The Truth Is Not Out There: An Enacted View of the "Digital Economy"

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Our title—with apologies to all *X-Files* fans—is intended to signal the key message of our chapter, which is that in many discussions of the digital economy in both the popular press and academic circles, there is a tendency—rhetorically and theoretically—to objectify "the digital economy," to treat it as if it were an external, independent, objective, and inevitable phenomenon, literally something "out there." We believe that such ways of conceptualizing the digital economy are inappropriate and misleading. In contrast, we want to suggest that the digital economy is nothing more or less than a social production—a product of our own making. As such, it is most certainly not "out there," but emerges in complex and nonlinear ways from our ongoing efforts, energies, and enterprises, both individual and collective. The digital economy is a phenomenon that we are, literally, enacting—that is, bringing into existence through our actions—everyday and over time. These actions are taken by us both individually and institutionally, as governments, communities, vendors, public and private organizations, workers, managers, consumers, citizens, hackers, pundits, lobbyists, and policy makers. We thus have the opportunity, the challenge, and, perhaps more importantly, the responsibility to shape this phenomenon in ways that reflect what it is we want—for ourselves, our organizations, our communities, and our economies.

In this chapter we consider the phenomenon now called "the digital economy" from a microsocial and organizational change

perspective. Rather than focusing on market forces or technological infrastructure (the basic components of a digital economy conceptualized as "out there"), we start with the assumption that organizational practices play a key role in creating and sustaining this phenomenon. As organizations invest in new technologies, use them to internetwork with other organizations, and implement new cross-boundary work practices and processes, they literally enact the digital economy. Considering the critical role of organizations in carrying out these activities, we were surprised to find that there has been little systematic research on the relationship of internetworking to organizational change processes. We argue that such a research agenda is critical if we are to begin shaping and directing the digital economy to reflect our aspirations and values.

In the next section of this chapter, we discuss some of the lessons learned from prior research into technological change in organizations and discuss their relevance for understanding the digital economy. We then examine what we currently know about the role of organizations in the digital economy, and we conclude by considering some research questions raised by taking an enacted view of organizations in the digital economy.

Thinking about the Digital Economy

At some time in the past 40 years, most organizations in the industrialized world have computerized significant aspects of their work processes. Under a variety of mantles such as manufacturing resource planning, office automation, computer-supported cooperative work, supply-chain management, and virtual integration, organizations continue to invest in information technology. Each wave of technology brings with it a new set of technological artifacts whose design and use are informed by the organizational problems of their era, the current expectations about their value and function, and the processes through which they are appropriated into organizations. Each wave is usually associated with rhetoric about the potential impacts, both positive and negative, of the new technologies (Iacono and Kling 1999; Wiener 1954; Yates 1999).

Much of the rhetoric following the advent of the digital economy has highlighted its apparently transformative nature. For example,

Cairncross (1997, p. 119) writes that "The changes sweeping through electronic communications will transform the world's economies, politics, and societies," and even lead to "world peace." Shaw (1999, pp. 15–16) similarly predicts that the digital economy will lead to "plug-and-play inter-operability and modularity, customer-centric, friction-free, global supply-chains. Cairncross (1997), Dyson et al. (1996), and Toffler (1980) all predict that geographic distance will be "obliterated" by the availability of electronic communications to connect globally distributed institutions and people.

Such broad predictions are useful in encouraging new ways of thinking about these new phenomena, and they may mobilize some organizations, individuals, and even governments into action. They become problematic, though, when they are taken literally, because they mislead on two counts. First, they mislead on a factual level in the sense that generalized, "transformative" predictions are rarely accurate. Consider the following "death of distance" prediction made in 1847 by a U.S. congressman trying to convince his colleagues to fund the development of the telegraph (Davis 1997, p. 10, emphasis added):

> The influence of this invention on the political, social and commercial relations of the people of this widely extended country will of itself amount to a revolution unsurpassed in world range by any discovery that has been made in the arts and sciences. Space will be, to all practical purposes of information, *annihilated* between the states of the Union and also between the individual citizens thereof.

The history of such predictions should have taught us that we cannot predict, with any accuracy, the social, economic, and technological changes and consequences likely to accompany unprecedented shifts in ways of working and living. We should not expect that today's pundits and technology advocates will be more prescient than their predecessors.

Second, sweeping predictions mislead on a theoretical level. That is, the promise of friction-free supply chains, obliteration of distance, and world peace creates the impression that the digital economy is an external and independent set of (largely) technological forces, from which individuals, organizations, and economies will necessarily reap significant benefits. Such conceptualizations do not take into ac-

count the difficult and often precarious process of realizing predicted changes. Decades of research on technological change in organizations have taught us that implementing change is a profoundly complex and uncertain endeavor (Attewell and Rule 1984; Carley 2000; Kling and Lamb 2000; Markus and Robey 1988; Orlikowski 1996). Not only is success not guaranteed, but significant unintended consequences are likely to occur.

