Book review: New organizational designs: Information aspects, by Bob Travica
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Book Reviews

New Organizational Designs: Information Aspects. Bob Travica. Stamford, CT: Ablex Publishing; 1999: 174 pp. Price: $39.50 (ISBN: 1-5670-404-3.)

For almost every organization seeking increased productivity, open communications, and more access to information, the answer often lies in information technology (IT). Industry investments in technology are made with the expectation that the organization will change in some way. These changes and investments are made as organizations struggle to overcome the ties of old bureaucratic processes. However, IT alone does not free an organization from tradition. In information technology, as in life, expectations and reality are rarely the same. The resultant change is not always what planners thought it would be. In *New Organizational Designs: Information Aspects*, Bob Travica of Indiana University's School of Library and Information Science, examines organizational design as affected by the use of IT. He provides an introduction to the study of organizational design, describes the various trends away from traditional to several nontraditional organizational designs and then applies this information to an investigation of organizational design and the use of IT in the accounting industry.

The book is organized into 12 chapters, which can be grouped into the broad topics of new organizational designs, the nontraditional organization (focusing on structural, cultural, political, information, and IT aspects), an examination of the accounting industry and the role and effect of information technology, especially in non-traditional environments. It closes with questions for further inquiry.

According to Travica, the new organizational designs are organic, adhocracy, networked, and virtual. Because he later sets forth a terminology for describing nontraditional designs based upon these new organizational types, I describe them here in some detail:

The *organic* organization changes and redefines itself for individual tasks, uses advice, rather than instruction and takes responsibility for problem solving.

In an *adhocracy*, the salient characteristics are low formalization of behavior, lack of standardization or clear role definition. This is because adhocracies must form and reform in response to changing needs. Adhocracies tend to be particularly high users of IT, which allow groups within the organization to form and disband as needed for problem solving.

Networked organizations, according to Travica, are becoming more popular in today's business environment. Networked organizations have overlapping managerial responsibilities, vague roles, organizational flux, and the potential for conflict. IT connects nodes within and between organizations.

Finally, Travica describes the *virtual* organization as one which produces a product customized to the individual consumer—"a virtual product." Its boundaries between customer, supplier and employee are blurred, as are the traditional roles of departments and operating divisions. Virtual organizations are high IT users because they need the ability to gather vast amounts of data to customize their offer to individual consumers.

After examining the new organizational designs described above in depth, Travica presents a five "F" method of characterizing the nontraditional organization: flexible, fluid, fickle, fit, and free.

The organic organization is characterized by its flexibility to vary itself in response to changing tasks and needs. A bit further on this continuum, adhocracies are described as fickle because of their ability to reorganize in rapid response to changing environment and needs. The fluid transfer of information marks the networked organization. Within the networked organization, information mixes into and becomes part of both process and social aspects. Travica aptly refers to the movement of information flows within this type of organization as the "blood circulation system" within the network.

Contrasted to the internal fluidity of the networked organization, the virtual organization is described in an external manner as "fit." This description stems from an examination of the individualized product of the virtual organization. The product is fit, or competitive, because, owing to customization, there is no substitute.

We thus arrive at the primary descriptor of new organizational design, the fifth "F"—free. No matter what structure they take, new organizations struggle to be free of the strictures imposed by the traditional organization. Yet there is not one way that works for every firm. How firms do it, how they determine what aspects of the traditional design they can keep, which must be changed and how IT affects each variable is still open for discussion. The five "F" framework, however, provides a starting point for further examination of individual companies and industries, as many of them move away from traditional design. According to Travica, although there is evidence that the type and amount of IT usage is a strong indicator of nontraditional design, there are no hard and fast rules to indicate that movement in any particular direction, or the application of any particular type of IT, will bring the desired results.

