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REVIEW OF: Irwin Lebow. *The Digital Connection: a Layman's Guide to the Information Age.* Computer Science Press. New York, New York, 1991.

by Pat Ensor

Irwin Lebow's *Digital Connection* is a beginner's look at the processes that underlay modern computing, telecommunications, and recording--all of these being tied together by their dependence on digitization. Lebow states as his premise for this book that "Without some understanding of its digital underpinnings, one cannot begin to appreciate the ramifications of the information revolution or the implications of the emerging

information society." He attempts to provide a readable guide for the non-technical person to the underlying concepts of digital computing and the recording of digitized audio and video, and the transmission of information resulting from these electronic processes.

Summary

Digital Connection has nine chapters and 261 pages, including an index. The chapters begin with "Digital Computing," which describes the way a computer works at the basic level, without tying the explanation to any particular kind of hardware. A chapter entitled "Telecommunications" provides an introduction to information theory and discusses the concepts of the energy required to transmit information and the noise that is always present in telecommunications. Lebow then changes gears to cover sound, music and speech. He covers the waveforms produced by sound, music harmonics, and speech harmonics, and how they relate to bandwidth.

Naturally following that discussion is a chapter called "Transmitting Audio and Video." Lebow believes that understanding the fundamentals of analog communication through broadcasting provides a foundation for understanding what we more typically call telecommunications. In "The Wonderful Symmetry of Frequency and Time," Lebow relates the essentials of communicating sound to transmitting digital signals.

A chapter entitled "Information Theory" conveys the essentials of channel capacity, bandwidth, digital signals, coding and error detection. This gets to the heart of what can theoretically be done with information transmission and the limitations of what can practically be accomplished.

Lebow then moves to a chapter called "Digitizing Audio and Video" in the first of two chapters which focus on aspects of sound and music. Even straightforward digitization is not accomplished without considering complex matters such as what can most efficiently be digitized without sacrificing quality. The eighth chapter, "Digital Recording and Storage," relates telecommunications and recording through looking at information theory. Compact discs are extensively discussed, including such issues as capacity, channel noise, recording and playback. Other digital recording mechanisms are also covered.

The final chapter is called "Public Telecommunications" and goes into detail about how the telephone system works and where changes are being made to digitize communication. The future is speculated about very briefly at the end of this chapter.

Evaluation

The obvious questions raised when looking at a book with this title and publication date are: 1) isn't it terribly out of date? and, 2) aren't there lots of other books that do the same thing? Surprisingly, the answers to both questions are "no." Although the subtitle of the book is a bit misleading, encouraging one to think of it as one of those guides-to-the-underlying-technology-for-managers, the main title is right on target. The book's focus on all aspects of digitization and its intention to relate its information in an accessible mode for a popular audience are what make it unique. There are many books that cover the fundamentals of digital electronics, but they tend to be textbooks and take an approach that is still too advanced for novices. There are many books which describe the "Information Age" for a general audience, but they don't cover this range of topics--from computers to sound to telecommunications. This book will not, however, help someone who is looking for a guide to networking technology or any of the other related topics that may be of interest in this age of the Internet.

Which brings me to the question of datedness--the material in this book is still essentially useful and accurate today, even given the fast-paced change in technology. That timeliness is precisely because it deals with the underlying theory and foundation for these technologies, and most things about them have

not changed at the basic level. The packaging of technology and some of its capabilities have changed and expanded, but this book is not dealing with those aspects of the subject.

Its greatest shortcomings lie in what it leaves out; the world view of the kind of people interested in reading this book now includes the concept of global communication through the Internet, and that is missing from this book. The basis of the Internet, as we understand it, was in place at the time of the book's publication, but not an aspect of everyday life, as it is for many of us today. In addition, Lebow's look at the future fills less than a page and a half, makes a few vague, very safe predictions, and then essentially concludes that no one can really foresee the future.

The book is well-written, and copiously illustrated with drawings and charts. Although on first reading, some of the technical material may still not make sense to the beginner, much of it is presented in a way that illustrates complex concepts in simple terms. The book would have been greatly improved by the inclusion of a glossary.

In summary, this book fills its purpose well--to lay out for the beginner the underlying principles behind digital technology in computing, sound, and telecommunications. It seems to be unique in doing this, and would be even more valuable if it were updated. It should be very useful as it stands for those wishing to increase their understanding of digital communications.

Pat Ensor (PLEnsor@uh.edu (mailto:PLEnsor@uh.edu)) is the book review editor for TER and Head of Information Services at the University of Houston Libraries. She speaks and writes in a variety of places about electronic information topics.

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Technological Vulnerability

by Thomas C. Wilson

Just as we have grown accustomed to attributing to science the power to resolve most, if not all, of life's difficulties, we often fall prey to trusting technology beyond its abilities--or believing it is far more fail-safe than it actually is. Revisiting cases of failure from time to time can attune us to its frequency and remind us that there is no such thing as a 100% fail-safe system.

