
Mediating between technological determinism and indifference.

Confessions of a Gardener: A Review of Information Ecologies

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Abstract

This review of Information Ecologies places the text in the mediating tradition that seeks a middle ground between rigid technological determinism and indifferent value neutrality. The biological metaphors for situated technology use make interesting reading, but the stories may not be compelling evidence that users really can shape technological change from the local level.

H.5.2 Information Systems—information interfaces and presentation, user-centered design

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Information Ecologies: Using Technologies with Heart by Bonnie Nardi and Vicki O'Day (1999) appealed to me for two reasons I suspect the readers of this journal will value. The first reason was the authors' efforts to theorize and demonstrate how users and the situated contexts of technology use actively shape technology. This effort, as I will argue below, meshes nicely with several important lines of thought advanced by documentation specialists, technical communicators, and rhetoric scholars. The second reason this book appealed to me might be a bit more confusing before you read the book. Put simply, I am a "gardener." Though I never would have known had I not read Nardi and O'Day's chapter nine. Now that I have, I wonder if technical communicators—and documentation specialists

in particular—aren't all aspiring gardeners of one sort or another? I'll leave the gardener question, which will take some explaining, for the latter part of this review. Allow me to begin with the first appeal the book held and we'll arrive at the "green thumb" portion of the review in due course.

An information ecology is a user-centered model of technology use and change

In laying out their ecological theory of technology, Nardi and O'Day highlight the roles of those in technology-rich contexts who occupy the middle ground between general knowledge about technology and domain specific knowledge about specialized practice. These folks, seen as "keystone species" in the information ecologies documented by the authors, are those best positioned to connect with end-users in a technology context and they are frequently the source of changes in work practices that must accompany shifts in technology. In chapter seven, for example, research librarians in two corporate libraries are shown providing services ("information therapy"), employing strategic expertise in executing searches, and building relationships among users in an effort to maintain healthy information ecologies. It's not too difficult to recognize, in Nardi and O'Day's discussion of research librarians as a keystone species, an argument similar to the one advanced by Doheny-Farina (1992). Doheny-Farina places

technical communicators at the center of project teams whose goals, in the information age, lie in a complex of transactions he calls “technology transfer” rather than in the simple production and sale of technical goods. Locations where technology transfer is routine might be called information ecologies.

The term “information ecology” names the central metaphor around which Nardi and O’Day build compelling localized narratives, drawing on their own ethnographic research of technological change. Adopting the concept of a biological ecosystem, Nardi and O’Day turn their attention away from technology design as the primary location for beneficial technical change and focus instead on contexts of situated use.

This move creates, on the one hand, a useful lens for examining the ways technology contexts are complex and varied, a feature that allows Nardi and O’Day to argue convincingly for technical biodiversity. On the other hand, the ecology metaphor tends to obscure the question of agency in technological change. The metaphor attributes a certain level of local influence to users, while reserving a significant, though unexamined influence, for technology designers who are assumed to be long gone by the time new technologies are on the ground in information ecologies. The book is also somewhat uneven in the depth of its treatment of the case studies in chapters seven through eleven, which are its main illustrative fuel. Nonetheless, *Information Ecologies* adds significantly to the conversation about technological change that is increasingly at the center of our disciplinary interests. To put the book into perspective, I found it helpful to see it alongside similar contributions to “alternative” discussions of technology that have gained popularity among technical communication scholars recently.

An information ecology describes a space between technical determinism and neutrality

The alternative discussions of technology that I am talking about, (see Andrew Feenberg,

1991, and Shoshana Zuboff, 1988) usually go something like this: There is a third space that lies beyond or perhaps between the two most prevalent modes of thinking about technology. The first of these is the idea that technology amounts to an inevitable future (utopia or dystopia, depending on the theorist). The second mode suggests that technology is politically and culturally neutral. Prevalent in both of these views is the assumption that technological development is largely beyond the control of most people who use, consume, and seemingly desire ever more sophisticated technologies.

In the third space, though, technology is not so determined, nor is it unconnected from social values. In the third space, technologies themselves become more than mere artifacts, comprising the systems of values and patterns of use that animate and give them significance. Technological development in the third space is more situated in and influenced by local contexts; it is seen to involve a process of exercising various levels of social as well as technical influence. The expertise and agency needed to produce favorable technological change exists and is exercised regularly in these local contexts, and not exclusively by technology designers and managers. Expertise and agency is present and available to users. How it is to be exercised, and indeed how change ensues from localized action, is the question Nardi and O’Day attempt to answer by turning to the idea of an information ecology.

As contributing theorists of this third space of technological development, Nardi and O’Day are advocates of the participation of users in technology design. The crux of their argument is that when we look, in careful and systematic fashion, at technology as it is used in specific local contexts we can identify important strategies for participation in technological development by those users most invested in the activity of those “information ecologies.” The ecosystem model represents, for Nardi and O’Day, a compromise position compared to what they consider to be the overwhelming

pessimism of technology critics such as Jacques Ellul who espouse a system view, and technology apologists such as Bill Gates who proudly assert the inevitability of a utopian technological future. Nardi and O'Day reject both of these extremes as too deterministic at the local level, fueled by a "rhetoric of inevitability" rather than by a close examination of the day-to-day reality of technological contexts.