Following the detailed introduction to organizational design, Travica examines the public accounting industry. Public accounting presents an interesting hybrid of traditional and nontraditional organization, both in its basic organizational structure and its use of IT. Travica takes great pains to describe the workings of the industry. From the traditional notion of the accountant working alone with an adding machine or calculator, to the teams of consultants working at distributed client sites, the reader develops an understanding of the industry under study. Travica shows how large accounting firms use IT to create nontraditional, information organizations. The accounting industry evolved from providing accounting and tax services to broad-based business consulting. It was able to do this because its early adoption of IT provided a great deal of information about the client, which, when properly analyzed, aided in developing general business strategies.

The use of teams within accounting consulting firms also contributed to their development as nontraditional organizations and heavy users of IT because of the need to communicate with spatially dispersed teams. For those unfamiliar with consulting, the usual mode of operation is for the team to be at the client site for most of the engagement and only in the accounting firm's office between jobs. It is necessary for teams to communicate both with

other teams at other client sites and the home office. Accounting/consulting firms are heavy users of such communication technologies as knowledge management systems, e-mail, and decision support systems.

The last chapter examines possibilities for further research, especially the need to study the relationship between hierarchy and IT and spatial dispersion and trust. The common consensus among info-enthusiasts (those who believe that IT alone will solve most of life's problems) is that IT flattens organizations and empowers employees. However, it has often been shown that IT can increase hierarchy within an organization by providing management with more tools and data with which to make decisions, removing independent action from subordinates.

In Travica's opinion, spatial dispersion and trust were worthy of further examination because management may be mistaken in its belief that IT alone is the answer to dispersed staff information and communication problems. Failure to consider the societal environment in which the technology is to be used may result in the "failure" of IT from management's viewpoint. If the technology itself hasn't failed (and management usually doubts that it has), then employees are often blamed if the expected results of IT implementation don't occur. Employees "don't get it" or worse yet, may develop end runs around technology they refuse to use.

The book is an exhaustive presentation of studies in organizational design, organizational behavior, and the role of information technology within these structures. For those new to the discipline and unfamiliar with academic studies of this type, it is a good resource. It provides an historical perspective on the topic that would be difficult to find duplicated anywhere else. For those more familiar with organizational design, the choice of the public accounting industry as a study against which to apply Travica's theories is an excellent choice because of the aforementioned characteristics.

I have two criticisms of this otherwise excellent book. The number of studies presented sometimes hindered the flow of the reading material. If the intended audience is strictly academic, this may be understandable, though nonetheless regrettable. If the targeted audience is broader, I think references to previous studies might have been better placed at the end of chapters so that the text flowed better and giving the reader a moment to breathe between references. The concepts in *New Organizational Design: Information Aspects* are very relevant to today's business manager who struggles with IT and an evolving organizational structure. The insights into their dilemma which are provided in Travica's book—including the realization that even following a number of studies on the topic, there are no hard and fast rules for redefining an organization through IT—may be lost (because of the book's format) on those who would be most interested in implementing what *is* known about IT and organizational design.

There is also an editing oversight in which social economist Mark Granovetter's name is misspelled as "Grenovetter." Granovetter's work describing the embeddedness of economic actions in the larger social environment, provides a framework upon which to place an understanding of the embeddedness of IT in various organizational environments and it was disappointing to see his name misspelled several times.

But these are minor shortcomings in a book that manages to provide an excellent overview of a large body of work and a stepping stone toward new approaches in analyzing organizational design and information technology.

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Information Visualization: Perception for Design. Colin Ware. San Francisco, CA: Morgan Kaufmann; 2000; 438 pp. Price: $59.95. (ISBN 1-55860-511-8.)

Vision, merely one of our six senses, dominates the world of information presentation and interaction. Ware asks us to consider the whole world as an information display. He uses this metaphor several times in reaching back to our primate past where there was need to be sensitive to the slightest motion, and where color vision helped our ancestors choose the ripest fruit.