The predictions embedded in the contemporary discourse about the digital economy reflect two particular and long-standing approaches to the relationship between technology and organizations: (1) technological determinism and (2) strategic choice (Markus and Robey 1988). Research on earlier technologies has shown that these approaches are not effective ways of understanding how organizational change processes are related to new technologies (Kling and Scacchi 1982). We do not expect them to be particularly effective here either. We shall therefore propose an alternative approach, which we call an *enacted* view. We briefly discuss each theoretical approach below.

Technological Determinism

This approach posits technology to be an external, largely independent phenomenon that determines or forces change in the social system (Marx and Smith 1994). Given this assumption, determinists focus on measuring and modeling the changes caused by technology, so that future changes in social systems can be predicted (Attewell and Rule 1984). Historically, predictions made about technological impacts have varied over time as well as by kind of technology being examined. From the late 1950s through the early 1970s, it was predicted that the use of mainframe computers in large hierarchical organizations would increase centralization and managerial authority, eliminate middle management, lead to massive work automation and job loss, and increase worker deskilling (Blauner 1964; Leavitt and Whisler 1958; Zimbalist 1979). In the 1980s and early 1990s, it was predicted that extensive internal computer networking and the rise of personal computing would increase decentralization, improve information sharing, and expand collaboration (Applegate et al. 1988; Giuliano 1982; Huber 1990). In the mid to late 1990s, with the exponential growth in the

use of the Internet and the World Wide Web, predictions have been made about technological causes of transformations in markets—toward "friction-free" electronic commerce (Bakos 1998; Martin 1996; Shaw 1999)—and in organizations—toward "virtual," networked forms of work and governance (Davidow and Malone 1992; Mowshowitz 1997; Turoff 1997). Empirical work on new technologies and organizational change over the past three decades has not supported such a simple, deterministic model. Instead, researchers have found, for example, that the same technology implemented in different organizations can result in different practices and outcomes (Barley 1986), that the implementation of a new technology does not necessarily mean that it will be used or that use will occasion the benefits or intentions of the designers (Orlikowski 1992), and that different social groups can conceptualize the same technology in different and often contradictory ways (Iacono and Kling, 1999).

Strategic Choice

The second common approach to technology posits it to be a malleable resource that can be put to a variety of uses (with a range of effects) depending on managerial or organizational strategies, ideologies, and political dynamics (Child 1972; Daft and Lengel 1986; Noble 1985; Thomas 1994; Zuboff 1988). This approach suggests that we should focus on identifying the motivations, objectives, and interests of relevant players as a way of predicting particular changes and outcomes. Commentators working from a rationalist position portray managers as making choices about which technologies they will purchase through strategic alignment of the technology's characteristics with their organizational environments, and then deciding who in the organization should use them for specific "value-adding" processes or tasks. The assumption is that the choice of the product (e.g., a new flexible or collaborative tool) determines the outcomes (e.g., more flexible or collaborative work practices). Commentators working from a labor process perspective see managers deploying technology with the intent of controlling and deskilling workers, thus decreasing corporate reliance on human labor and skills.

In both cases, commentators share the strategic choice presumption that managers rather than users are the key actors in shaping technology to particular organizational or economic ends. In fact, however, once a new technology is deployed, developers and managers often have little control over how specific workgroups and teams will use it. Instead, users shape the technology to their own needs—for example, by developing "workarounds" (Gasser 1986), by only using the most basic features (Bullen and Bennett 1991), or by improvising with the technology to generate new uses (Mackay 1988; Orlikowski 1996).

Enacted Approach

An alternative approach to understanding the relationship between technology and organizations is to see this relationship as an ongoing sociotechnical production. It is through our actions, both individual and collective, and either deliberate or not, that outcomes associated with technological change emerge. Technology in this view is neither an independent, external force completely outside of our influence, nor a fully malleable resource that can be thoroughly controlled and bent to our will. Rather, the organizational changes associated with the use of technologies are shaped by human actions and choices, while at the same time having consequences that we cannot fully anticipate or plan. This approach we term an *enacted* view.

An enacted view represents a historical and proactive stance with respect to the world. Its strong focus on human agency (Giddens 1984) leads to the core assumption that the economic, institutional, infrastructural, technological, political, and social arrangements that shape our lives don't exist "out there" as part of nature, nor are they imposed on us by the will of the gods or a brilliant leader. Rather, they are equally shaped by our actions, individual and collective, intended and unintended.

This view suggests that the digital economy is neither an exogenous nor a completely controllable phenomenon, but an ongoing social product, shaped and produced by humans and organizations, and having both intended and unintended consequences. It is our individual and institutional actions in developing, constructing, funding, using, regulating, managing, supporting,

amplifying, and modifying the phenomenon we refer to as the "digital economy" that enacts it over time.

Implications of Using Technologies in Organizations

Given the fundamental role of technologies in the digital economy, it may be instructive to review some of the lessons learned in three decades of studying technologies in organizations. While the findings have often been tied to specific contexts, particular time periods, and certain types of technologies, they have also yielded deeper and more general insights about the nature of technologies, their use by people in organizations, and resulting outcomes. These insights, which we have grouped into three clusters here, should aid our understanding of the digital economy.