Information ecologies are views of technology from the bottom up

In order to develop their third position, Nardi and O'Day offer a definition of an information ecology as "a system of people, practices, values, and technologies in a particular local environment." This definition allows Nardi and O'Day to borrow several important features of biological systems that apply to information ecologies. Each of these are further illustrated by the case studies in chapters six through eleven:

- Information ecologies exhibit diversity, consisting of varied components in varied relationships.
- The components of an information ecology continuously co-evolve.
- Technical artifacts in an information ecology are localized, having a unique place and name/identity suited to the specific conditions of use in that ecology.
- As living systems, information ecologies rely, in varying degrees, on keystone species which help keep the system in balance.

I found the features above, as demonstrated by Nardi and O'Day in the case studies, valuable because they address the types of professional relationships technical communicators find themselves in these days. The parallels are indirect, as none of the case studies examines technical communicators specifically. The case studies do represent a variety of technology contexts, however, including two elementary and secondary schools, a teaching hospital, and several corporate contexts including an architectural design firm and the aforemen-

tioned corporate libraries. The idea of an information ecology that emerges from these cases is in concert with several arguments about technology and technological development in the information age that help locate the value of technical communicators. One of the more important points of convergence is worth highlighting here. It might be stated this way: information ecologies reflect an acknowledgment of the fluid boundary between technology use and technology design.

In his book *User-Centered Technology*, Johnson (1998) takes as his point of departure the concept of the "mundane" contexts of technology use, turning the logic of the ordinary and everyday use of technology around to face outward in an effort to show how the situated expertise of users can be a powerful force for technical change. Johnson's rationale for this move includes a move technical communicators should find endemic to their practice in designing effective documents: championing an "audience centered" rather than a "writer centered" view of technology. Nardi and O'Day also advance an "audience centered" view of technology by focusing on the mundane, the everyday, and the routine.

In chapter eight, for example, Nardi and O'Day describe an information ecology that grew up around an educational MOO called Pueblo. The MOO project was coordinated by faculty at a Phoenix, Arizona, area college and included participants from an ethnically diverse elementary school in Phoenix, researchers at Xerox PARC in California, and senior citizens from the Phoenix area. And while many of the arguments for the educational value of the MOO space are conventional in discussions of MOOs in the field of computers and composition—that the writing activities are more "authentic" due to a real audience, for example—Nardi and O'Day make an important new argument. They suggest that the ability of all participants—from the youngest children to the seniors—to actively shape the MOO community is the primary reason for the overall health of Pueblo as an information ecology. It becomes clear that, whoever may have originally

designed the MOO software for Pueblo, its most adaptive feature is the fact that its day-to-day users extend, reshape, and even negotiate limits for the use of the software.

This is a useful lesson about the value of user participation, particularly where information technologies are concerned. In our networked world, the value of information technologies exist in their nature as systems of potential connections. Local networks, hypertext, and the web are made up of such connections. As such, the value of these technologies are realized only when connections are made, remade, reinforced or even denied by users. In developing the idea of the information ecology, Nardi and O'Day provide a useful model for the study of the nature of user participation in what we might call "technologies of connection" that must remain unfinished until, in the mundane course of everyday use, they are brought to completion by users.

Information ecologies are tended by gardeners

Perhaps the most compelling case study in the book is also one of the least developed. In chapter nine, Nardi and O'Day pull together data from two different studies completed by Nardi. One examined spreadsheet users and the other CAD users in both small and large accounting and architectural firms. Because the full elaboration of both studies is well beyond the scope of the chapter, the ethnographic account falls far short of "thick description." But the fascinating common feature of both studies that is the focus of the chapter is the emergence of the role of the "gardener," or the person in each context whose primary role was to nurture the growth of specific technologies within that information ecology. Often, this role was informal in terms of the organizational structure of the workplace. Put simply, a gardener is a person who knows and likes technology, an insider to the specialized knowledge of a given discipline who is also the "go-to" for technology questions. In the contexts Nardi studied, a gardener was a person

who knew the CAD package inside and out, knew how to play a spreadsheet like a well-tuned harpsichord, could explain to coworkers how to write a macro that could automate a repetitive function, or spent considerable time customizing CAD libraries.

I could relate. I have done a little gardening in my own information ecologies. As a graduate student in an English department, for example, I coded HTML and showed others how they could learn "just enough to get them by," as the request often goes. I helped unravel networking problems, showing colleagues and superiors how to store and retrieve data on a remote volume or send documents to a printer in a different office when their toner cartridge could no longer be coaxed into putting out just one more page.