Information visualization is a vast subject area that encompasses not only our brain's hard wiring and the structure of the eye with its rods and cones, but also the mechanics of computer monitors in presenting clear text and true colors. Its many facets include pre-attentive processing (what we see before we begin looking), cultural sensitivities to colors, primitive graphemes, and complex visual languages used in statistical displays, maps, entity-relationship diagrams, flowcharts, and so on. This is not to neglect multidimensional presentation and 3-D navigation metaphors. No single book can cover this whole field in depth.

Sorting out this vast area of information visualization is one of the book's major accomplishments. It is an excellent survey for the casual reader with many links to the scholarly literature. Ware's ambition is to set out the field in terms of its scientific basis, hence the subtitle: "perception for design." This ambition propels his greatest success: suggesting strategies for effective information presentation based on empirical results. The net result is effective web page design based on the science of vision. This ambition also leads Ware to open each of the early chapters with some fundamental science. Unfortunately, this may be the least successful material in the book. For example, there is a cursory look at brain functioning, a sketch of how are eyes work, and scientific formulae tend to pop up on the page without sufficient hand holding for the casual reader.

The book is excellent when Ware summarizes the research literature by assembling lists of suggestions for word/image trade-offs, requirements for visual interrupts, recommended colors for labels, shapes for pre-attentive processing, and so on. His treatment of Gestalt processing is masterful. He discusses and gives examples of the laws of proximity, similarity, continuity, symmetry, closure, size, and contours. The treatment rises to a textbook on web page design.

Chapter 4 on "Color" is the single most impressive chapter in the book, perhaps reflecting Ware's own strong interest. The discussion of chromatic aberration (different wavelengths of light focus at different distances within the eye) is an example where the science of sight feeds directly into web page design strategies. We are given maxims to live by: "Pure blue text on a black background can be almost unreadable if there is white or red text nearby to attract the focusing mechanism" (p. 54). The chapter discusses seven perceptual factors for creating color labels and issues for pseudocoloring maps. It presents the case for the uniqueness of the color yellow and the naming schemes of colors across cultures. One could easily write a book about color alone.

There are also strong discussions of visual acuities in relation to the precision of information presented on computer screens, and pre-attentive processing. A series of illusions are presented and in discussing the Cornsweet effect, there is an application to the pointillist painter Seurat.

This is an excellent book that could serve as a textbook in the area. It also is part of an interesting dialog between a visual guru like Edward Tufte over "chart junk." (The disagreement is over a plane and a surface. Texturing makes a plane

surface visible, but may be construed as unnecessary ornamentation.)

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Reference

Tufte, E.T. (1997). Visual explanations: Images and quantities, evidence and narrative. Cheshire, CT: Graphics Press.

Information Retrieval: Algorithms and Heuristics. David A. Grossman and Ophir Frieder. Boston, MA: Kluwer Academic; 1998; 254 pp. Price: $120.00 (ISBN: 0-792-38271-4.)

Grossman and Frieder's text covers the broad field of Information Retrieval (IR) by presenting lists of techniques and following with short surveys of each technique. Unfortunately, the title only partly reflects the contents: there is no practical coverage of algorithms and heuristics, and the preface note of the "focus on algorithms" is misleading. Techniques are described without details of their efficiency, how the algorithm might work in practice, and, importantly, without comparison. For the IR-minded, the text is richer in its study of effectiveness than of efficiency, but even the study of effectiveness contains little more than hints.

Chapters two and three are the longest and strongest of the nine chapters. Both chapters begin with introductions that contain lists of techniques and follow with descriptions. Some descriptions work well, presenting the evolution of a technique with the detail of methods to calculate, e.g., document similarities using the vector space model. Others are less successful. For example, extended Boolean retrieval is presented in two pages that are unrelated to other descriptions and without discussion of its merits or drawbacks. The two chapters present an adequate survey, but the reader gains no appreciation of the relative merits and practical successes of the techniques.