1. Technology Is Social, Dynamic, and Multiple

Technologies—whether hardware, software, networks, or techniques—are human artifacts, produced through a social process of design, development, and maintenance. As such, their form, function, and operation reflect the interests, assumptions, values, objectives, resources, materials, and skills of their makers. Thus, technologies are not neutral, objective, or independent; they are social because they are constructed by people.

Technologies are also dynamic. Even after a technological artifact appears to have solidified, with the discourse around its functions and features apparently having reached "closure" (Bijker 1997; Pinch and Bijker 1984), the stability of the actual artifact is still only provisional. It is provisional because new materials might be invented, different features might be developed, existing functions may fail and be corrected, new standards could be set, and users can adapt the artifact for new and different uses (Mackay 1988; von Hippel 1988). Technologies are thus never fully stabilized or "completed," even though we may choose to treat them as "black boxes" for a period of time. By temporarily bracketing the dynamic nature of technological artifacts, we assign a "stabilized-for-now" status (Schryer 1993) to our technological products. Such bracketing is an analytic and practical convenience only, because technological artifacts continue to evolve, are tinkered with (by

users, designers, and regulators), modified, improved, rebuilt, etc. Typically, such change is not predetermined or predictable, but implemented by people influenced by competitive, technological, political, cultural, and environmental forces (e.g., feature wars with competitors, privacy or decency concerns, technological innovations, security legislation, climatic conditions, earthquakes, poor maintenance).

All technologies are thus social and dynamic, produced by people over the lifetime of their use. This applies, in particular, to contemporary internetworking technologies. For example, the World Wide Web (WWW) was first proposed in 1989 by Tim Berners-Lee of CERN as a hypertext, networked system for sharing information within the high-energy physics research community. No one, least of all its inventor (Berners-Lee 1996), envisioned the changes associated with this technology. Planned and designed as a particular artifact for a particular community, the WWW was taken up by other individuals and communities, used in different ways, and adapted, enhanced, and expanded to accommodate those differences in use and community. Today, the WWW continues to be adapted, enhanced, and expanded by individuals and organizations around the world.

Technology is also multiple. It does not consist of a single thing but is typically a multiplicity of tools and a variety of different configurations of often fragile and fragmentary components. In addition, the interconnections among these components are only partial and provisional, and they need bridging, integration, and articulation in order to work together. We have a tendency to talk of technology, systems, and networks as if they were wholes—monolithic, uniform, and unified. For example, we talk about "the Internet" or "the Digital Economy" as if these were single, seamless, and stable—the same at every time and every place, always operating, flawlessly connecting everyone, anytime, anywhere. While such simplifications make it easy to talk about new technologies, they also mislead because they obscure the many ways in which technologies are not fully formed, coherent, integrated, and dependable, and the many ways in which they may and do break down, wear down, and shut down.

In our talk and visions we tend to focus on the apparent solidity and sensibility of the technological artifacts to which we have

assigned rhetorically powerful and provocative labels. But in focusing on coherent labels, we can lose sight of the multiplicity of components that need to work together to produce the artifacts we can name (e.g., hardware devices, software applications, middleware, telecommunications, interfaces, training services, access protocols, business models, and workflow processes). These components are far from unitary, unified, or uniform. They are often characterized by brittle interconnections and complex interdependencies. And we should have no illusions that such multiplicity and connectivity will disappear. On the contrary, it is likely to increase as people keep developing, experimenting, and inventing new technologies, evolving components and uses, yielding ever more interfaces, interdependencies, and applications.

The fragility of our multiple, interdependent technologies often becomes salient when a new component needs to be integrated into an existing system, when someone wants to use it for novel purposes, or when there is a breakdown or public protest. For example, many corporations have explicit e-commerce strategies for collecting consumer information and monitoring online activity, in what Culnan and Milberg (1999) describe as the second exchange. When the public finds out about these invasions into their privacy, they often take action (Markoff 1999). Consider the case of Lotus *Marketplace*. When people learned that Lotus Development Company and Equifax Inc., the national credit reporting company, were in a joint venture to market Lotus *Marketplace,* a database that would have contained the names, addresses, and buying habits of 80 million U.S. households, more than 30,000 messages of protest flooded into Lotus Development Company, many of them sent by email (Brody 1992). These actions, which have been called the first "electronic sit-ins," forced Lotus and Equifax to abandon the product.

2. Technology Must Be Used to Have Effect, and Such Use Is Varied, Embedded, and Emergent

To be useful, technology must be used, and when we fail to pay attention to what people actually *do* with a technology, we often end up focusing on the wrong thing, such as the artifact itself, its features, or the discourse around it. But technology is not valuable,

meaningful, or consequential until people engage with it in practice. Neglecting the centrality of use leads to simplistic assumptions such as: if people are given technology, they will use it; they will use it as the creators intended; and such use will produce expected outcomes. Such assumptions reflect a "build it and they will come" approach to technology. Research, however, indicates that such fields of dreams exist only in the movies!