According to Nardi and O'Day, gardeners are those who can translate the specialized knowledge of a given domain of work into the language of that domain's technical tools and vice versa. In Nardi and O'Day's words, gardeners "bridge the specifics of the domain, with its unique problems and challenges, and the capabilities of the tools used in the domain." If you are a documentation specialist, this should sound not so much like a fascinating new discovery as it does your job description. In an age where the specialized "tools" of just about any discipline or work domain are information appliances of one sort or another, technical communicators routinely serve as gardeners. If we consider writing and other forms of communication to be core technologies of information ecologies, it should come as no surprise that technical communicators do a lot of gardening. What is surprising is the ways the value of gardeners can be all but invisible, leading companies to downsize the insider expertise that is the best fertilizer for growing their information ecologies.

Information ecologies are attractive, but not perfect models of technology change

As a teacher and researcher who divides my time between technical communication

and human-computer interaction, pursuing both as rhetorical enterprises, I am drawn to discussions of technology and technological development that present a rhetorical view of technical invention. I value discussions that recognize the fact that the value of technical

artifacts in the information age is all but eclipsed by the value of the information they are surrounded by and help to produce. There is certainly a political component to my desire for such theories of technology: it is only in these types of discussions, for example, that the expertise of the usability researcher is on par with that of the product engineer. And only in these discussions can the malleability of networked technologies—their fundamental nature as systems of potential connection, unfinished until conditioned by sustained patterns of contextualized use—be seen as a kind of setting for localized invention in a way that values the expertise of those who develop, observe, and document work practices.

But my interest in such discussions is not limited to the sense of satisfaction one gets when the particular brand of technology theory one adheres to is espoused, yet again, by researchers in a different discipline. In fact, my interest is more accurately self-doubt than self-assurance. My interest in what might be termed “alternative” technology theories tends to focus on the evidence researchers such as Nardi and O’Day draw upon first to reach and then to validate such theories; this evidence is typically found in the very specific work practices and contexts of technical communicators, librarians, and other keystone species. And yet the stories that emerge from the observations, interviews, and analysis of researchers such as Nardi and O’Day often fall short of convincing me that there is indeed sufficient local expertise, power, and possibility to spur technological change. As

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a technical communicator, I am often well-positioned in “alternative” accounts of technological development. But this technical communicator seeks compelling evidence that might convince those traditionally recog-

nized as decision-makers in technology design and development that their responsibility is also shared by groups of stakeholders generally regarded as “non-technical.” It is for this reason that I seek out alternative discussions of technology such as the one pursued in *Information Ecologies*. And I am happy to note that is, in fact, a source of some the evidence I seek.

There are many valuable things to take away from the book, including the idea that a process of critical questioning based on the criteria for a healthy information ecology should precede major decisions about technological change in a given community. An elaborated list of such critical questions is presented in chapter six. Another important idea is the subject of chapter eleven, which describes a dysfunctional information ecology comprising the neurosurgery unit of a large teaching hospital. The moral of that story emphasizes the value of diversity in information ecologies, prompting us to consider how introducing new technologies into established information ecologies might disrupt the balance of social roles played by the various people in those ecologies.

There are important questions raised by the book as well. The chapter on gardeners, for example, suggests that we should consider the value of insider expertise before we accept the outsourcing of “gardening work” as a viable strategy. Might it be more valuable, for example, to recruit technical communicators and to see them as keystone species in the information ecologies of high-tech workplaces than to hire them as independent contractors or consultants?

Finally, there are a few problems with the book. I save these for last not because they are minor, but because they are best seen as cautions to potential readers. I present them here in brief:

- The authors are reluctant to explore the limits of the ecology metaphor as it has been imported from biology and evolutionary theory. No doubt, one of the assumptions the authors attempt to overturn in the book—the idea that technology is an inevitable march of progress—is subtly reinforced by the alignment of information ecology with biological ecosystems. There is little in the “survival of the fittest” doctrine of evolutionary biology to reconcile it with the argument that forms the subtitle for the book: using our hearts as well as our heads to make technology decisions. On the other hand, evolution and ecology are nicely aligned with capitalism and the market, making the metaphor all too effective.
- There is also too little attention paid to the social and economic conditions which make local information ecologies work the way they do. The authors efforts to focus on the users rather than the designers, policy makers, and funding agents who shape information ecologies are laudable. However, their argument about how change happens in these contexts relies too simplistically on the “commitment” and “local influence” of users, ignoring powerful cultural and economic conditions that limit users abilities to exercise

influence. The authors suggest that such critiques are already extant in the work of technology critics such as Jacques Ellul and Langdon Winner, but their failure to address the specific ways users may be marginalized in the five cases they examine can not be written off so easily.

Despite these shortfalls, I recommend the book to anyone interested in the discussion of technological development and particularly to those who have a stake in user participation in technical change. The book is very readable and appeals to a broad audience; the authors are careful to explain concepts in plain language and to surround their arguments with many specific examples. It’s a book for the casual user as well as the gardener, and it should prove useful in a variety of real-world discussions about technology.

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