Chapter two addresses the backgrounds of eight fundamentally different techniques for ranking queries against documents in a text collection. The ordering of the topics is good—arguably from the most to the least successfully applied—though the authors do not offer comparisons through reported results. Answering the question "So which strategy is best?" with only "this is still an area of debate" is unsatisfactory; there are mature testbeds for techniques, such as the Text REtrieval Conference (TREC), and many conclusions can, and have been, drawn from experiments.

The key topics in the 70-page Chapter two are vector space and probabilistic models. The vector space model—the most widely implemented—is presented briefly first with a worked example and pointers to key references. A useful summary of popular similarity measures includes the rationale behind each approach. A much longer survey of the arguably less successful probabilistic methods follows, which works well but is not as rich in pointers to the literature (e.g., Crestani et al.). This criticism applies to most of the book: given that the text does not present the details of the algorithms or present critical discussion, a more thorough bibliography could have been a strong contribution. Chapter two also presents newer and older schemes, inference networks, latent semantic indexing, neural networks, genetic algorithms, fuzzy set retrieval, and extended Boolean techniques.

Chapter three is around 40 pages and presents retrieval utilities: algorithms from all areas of IR that can be employed for efficiency, effectiveness, and for a variety of other reasons. In the same list-then-detail style, the utilities presented are relevance feedback, clustering, passage-based retrieval, parsing, n-grams, thesaural techniques, semantic networks, and regression analysis.

Relevance feedback encompasses techniques permitting the user to judge answers as relevant or not, and for the system to use those in subsequent refinement of the answer set. The section surveys the field well, focusing on relevance feedback in the vector space and probabilistic retrieval models. The other utilities are covered reasonably, with the exception of the discussion on n-grams; n-grams have been applied successfully for phonetic matching and proximity matching, as well as successfully in non-text retrieval domains, but this whole contribution is missed. Also, again the lack of connection between topics and applications of the utilities to other areas is missing.

Chapter four is a weak and altogether unsatisfactorily short treatment of efficient IR. Inverted index construction, index compression, and efficient query processing are each covered in a few hundred words. The coverage of index construction is so brief, it is erroneous; efficient techniques for index construction bear little resemblance to the methodology described. Index compression suffers a similar fate, where a byte-aligned scheme that is easy to explain, but not used in indexing in practice, dominates a section that does not cover the popular parameterised Golomb codes. Other texts, such as *Modern Information Retrieval* (Baeza-Yates & Ribeiro-Neto, 1999) and *Managing Gigabytes* (Witten, Moffat, & Bell, 1999), are better resources for efficiency topics. A section on signature files should have been omitted: there is no discussion of how they might be used in ranking and is supplemented with a simplistic section on string matching. For a book aiming to discuss algorithms and heuristics, this chapter is a particular disappointment.

The fifth chapter could be described as odd, but the bibliography offers an explanation: Grossman's doctoral thesis investigates using relational systems as text repositories. The chapter title, "Integrating Structured Data and Text" suggests an introduction to the interesting problems of managing structured documents, querying against passages and fragments, and heuristic approaches to ranking. But it is a review that feels like a cut-and-paste from either a thesis or a published paper. The chapter covers the relational algebra and the Structured Query Language (SQL) and continues into a history of using relational systems as text repositories. This leads to a discussion of structured documents stored in relational tables for the purpose of simulating the in-memory vocabulary of an inverted index. It is a practical problem, but the fundamental point that relational systems are not designed for nonrelational data is avoided. Other important solutions are not discussed.

The sixth chapter is another area the authors know well, and the topic will be of more interest to the generalist than the topic of the preceding chapter. The short chapter introduces the taxonomy of parallel architectures, and the different systems developed for information retrieval using these architectures. The received wisdom that indexed searching is highly parallelisable is explained well and illustrated with an algorithm for the Connection machine; alternative approaches for parallel query term processing and indexing on the Digital Array Processor are discussed briefly.