Because of simplistic assumptions about technology and its use, many organizations have concentrated resources, attention, and effort on getting the right technologies to the right place at the right time, effectively ignoring "right use." In learning theory, Argyris and Schön (1978) were thinking of this general tendency when they distinguished between "espoused theories" (what we say about how we act) and "theories-in-use" (what our actions reveal about how we act). They note that people are usually unaware of this distinction, and that an important part of learning is recognizing and dealing with it. Similarly, people typically do not differentiate between what we may call "espoused technologies" and "technologies-in-use." *Espoused technologies* refer to our expectations about the generalized use of hardware and software components and the broad discourses associated with their functions and features. *Technologies-in-use* refer to the situated ways in which we actually use specific technological features in particular ways depending on our skills, tasks, attention, and purposes, and varying by time of day, situation at hand, and pressures of the moment.

For example, one study examined the use of the Lotus *Notes* in a multinational consulting firm that had adopted the technology to facilitate knowledge sharing among consultants across the firm (Orlikowski 1992). The managers implementing *Notes* concentrated their energies and resources on installing *Notes* within the firm's infrastructure and on every consultant's desktop. They believed that their deployment of the technology was successful, as measured by the number of user accounts established, the number of servers installed, and the number of databases created. Focusing on the espoused technologies, these managers did not attend much to the technologies-in-use, that is, to what consultants were actually doing with *Notes* in their everyday consulting practice. Such attention would have revealed that consultants were not using the technology to share knowledge, choosing instead either to not use

Notes or to use it only to transfer files or send memos. This consulting firm, like most professional services firms, had a competitive "up or out" career path and individualistic work norms; hence, sharing knowledge through *Notes* with anonymous others across the global firm was countercultural and, not surprisingly, did not happen.

Because technologies-in-use are, by definition, distinct from espoused technologies, we cannot use the features and functions of the latter to predict the former. Consider the HomeNet project, a multiyear research study at Carnegie Mellon University examining the Internet usage of about 100 families in Pittsburgh during their first few years online (Kraut et al. 1998, p. 21). The surprising finding so far is that "Using the Internet at home causes small but reliable declines in social and psychological well-being." Many find this result disquieting, at odds with both popular beliefs and personal experiences. Users of the WELL, for example, a virtual community on the Internet, report quite different experiences. As chronicled by Rheingold (1993), members of the WELL offer each other social ties, friendship, and emotional support. Similarly, Galegher et al. (1998) report intense emotional and practical support offered by online networks of electronic support groups.

How can we explain these differences in experiences with the same technology? One possible explanation lies in the difference between espoused technologies and technologies-in-use. Stories of the WELL and electronic support groups are descriptions of technologies-in-use. The HomeNet project's measures of "Internet use"—number of hours connected to the Internet—reflect espoused technology. They don't tell us what people were actually doing with the Internet and how they were using it—whether they were surfing the web, shopping for books, interacting with friends, participating in an electronic support group, etc. The meaning of the HomeNet results may be less paradoxical if represented in terms of technologies-in-use. Thus, the decline in social and psychological well-being found by the HomeNet researchers may be associated with the specific technologies-in-use (not yet described in the research) generated by 169 people in Pittsburgh, rather than the result of some general and universal "use of the Internet." Other technologies-in-use generated by using the Internet—as suggested by the experiences of WELL users and members of

online support networks—may result in different social and psychological outcomes. Clearly, we need to look not just at the use of technology in general, but at specific uses by particular people in particular times and places. Use of technology is varied, embedded in various contexts, and consequently has a variety of outcomes.

The distinction between espoused technologies and technologies-in-use may also help us make sense of and address the debate that has formed around the existence and meaning of the so-called productivity paradox—the idea that the increased investment in information technology is not yet producing increased productivity. While the force behind this debate has generally been defused due to recent empirical work linking organizational IT investments to increases in organizational revenues (Smith, Bailey, and Brynjolfsson 2000), and the explanation that productivity gains are linked to IT "regime transitions" rather than simple technology substitution (David 2000), we argue that—for organizations—it would be more appropriate and more meaningful to look for returns on the *use* of information technology rather than only for returns on *investments* in information *technology*. Information *technology* per se cannot increase or decrease the productivity of workers' performance, only their *use* of the technology can. This differentiation may sound like semantic hair-splitting, but how people talk has profound implications for how they think and act in the world. By emphasizing technology in their talk, people tend to emphasize *espoused technologies* in their allocation of resources, attention, and measures. And such an emphasis, as our examples of *Notes* and HomeNet showed, typically leads to a neglect of *technologies-in-use*. By not understanding (and supporting) what actually happens at the moment of use, commentators miss the crucial point that it is how people *use* technology in their day-to-day activities—not the mere presence of the technology on the desktop or factory floor—that determines actual effects and work productivity.