In an e-mail conversation with a friend who has served in the military, I was reminded of our oft-blind faith in technology. She shared an experience in which she discovered that a system to sense perimeter invasion had failed in the field--a scary thought since it was a mechanism already deployed in battlefield environments.

As I write this commentary, I am also dialed into a host performing a database load. While this specific host system is fully capable of loading and indexing data, and my home system is agile enough to function as a dumb terminal, there is another system between these two technological wonders--the phone company. Despite the recent replacement of the phone cable from my home to the pole, my phone connection still

suffers from intermittent interference. I have been online for 12 years, in three different states, with two different RBOCs and have experienced the same weakness in the system. Even error detection and correction cannot deal with control and escape sequences generated falsely or outright carrier loss. Yet from what one hears and reads about cyberspace in popular culture--which reflects our shared beliefs--life in the bit stream is serene. Even the vocabulary (e.g., surfing the net) suggests a carefree, non-problematic existence. (I'm just waiting for El Nino to overtake the cyberpopulace.)

About a month ago, my spouse's employer experienced difficulties with an overnight package delivery service. Despite a sophisticated system for tracking packages anywhere in the world, this company was unable to locate two of seven packages sent from Houston to Chicago that turned up in one of their warehouses two days later. Yes, they use barcodes; yes, they have an advanced computer system; yes, they "normally" can track a package within hours to any location in their business districts. But, in this case, the system broke down. (I might add, they weren't helpful at first in resolving the problem. And we're all ready for fully online banking? Yeah, right!)

There you have it--the military, the phone company, and an international business--all of which can spend far more on computing than a typical library, and even they have failures. Some would argue that these cases are indicators of the human element of systems. And indeed, we do influence and participate in the performance of the systems we create. On another level, however, that argument misses the point: systems do fail. Whether the failure occurs in the machine portion or the human portion of the system, it is our blind faith in the power, reliability, and performance of technological systems that is frequently the cause of avoidable misconceptions, unrealistic expectations, and at worst vulnerable, risky procedures and policies.

No matter how much we prepare our systems for fail-safe operation, there are always human beings or other elements of nature that can undo us. Even when we can be prepared, for example by using uninterruptable power supplies to compensate for fluctuations in or losses of voltage, the solutions are only partial (e.g., a UPS provides protection for some limited time period relative to the load on it). Furthermore, these avenues of redundancy come at a cost, often substantial, and they are also systems that can fail. So, deciding what protections to implement is to a large degree a game of chance.

Here again, we have another example of the tradeoffs life presents. To implement and maintain so called "fail-safe" systems costs real dollars, but not all the costs are obvious. Once a system is built to be redundant, it must be maintained as such to remain fail-safe- -perhaps we should coin a new term, "fail-unlikely." Given that some of the most fault-tolerant and reliable machinery also happens to be highly proprietary, it is no wonder that costs to reduce the likelihood of failure escalate. It is also the case that such systems are by design more complex which adds to the overall costs as well.

Beyond these very explicit expenses, I am most concerned about hidden costs which take a form other than real dollars. When we begin to believe that our creations are more reliable than they are, we not only run the risk of becoming out of touch, we also create a PR dilemma with the people we serve. They will hold us accountable, rightly or wrongly, for the systems to which we provide access and on which we depend for our services. We must have our technological feet on the ground and present realistic pictures, metaphors, and debates that encompass the game of chance we all play.

Some libraries have avoided getting caught in this tradeoff up to now. As our organizations increasingly depend on technological solutions as a necessary component of their existence, these vulnerabilities will become unavoidable. Some people have used this inevitability as grounds to argue continued allegiance to out-moded operations. It seems easy to react to these issues by appealing to solutions of another day. The

challenge comes when we seek a balance between the oft-oversold wonders of a solution and the inherent risks of any system, computer-based or not. Libraries cannot afford to disregard technologies in the marketplace; nor can they afford to invest in the snake-oil found there as well.

So, are you practicing safe computing?

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CALL FOR REVIEWERS--TELECOMMUNICATIONS ELECTRONIC REVIEWS

Telecommunications Electronic Reviews needs qualified reviewers for all types of resources related to telecommunications. TER is an e-journal published by the Library and Information Technology Association division of the American Library Association. Here's your opportunity to get in on the ground floor with a publication that fills a vital role in making information resources on telecommunications widely accessible.

The primary function of TER is to provide reviews of and pointers to telecommunications and networking resources, both print and electronic. Resources reviewed include books, articles, serials, discussion lists, software, software sites, training materials, bibliographies, and other items of interest to professionals dealing with networking and telecommunications, primarily related to libraries and information centers.

The topics covered may include, but are not limited to, specific telecommunications and networking technologies; hardware and software; network operating systems; network applications; management tools and utilities; technical management issues; training and personnel issues; organizational, regional, and national networking; library perspectives; and research and development.

If you are interested in being considered as a reviewer, please send a brief resume which speaks to your qualifications in this area, samples of your writing, and information about which topics and material formats you'd like to review. You may email this to Tom Wilson, TWilson@uh.edu (<mailto:TWilson@uh.edu>), or to the appropriate editor from the following list.

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