Parallel IR leads to a description in chapter seven of Distributed IR (DIR). The chapter covers the basic topics, including the theoretical model of DIR, replication, and architectures. Strangely, web search engines are included in this chapter as examples of DIR systems. Web search engines as DIR systems? The link seems tenuous, but the argument is that the replicated information in the database of a search engine was once distributed and the hypertext links navigate to the original resource.

Chapter eight discusses the Text Retrieval Conference, TREC, in five pages. TREC is an initiative to improve the performance of information retrieval systems through collaboration. Participants train their systems in supplied query and answer sets, and then complete a blind run with a query set and return the answers for relevance judgement by human assessors. There are several tracks focusing on different IR issues, and the conference allows participants to present, discuss, and improve techniques for efficient and effective IR. This chapter is an opportunity for the authors to present results of TREC and to compare and contrast techniques, but the authors do not, oddly commenting that "the focus of this book is on algorithms." Chapter nine concludes with three pages on future directions.

Overall, the greatest flaw is that a modern IR text should discuss search engines in depth, a flaw in many texts with new editions. Readers are interested in the large, semistructured collections maintained by the search engines and how they are stored, queried, ranked; and how search engines make use of the retrieval strategies that are the core of IR. While the authors touch oddly on philosophical questions concerning the web's popularity, only three sketchy pages of details on two search engines, Infoseek and Excite, are presented. The short technical overviews presented by the search engines at their Web sites, or details from sites such as searchenginewatch.com, contain more information. Chapters five through seven could well have been focused on practical Web technologies and less on the research interests of the authors.

The book suffers glitches in the figures, a recurring problem in the text; one figure in Chapter two is missing and is replaced with a duplicate of another, while other figures are oddly sized, and, in all, the figures are amateur. The exercises at the end of each chapter amused me, mainly because many could result in a major research project. For example, at the conclusion of the chapter on distributed information retrieval, we are asked to: "1. Develop a distributed IR algorithm that stores equally sized portions of an inverted index on separate machines. Compute the communications overhead required by your approach."

Overall, chapters two and three, which represent more than half the pages, are a useful resource for a summary of similarity estimation and utilities such as stopping, stemming, and relevance feedback. It is true these chapters deliver "the basic strategies used by the majority of commercial products," and they do offer a little more depth in some topics than a more general text, such as *Managing Gigabytes*.

What is missing from the book is what is promised by the title: algorithms and heuristics for information retrieval. Moreover, the material that is presented should be framed in the context of what currently interests readers; i.e., applied information retrieval on the Web and Web search engines. And, most importantly, the book needs to be critical in its discussion, not just listing topics and summaries.

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References

Crestani F., Lalmas M., van Rijsbergen C.J., & Campbell I. (1998). "Is this document relevant? . . . Probably": A survey of probabilistic models in information retrieval. ACM Computing Surveys, 30, 528–552.
Witten I., Moffat A., & Bell T. (1999). Managing Gigabytes. San Francisco, CA: Morgan Kaufmann.

Baeza-Yates R., & Ribeiro-Neto B. (1999). Modern Informational Retrieval. New York, NY: ACM Press.

The Internet Public Library Handbook. Joseph Janes, David Carter, Annette Lagace, Michael McLennen, Sara Ryan & Schelle Simcox. New York, NY: Neal-Schuman; 1999; 218 pp. Price: $49.95 (ISBN: 1-55570-344-5.)

