communication, Third Quarter 2002, pp. 341-358) [5]*

memory load is reduced when information items are grouped or chunked, this technique helps users better create hierarchical frameworks for storing information in long-term memory, and eventually users perceive the text structure more easily [16]. The organization system of a web site typically involves various schemes and structures. These schemes or classifications define the shared attributes of content items, and establish a logical grouping for them. These schemes may include exact schemes such as alphabetical, chronological, and geographical, or other more ambiguous schemes such as topical, task-oriented, audience-specific, metaphor-driven, and hybrid schemes [15].

The organization structure of a web is the primary way to determine how pages are organized and linked together. The most common and well-understood structure is a hierarchy or tree structure since it allows relatively quick and easy navigation from one page to another. Others include a linear structure where pages occur in an ordered sequence such as a matrix or grid, a full mesh structure where every page is linked to every other page, an arbitrary network that is an informal structure where several pages may link back and forth, and a hybrid structure that is a combination of other formal structures [2] (see Figure 3). The design of the web navigation system is another important process since it defines how users will navigate through web structure; or in other words, it determines which pages are linked together within the defined structure (see Figure 4).

The information architect needs to understand how people navigate, which usually is determined by user task or what they are trying to accomplish. Users may also navigate using their mental maps; that is the user idea of how the overall web site is structured, which may be based on prior experience on the particular web site or other similar web sites. A web site can help provide users with mental maps by presenting a strong model for its organization, such as presenting a navigation bar or a site map.

Eventually, a labeling system is created to show users the organization and navigation system of the web. Labels are used to present larger chunks of information in web site, in order to trigger the right association in the user's mind without prominently presenting all the detailed information on the higher levels of web pages [15]. Labels can be used and presented in different ways. They can be used as links to chunks of information in lower levels of web pages, such as labels within navigation systems, labels as indexing terms, and link labels embedded in text.

On the other hand, they can also be used as headings that help set up information hierarchy by breaking up and identifying the chunks of information on a web page, similar to the heading found on a printed page. They may also come in two formats, textual and iconic [15]. Designing a successful labeling system is normally underpinned by studies of *information scent*[1]. It is important that users' thinking and the language or classification schemes they typically use are clearly understood and explored. Furthermore, using organizational cues to make text visually accessible and scanable is also important in the information labeling system to help ensure that all links clearly indicate their destination systematically.

RELATED STUDIES AND PRACTICES THAT CONTRIBUTE TO INFORMATION DESIGN FOR WEB-BASED MEDIA

Information retrieval and information filtering are applied when a web site provides an information search system. Information retrieval examines how users find information and how tools such as search engines and catalogs can be constructed to help in this regard. Information retrieval is concerned with the organization of information, types of user search and search queries, and how these affect retrieval; it also establishes the relevance of retrieved information. Information filtering helps select subsets of information to deliver to users based on preference, relevance or importance of a given chunk of information,

[1] *"Information scent* is the shade of meaning in a lablel and its description that suggests the full meaning that people are seeking in other words, people need meaningful local cues to help them locate distant content." [2]

and past information usage to avoid information overload [2].

Additionally, content management including content analysis, defining metadata schemas, and indexing is performed when maintaining a complex database in order to better manage and access information. The studies of information visualization help determine how to present information visually, or how to display the pages on a web site effectively. Its techniques usually include selective hiding of data, layering data, using 3-dimensional space, and scaling techniques such as fisheye views. It also takes into account the psychological principles of layout including proximity, alignment, and shared visual properties such as color. Furthermore, legibility of text, image, and motion graphic on screen are also studied within this area. These studies investigate perceptual attributes such as color, position, size, isolation, complexity, and tonal contrast of display elements on screen.

CONCLUSION

Since some characteristics of a web site resemble those of print media, web design has adapted some principles from Communication Design (particularly from Information Design and Graphic Design) whose traditional focus has been publishing. However, these characteristics, removed from their original generally passive and linear print context, are adaptively presented in an entirely new context with hypertext links, immediate interactivity and complex non-linear content. Accordingly, web design also borrows principles from Human-Computer Interaction (HCI), rooted in Cognitive Psychology, including Interface Design and Interaction Design, which are particularly concerned with an information processing model and the development of user mental models.

The crucial aspect that makes web design fundamentally different from traditional communication design in printed media is the hypertext links and interactivity. In this different context, users have a broader array of behaviors; they detect, see, discriminate, identify, recognize, search, browse, find, scan, read, record, and comprehend the same contents in different ways. As a result, web contents needed to be collected, organized, structured and presented for users to perceive, process, and utilize in the way that fits their purpose and enhances their performance in the web context.

The main purpose of the output information in typical user interface is primarily to inform users about the current state of the program or machine; information is usually presented briefly using short text. In contrast, information provided on a web site is refashioned from print media or

publishing, whose purpose can range from persuasion, advertisement, entertainment, to formal report, information, and education. Such information involves a complicated content within which to select, organize, structure and present. Consequently, while a typical software application user interface is particularly designed, based on user intended tasks and functionality of the program or machine, the design of a web interface and structure is strongly related to its contents, functions, user intended tasks, as well as business goals all together.

Accordingly, because of these differences in purpose and media attributes, the design of a web site cannot simply borrow design principles or methods from traditional communication design and user interface or interaction design. The design principles or methods borrowed from communication design in print media need to be cautiously adapted to fit the new context. The design methods borrowed from user interface or interaction design need to be thoughtfully extended in order to consider other factors such as various types of web content and user goals; these go beyond the original goals that are confined to user tasks and web functionality.

Therefore, information design research should be further developed to expand understanding within the area of user studies. In most current practices, user studies are taken into design consideration only in a general sense - identification of the intended users of the web site, and what they want to achieve, or application of usability testing in terms of what is working, and what is not. Additionally, most user studies look into what and how users behave, what tasks they need to do, and how they perform those tasks in different contexts and situations.

However, information design research should allocate their focus to the relatively new areas of user studies: user goals and user modes of searching, and accordingly investigate how these user cognitive factors contribute to differences in user information needs and their information-seeking behaviors on web-based media, particularly in view of user search strategies and user search methods. Understanding within this area will contribute to the further development of information architecture and interface design.

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