Use of technology is also emergent. It typically departs from the expectations of its original inventors, designers, and promoters. Indeed, our own experiences with technology reveal that we do not passively or mindlessly follow the dictates of the machine or its designers' specifications. Rather, we constantly make choices about whether, how, when, where, and for what purposes to use technol-

ogy. When the order entry system slows to a crawl at peak times, we bypass it. If we can't figure out how to program the VCR, we only use it to play prerecorded videos. When we want to use a spreadsheet tool, we learn the basic functions we need and ignore the advanced features. As the Internet keeps evolving, we keep adjusting how we use it as we figure out what is possible (and what others are doing). We are purposive, knowledgeable, adaptive, and inventive agents who engage with technology to accomplish various and changing ends. Where the technology does not help us achieve those ends, we abandon it, or work around it, or change it, or improvise new ends.

People engage artfully with the technologies they encounter in their lives, using them in a multiplicity of ways not imagined at their design and construction (cf. Gasser 1986). For example, in a study of a customer support department's use of *Notes* (Orlikowski and Hofman 1997; Orlikowski 1996), we found that the staff's initial use of the technology to support call tracking evolved over time as they learned more features and experimented with different types of use. Over a period of about two years, the use of the technology had changed dramatically from the initial, simple model of documenting a problem to a more complex model of collaborative problem-solving. Similarly, uses of the WWW have evolved considerably beyond the ones imagined by its inventor (Berners-Lee 1996). From the initial vision of project home pages for high-energy physicists to intranets, extranets, and e-commerce for everyone, we have seen an explosion of emergent and diverse uses. It should be clear, then, that any understanding of technology and what it might mean for organizations or economies must begin with an understanding of how and why people engage with it initially and over time.

3. Use of Technology Has Unintended Consequences

All action in the world, including the development and use of technology, has unintended consequences. Because each of us participates in multiple social systems, our every action can have multiple implications. For example, when we use money to buy a product, in addition to participating in a purchasing transaction, we are reinforcing the prevailing market economy and the legiti-

macy of money to mediate such transactions. Similarly, an unintended consequence of the increased use of the WWW by people around the world is the extension and reinforcement of English (the *lingua franca* of the Internet) as the language of the global economy. Consider, too, how the increased use of technology throughout the economy has had the unintended consequence of increasing vulnerability to technical breakdown and error, manifest recently in the heightened state of anxiety and activity around the Y2K problem and various computer viruses. One such virus—the "Love Bug"—launched on May 3, 2000, attacked an estimated 45 million home, office, and government computers around the world, causing an estimated two billion dollars in damage. One final example of unintended consequences of the global economy is the creation of a new and growing class of workers that Iyer (1998) calls the "business homeless." These are people who jet-lag their way through the world's airports, spending more time on airplanes than most flight attendants, and becoming in the process "glazed nomads" with "decentered souls."

That technology in use always has outcomes not intended or envisioned by its designers and implementers is a central finding of the research conducted over the past few decades on social issues of computing. This finding has been stable across time periods, type of information technology, and social context (Barley 1988; Button 1993; Gasser 1986; Kling and Scacchi 1982; Kraut et al. 1988; Iacono and Kling, 1999; Orlikowski 1992, 1996; Sproull and Kiesler 1991; Thomas 1994). As a result, our studies of and practices within the digital economy should take into consideration not only the possibility but the likelihood that there will be many and various unintended consequences of living and working in the digital economy.

Organizations and the Digital Economy

While little research to date has generated deep understanding of the relationship between organizations and the digital economy, three aspects of this relationship may serve as starting points for developing such an understanding: extent of organizational engagement in the digital economy, rationale for engagement, and nature of engagement.

Extent of Organizational Engagement in the Digital Economy

In the early 1990s, NSF transferred most Internet operations to commercial providers. By 1995, restrictions on commercial use of the Internet were lifted and organizations were increasingly investing in internetworking technologies to interact and connect with other organizations and their customers (National Research Council 1999). Internetworking refers to the use of special-purpose computers or hosts to connect a variety of separate networks for transmitting data, files, and messages in text, audio, video, or graphic formats over distances. For example, organizations exchange email with people outside the organization. They develop web sites to provide online information for external consumption. They build intranets and extranets, and they are shifting some of their operational systems onto the Internet, where many expect the bulk of their future business activities to be conducted. This "net presence" strategy adopted by many organizations constitutes one common aspect of the digital economy.

Today, the Internet is the largest internetwork. As a result of the increasing use of the Internet by organizations, Internet traffic, defined as data flow on the U.S. Internet backbone, has roughly doubled in size each year for the past decade (Guice 1998). Internet traffic and counts of hosts and users are routinely tracked by various monitoring services. In 1981, there were 621 connected hosts. According to recent estimates, over 43 million hosts are now connected (Network Wizards 1999), and 254 million connected hosts are projected by the year 2000 (Matrix Information and Directory Services 1997). One recent survey of the number of people connected to the Internet estimates that there are 163 million users worldwide, with 90 million in North America (NUA Ltd. 1999). A number of surveys have focused on the demographics of Internet users (Hoffman et al. 1996), their attitudes and uses (Chung 1998), and changes in well-being (Kraut et al. 1996, 1998).