With all the publicity the Internet has garnered, many people who have computer access are now trying to satisfy their information need via The Net. Even in traditional library settings many users expect to retrieve information from the Internet. Ask any reference librarian if they have heard the question from patrons, "is it not on the Web?", and you will get an almost unanimous positive answer. The World Wide Web, a system for searching the Internet, has grown so much in size that it has the potential for making printed reference obsolete. However, at least two caveats hold for the Web, as it is sometimes called, back from reaching its fullest reference potential. With its holdings being so vast, users are sometimes not able to find information in an expedient manner, and even when they do find the information they are not able to discern whether the information retrieved is reliable. To combat this dilemma, many libraries are now creating Web sites that respond to these very issues. One of the first organizations to take the lead in developing a Web site for the purpose of determining what role librarianship could offer in a networked environment was The University of Michigan School of Information. In 1994, Joseph Janes, a professor in School of Information, began formulating an idea about an internet public library. This idea, with the help of colleagues and students, became the Internet Public Library (IPL), which made its debut in 1995. This unique experiment, which continues to this day to be a true success story, has become an institution in the virtual world. Especially in this age of commercialization of the internet, the IPL embodies the original ideas upon which the Internet community was founded and built, free and equitable access to information without profit. As one of the first virtual libraries and the Internet's first and only "public library" on the scene, the IPL is in position to share its experiences over a 4-year time span.

Fortunately, many books, articles, and conference papers are now appearing on the topic of virtual libraries. Thus far, these works have dealt with digital academic libraries, financial payment mechanisms, collection development, interface design, and spatial design. Writing a book that demonstrates the possibilities of using the Internet as an on-line public library is just as daunting as creating the actual site itself. The IPL's (http://www.ipl.org) role is to serve the on-line world community in a manner similar to a traditional public library. Individuals can access the site from computers throughout the world to get information that is also found in traditional public libraries. The site collection consists of reference services, exhibits, newspapers, magazines, on-line texts, a librarian's library, and children and young adult resources. Just as many public libraries have a ready reference collection, so does the IPL. One can access reference tools such as the *Information Please Almanac*, in full text. However, just as in traditional public libraries, the IPL has some information included that has to be paid for if you want to take it home with you. For example, performing a title search in the IPL Online Literary Criticism collection for the title *The Color Purple*, by Alice Walker, revealed a link to a Northern's Light Special Collection site that just gave a two- to three-sentence summary of the actual document. To see the entire literary criticism, one had to purchase the document. In fairness to the IPL, another search was performed using the author's last name, and this time, after going through several subheadings, a short full-text essay on *The Color Purple* was found. Also, to the

credit of the IPL creators, they do ask users to recommend and send in other sites on a particular topic such as literary criticism on Alice Walker.

As one of the stated goals, this handbook was written to ensure that other information providers learn from IPL's mistakes, and to not waste time by "reinventing the wheel." *The Internet Public Library Handbook* is a guide to creating a successful virtual library. The authors, who were the creators of the IPL site, have been successful for the most part in presenting a handbook that demonstrates the issues of designing a virtual public library. The first chapter of the text offers an overview of their vision of librarianship in the networked environment, including historical background on the IPL project. Chapters 2–5 could be used by an instructor who is teaching an introductory course on virtual librar- ies. In Chapter 2, "Building Online Collections," the authors discuss issues such as scanning and searching for materials, orga- nization and subject access decisions, and considering future trends related to internet collection development. Chapter 3, "Cre- ating a Successful Web Site," lays out the steps involved in building new resources on the Web, which range from understand- ing users to dealing with support and maintenance. Chapter 4, "Serving Young People," was particularly refreshing because it covered providing services for young people, which is extremely important in getting the attention of the next generation of library and information seekers. Chapter 5, "Establishing Online Refer-

ence Services," is very useful in addressing reference concerns such as staffing, and the importance of the Ask a Reference Service. Chapter 6, "Handling Money Matters," was the weakest essay in the book. This chapter demonstrates the difficulty of funding a venture such as a virtual library without providing proven solutions.

The text also contains a number of useful charts and screen designs. For example, the chart on criteria for evaluating an existing on-line collection, is a practical checklist to have when evaluating Web sites. If I find any fault with the book , it is because it is riddled with jargons and acronyms, without a glossary. More explanations of certain terms like XML on page 204 would be very helpful. In addition, a fuller discussion on metadata is needed to find out more about the IPL computer programs.

In conclusion, I think the book should be on the shelves of anyone who is thinking about developing a library Web site. This book is a valuable resource for guiding the creators of virtual libraries through the process in a simple clear way.

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