Given all this attention to contouring the size, shape, and scope of the Internet in terms of individuals and computers, it is surprising that little attention has been paid to organizations and their connections to the Internet. The only estimates we have are based on figures from DomainStats.com (a database run by NetNames, the company that registers domain names). They report that there

are almost 16 million registered domain names worldwide (a doubling of the numbers in less than one year). Almost 9.5 million of them are registered to commercial organizations (.com domains). Almost one million are registered to nonprofit organizations (.org domains). Almost 6,000 are registered to educational institutions (.edu domains), and over 700 are registered to the U.S. government (.gov domains). While these figures may be seen as rough surrogates of organizational presence on the net, they are also misleading. For example, international domains are registered at the top level by their country of origin (e.g., .ca for Canada, .fr for France), not by their type. Additionally, it is not clear whether domain name registration satisfies legal or even common assumptions about what constitutes an organization. Several organizations might share the same domain name (e.g., if they are subsidiaries), or one organization might have many domain names (e.g., for different divisions). And many domain names are simply registered to individuals who plan to use them or sell them at a later date.

This lack of attention to mapping the presence, power, and performance of internetworked organizations is particularly surprising given that the predominant domain on the Internet is that of commercial organizations and the expectation is that business-to-business transactions will account for the majority of activity in the digital economy. In 1998, $43 billion were spent on e-commerce business-to-business transactions, five times that spent on business-to-consumer transactions. Forrester Research projects that e-commerce business-to-business transactions will grow to $1.3 trillion by 2002, while in that same time period e-consumer business will grow to $95 billion (Tedeschi 1999). Clearly, much research and monitoring of organizational engagement in the digital economy will be necessary to assess its extent, effectiveness, and consequences.

Rationale for Organizational Engagement in the Digital Economy

There are two common answers to the question of why organizations are engaging with the digital economy. The most frequent one is that the Internet has opened up a new marketplace for buying and selling. Rao et al. (1998) argue that there has been a

"stampede of businesses to the Net" as a result of a number of trends: the commercial advent of the WWW in 1994; the availability of user-friendly browsers on many desktops; the tremendous growth in the number of Internet users; and the low marginal costs associated with offering products or services to customers via the Internet. Others point out that by lowering the search costs for alternative products, electronic markets will benefit consumers through greater price competition and lower prices (Elofson and Robinson 1998). Additionally, use of the Internet is seen to open up new markets by moving organizations closer to their customers (Palmer and Griffith 1998). From this perspective, the rationale underlying organizational engagement in the digital economy is based on the resource needs of organizations, expectations of reduced costs and access to new markets, and the availability of cost-effective internetworking technologies.

A variant of this answer focuses less on immediate economic gains and more on issues of long-term organizational survival. Here, engagement in the digital economy is seen to be an essential aspect of a flexible and learning organization. Organizations can no longer learn all they need to know internally (Powell 1996). New ways of gaining information are essential. For example, marketing information can be gained from electronic communities and online focus groups (Kannan et al. 1998). Commercial firms develop partnerships and maintain continuing communication with external parties such as research centers, laboratories, and even former competitors. Because they provide a means of gaining access to new knowledge and a way of exploiting those capabilities for innovation and experimentation, these linkages are seen to be necessary for the long-term economic viability of organizations.

A second type of rationale focuses on epochal social transformations and argues that the United States is shifting from a society where industrial activity and modernist systems dominate to one in which information and postmodern systems will prevail (Bell 1979; Lyotard 1984). Toffler (1980) coined the term "the Third Wave economy" to refer to an economy based on information, reflecting what he sees as the central event of the past century—the death of matter. He and his colleagues posit the inevitability of a Third Wave economy, arguing that Internet connections are nothing less than the first step in the creation of a new civilization.

These two rationales evince the two approaches to technology-based organizational change we discussed above. The first answer, characterized by "strategic choice" assumptions, is grounded in both conventional economic analysis of information flows along value chains (Porter and Millar 1985) and the resource-dependence view of organizations (e.g., Pfeffer 1987). Engaging in internetworking is a strategic choice to enhance organizational performance. The second answer reflects the approach of technological determinism and is based on an assumed causal relationship between the technological infrastructure of an era (e.g., farm implements, factories, and computers) and the organizations, societies, and economies that result. The belief is that inter-networking is imperative given the certain coming of the digital economy.

While these two approaches offer some insight into internetworking processes, they ignore the difficulties of implementing technological change in organizations and the challenges of dealing with unintended consequences. For example, a story in the *Washington Post* (March 6, 1999) describes the dilemma faced by the U.S. government as it tries to keep open channels of communication with its constituencies while also limiting the amount of email received by its employees. In 1999, the Forest Service was swamped by thousands of emails from environmentalists and forest industries. Concerned that the agency's system might crash, Forest Service Chief Michael P. Dombeck announced a policy change, declaring that all email from constituents to Forest Service employees must go through him. We suspect that this story of email overloading the Forest Service workers is not an isolated incident. However, neither strategic choice nor technological determinism is particularly helpful in informing organizations how to respond effectively to the increasing demands of external constituents.

Internetworking has become part of doing business. However, many organizations are struggling with issues of how permeable their boundaries should be, how they will structure interactions with the outside world, how tightly or loosely coupled they should be with various stakeholders, and how exactly to integrate transactions and interactions into their own work practices. Moving beyond these struggles will require extensive experimentation and ongoing research.

Nature of Organizational Engagement in the Digital Economy

The artifacts of internetworking and the ways in which they have been used by organizations have changed over the years. During the earliest period, computer science departments in a few universities across the country and a small number of R&D organizations such as Rand Corporation and Bolt, Beranek & Newman helped to develop the Arpanet. Over time the development of other nets such as NSFnet and Bitnet allowed use to expand to include specific scientific communities. At that point, internetworking was understood as a way for distributed scientists to share distributed resources such as rare scientific instrumentation and large-scale databases or to achieve relatively unrestricted exchange of data and information. By the late 1980s, the use of email to communicate with distant scientific colleagues became popular. Being on the Internet primarily meant access to email for long-distance communication and collaboration. In the early 1990s, such usage spread more generally to public agencies, colleges, and universities. Other Internet services became popular, as did the notion of sharing information across organizations and with the general public.

Today, what it means for an organization "to be on the net" continues to evolve. Starting in 1995, private organizations and political groups in the United States have created WWW sites to advertise and market their products to a larger audience. Increasingly, organizations in countries around the globe are developing their own web sites, and some form of Internet presence has become an obligatory part of doing business in the late 1990s.

At this stage of development and use of the Internet, we can identify at least four modes in which organizations internetwork: (1) communicating via email; (2) generating a web presence; (3) establishing buyer-supplier transaction networks; and (4) creating real-time virtual integration. While some organizations might have one or two capabilities, such as web sites and email, others might employ all of them or be developing new ones. Much research remains to be done on the possible consequences of each of these ways of organizational engagement with the digital economy in terms of such factors as privacy, overload, surveillance, connection, dependence, fragmentation, and isolation. We briefly describe each mode below.

1. *Communicating via Email:* Since 1992, the number of corporate email addresses worldwide has gone from 1 million to 167 million. In 1998, email surpassed the telephone as the most frequently used communication medium in the office. Three billion email messages are sent each day by 100 million users (Yehling 1999). Early studies of email use focused on related changes within a single organization (Sproull and Kiesler 1991) or research community (Hesse et al. 1993; Orlikowski and Yates 1994). We now need to investigate changes in organizational processes and work practices resulting from email use, particularly across heterogeneous, global organizations or virtual communities, and with external constituents.

2. *Generating a Web Presence:* Presumably, most organizations with registered domain names plan to or already have web sites. Investigations into the qualitative aspects of such web sites has just begun. One research project analyzed the "openness" of governmental web sites, where openness was measured by degree of interactivity and transparency (Demchak et al. 1999). Culnan (1999), in a study for the Federal Trade Commission, investigated the extent to which customers interacting with web sites are informed of their privacy rights. The London School of Economics recently conducted a comprehensive survey of corporate web sites, ranking them according to quality and business value (see *The Financial Times,* May 17, 1999). We expect more research on the nature, use, and implications of web sites, particularly as organizations are pressured to produce high-quality sites while also providing significant consumer protection.

3. *Establishing Buyer-Supplier Transaction Networks:* Electronic marketplaces and buyer-supplier networks have received considerable research attention (Bakos 1998). Most of this research focuses on market dynamics, economics, or quantitative shifts in the makeup of industries, for example, rather than on organizational change processes or outcomes. In effect, organizations and their members are transparent players in these depictions of electronic markets. Research is clearly needed to examine the organizational role and consequences of constituting such electronic markets.

4. *Creating Real-Time Virtual Integration:* A more experimental and less common form of internetworking is real-time direct accessibility across organizational boundaries. Research suggests that such

internetworking is particularly challenging for organizations. For example, a recent investigation of telemedicine applications in three Boston hospitals looked at a videoconferencing system used by nurses to conduct presurgery assessment of patients living at a distance (Tanriverdi and Iacono, 1999). The researchers found that while the technology was easy to install, it was difficult getting people to collaborate and coordinate their activities on a regular basis. This confirms the well-established research finding that simply having technology in place is no guarantee of effective use. In this case, having technology available for interconnecting across hospitals did not ensure that interorganizational processes were integrated. Also necessary were new strategies, protocols, roles, and management techniques for working together across organizational and functional boundaries.

Despite the predominance of commercial, for-profit organizations on the Internet and their predicted role as major players in the digital economy, we do not have good understandings of who these organizations are, the change processes they are undergoing, the kinds of uses they make of the Internet, and what the consequences of these changes are for their members. We also do not know which organizations are not connecting and why, and what types of challenges organizations face when attempting to participate in the Internet. What it means for organizations to "be on the Internet" will also evolve as new technologies, business models, regulations, laws, and organizational processes emerge. Further research on various modes of internetworking is necessary if we want to be able to guide the evolution and emergence of the digital economy.

Suggestions for Future Research

We have argued that it is organizations (and the people in them) that create the digital economy as they develop and implement internetworking technologies and new organizational and interorganizational practices. We have also argued that these processes are not well explained by technological determinism or strategic choice. Consequently, we propose that an enacted perspective on the digital economy may be particularly useful. Taking

such an enacted view seriously leads to a number of implications for our understanding of organizations in the digital economy. First of all, it eschews any notion that either technology or the economy is an unstoppable, independent, or deterministic force, outside the control of social institutions and individuals. It also eschews any notion that we can control, predict, or precisely model what the digital economy will be and what its organizational effects might be. The enacted view therefore suggests that in assessing the future of organizations in the digital economy we should start with three assumptions: (1) time-, context-, and technology-specific generalizations will be most useful; (2) as knowledgeable human agents, we can choose how and why we use internetworking technologies, thus significantly influencing the shape and consequences of the digital economy; and (3) we need to answer the question, what sort of digital economy do we collectively want to create?

We propose that research into the relationship between the digital economy and organizations should include programs that will explore, experiment, track, investigate, and detail the variety and complexity of technology-based organizational change and their socioeconomic consequences over time. Three arenas of investigation seem particularly important.

Research on the Role of Organizations in the Development of a Digital Economy

This program of research will attempt to document and identify why and how organizations are connecting to the Internet, both quantitatively and qualitatively. That is, we need to collect indicators over time of how many and what types of organizations are connecting to the Internet and how, as well as which organizations are not connecting and why. We also need to examine the social and technical challenges and opportunities that organizations face as they begin to internetwork. And we need to understand, through in-depth field studies, what it means for organizations to be internetworked, that is, what are the consequences—intended and unintended, initial and ongoing—of internetworking, for organizations, members, and communities.

Research on Social Transformations within and across Internetworked Organizations

This program of research will focus on the kinds of changes being enacted within and across organizations as they internetwork. Of particular interest is understanding and classifying the range of work processes associated with internetworking, and the implications of tighter and looser coupling with stakeholders such as workers, customers, partners, regulators, suppliers, and citizens. The example of information overload experienced by the Forest Service is just one of many difficult issues facing organizations as they attempt to engage in the digital economy. Others include whether and how to integrate data, information systems, and local work practices with those of customers, suppliers, and alliance partners, all of whom may have different standards, protocols, traditions, demands, incentives, and work processes, and how much organizational information to share with various stakeholders and the public. As various social changes are implemented, new kinds of roles, skills, capabilities, challenges, and processes are likely to emerge, and these need to be examined along with the personal, organizational, and economic implications. For example, what does it mean to work in an internetworked organization? What are the social, cultural, and personal implications of working this way? What are the changes in quality of life for people who work in internetworked organizations? And what are the unintended institutional consequences of new ways of organizing in the digital economy?

Research on the Development and Use of Internetworking Technologies

This program of research would examine the types of internetworking technologies developed for the digital economy and consider how they are being used by various organizations. It would attempt to identify differences in use and outcomes associated with a variety of internetworking technologies, as well as when, where, and why these technologies are used within and across organizations. Such new uses will create important new challenges

for the users of internetworking technologies, and we need to understand how and in what ways more or less effective uses emerge and are sustained or modified over time. New internetworking technologies and uses will put new demands on existing technology departments, and these need to be investigated. In addition, we currently have a plethora of yet-to-be-invented component technologies that will need to become part of the internetworked infrastructure of the digital economy. How this multiplicity of internetworking technologies will work together, which (if any) configurations will dominate, which social values will be embedded in them, and how organizations will deal with increased access to their people and systems are all important empirical research questions.

The digital economy is a phenomenon that is embedded in a variety of different social and temporal contexts, that relies on an evolving technological infrastructure, and whose uses are multiple and emergent. As a result, research studies will yield not precise predictions—because that is not possible in an unprecedented and enacted world—but underlying *patterns* of socioeconomic implications of working and organizing in various digital ways in different contexts. Similarly, research studies will offer not crisp prescriptions—because these are unhelpful in a dynamic, variable, and emergent world—but general *principles* to guide our ongoing and collective shaping of a digital world. Influenced by an understanding of patterns and principles, research can help to engage all of us in a dialogue about what future we want to invent.

Conclusion

While an enacted view recognizes that the digital economy, as a complex, emergent phenomenon, is not precisely predictable or completely manipulable, it does not suggest that we are powerless. Quite the contrary. By recognizing how our energies and efforts, interests and innovations, visions and values produce the nature, form, features, and effects of this digital economy, we can see how we might shape this phenomenon in new and effective ways. There is a well-known saying that the best way to predict the future is to invent it. As we invent the digital economy, we also have the

opportunity to design experiments, prototypes, and research studies, as well as to engage in discussions and dialogues about our invention and its socioeconomic implications, so that we can continue to learn from and influence the worlds we are creating.

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