Managing Use not Technology: A View from the Trenches
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Every year many billions if not trillions of dollars are spent on information technology in corporations world wide. I study what people actually do with all those technologies once they have been purchased and installed. And from my view in the trenches, the recent talk about the "productivity paradox" (that the increased investment in information technology is not yet producing increased productivity) is missing a central and simple point -- that expecting any return on information *technology* may be part of the problem. What we should be looking for instead is a return on the *use* of information technology. Information technology per se can't increase or decrease productivity, only use of it can. This may sound like semantic hair-splitting, but how we talk has profound implications for how we think and act in the world. By emphasizing technology in our talk, we have tended to emphasize technology in our allocation of attention, resources, and measures. And such a focus has come at the expense of understanding what happens in the trenches -- what people actually do with the technology in their day-to-day activities. After considering the implications of this asymmetry, I will offer some suggestions for dealing with it.

Over the past few years, I have had the opportunity of studying a pioneering technology as it has been adopted and used throughout many organizations. *Notes* from Lotus Development Corporation was designed to facilitate collaboration among people in contrast to more common software tools that emphasize transaction processing or individual productivity. The interest in this powerful pioneering technology has been high, as is the motivation to use it to enable people to work together across time, space, and expertise. In the firms I studied in both Europe and the U.S., managers painted compelling visions of how the *Notes* technology would bring profound transformations in how, when, and where work would be done. With a few exceptions, many of these firms have so far failed to accomplish their visions -- not because the visions are inappropriate or irrelevant (they are not), not because the technology is flawed or immature (it is not), and not because implementation strategies have been inadequate (they have not been) -- but because these firms have failed to manage the most critical determinant of technology effectiveness in organizations, how people use it to get their work done.

By neglecting the critical activity of technology use, we forget that technology is not valuable, meaningful, or consequential by itself; it only becomes so when people actually engage with it in practice. Such neglect encourages us to make simplistic assumptions such as, if people have technology they will use it, and they will use it as it was intended, and such use will produce expected outcomes. On reflection, most of us would agree that such assumptions are naive or faulty. 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 technology. 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 the exhaust of our car breaks, we improvise a fix with a bent wire hanger. When we want to use a spreadsheet tool, we learn the basic functions we need and ignore the remaining two thirds. As Web technology keeps evolving, we keep adjusting how we use it as we figure out what is possible (and what the competitors 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 think about changing our ends.

As users, we know this about our use of technology, but as managers, we have believed that if we can just get the right set of tools, more user-friendly interfaces, better training, more responsive technical support, and closer alignment with business processes, then use (as anticipated) will surely follow, along with the expected outcomes. Because of such beliefs, we have concentrated much of the resources, attention, effort, and measures on getting the right technologies in the right place at the right time. But this has effectively ignored "right use." For example, take a look at the budget for new systems development, and see what percentage of the attention, effort, and resources is allocated to the upfront analysis, design, installation, and training activities, and what percentage is earmarked for supporting ongoing use. Where the budget for the former exceeds the latter, there are insufficient means for users to effectively incorporate the technologies within their work practices, both initially and over time -- as breakdowns and updates occur, as skills improve, as people and jobs change, as innovations result, and as the business shifts.

In how we manage and measure, we have tended to focus on the "hard" stuff -- the technology with its tangibility, relative stability, and predictability of performance, and downplayed the "soft" stuff -- the ongoing use of technologies with its more open-ended, more variable, and less tangible outcomes. But as many of us know, it is the "soft" stuff that is harder and more critical to ensuring ongoing technology effectiveness.

This tendency to favor the more tangible and stable over the less tangible and more variable is a common dispositional error. In the area of learning, social scientists, Chris Argyris (of Harvard University) and Donald Schön (of MIT), have referred to this tendency by distinguishing 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 the discrepancy between these, and a fundamental aspect of learning is recognizing and dealing with the discrepancy. I suggest that we can similarly differentiate "espoused technologies" (the technologies we buy and install in our offices, factories, and homes) from "technologies-in-use" (the technologies we use in our action). Espoused technologies are the bundles of sophisticated hardware and software components that provide a given set of predefined features available consistently over time and place. Technologies-in-use are the specific features we engage with 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. What we buy is given and predefined (espoused technology); what we engage through our use is contingent and local (technology-in-use). The two are not the same, and managing and measuring the former as if it were the latter can lead to conceptual and practical difficulties.

Some examples may help. One of the firms I studied in my Lotus *Notes* research was a multinational consulting firm which had adopted the technology to facilitate knowledge sharing among its consultants across the firm. The managers implementing *Notes* were very impressed with the technical sophistication of the technology itself, believing it to be, what in today's parlance would be known as "a killer app." They concentrated their energies and resources on installing *Notes* within the firm's infrastructure and on every consultants' desktop. They believed the technology to have been very successful, as indicated by their measures (number of user accounts established, number of servers installed, number of databases created). Managing and measuring espoused technology, 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, either not using *Notes* at all or only using it to transfer files, send memos, or access news bulletins. In the context of this consulting firm, with its competitive "up or out" career path and individualistic work norms, to share knowledge was counter-cultural, and not surprisingly, it did not happen. Looking only at the espoused technology, *Notes* could be seen to have the potential to facilitate knowledge sharing across the firm. However, what matters in assessing technology effectiveness is not the espoused technology, but the technology-in-use. And the consultants' use of *Notes* quickly revealed that the vision of knowledge sharing had not been achieved.

A similar tale may be told of the R&D division of a large pharmaceutical company. Envisioning seamless, cross-functional project integration through *Notes*, managers rolled it out to hundreds of scientists across a number of laboratories. However, this company, like many others, had a hierarchical structure, and its scientists were rewarded for distinct functional contributions and individual patent applications. Not surprisingly, they chose to maximize their personal initiatives and to minimize their participation in cross-functional work. As a result, their use of *Notes* was quite limited. By managing technology rather than its use, these firms (like many others that I continue to encounter today) failed to realize the potential of their investment in groupware technology.

Focusing on espoused technologies rather than technologies-in-use is not just an issue for corporations; it is also one for research. Another "technology paradox" was recently generated by a report of the HomeNet project, a multi-year research study at Carnegie Mellon University examining the Internet usage of about 100 families in Pittsburgh during their first few years online. The current and surprising findings are that "Using the Internet at home causes small but reliable declines in social and psychological well-being."[1] As this project is being conducted with considerable care and expertise by leading social researchers of computing, we have no reason to disbelieve the results. And yet, many find them 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 from their use of the Internet. As chronicled by Howard Rheingold, members of the WELL offer each other social ties, friendship, and emotional support.[2] Similarly, Andrew Lam of the Pacific News Service reports that the Internet is being used to create a global Vietnamese community among many of the 2.5 million Vietnamese displaced by the Vietnam

war and now living on five different continents.[3] Through their use of web sites devoted to Vietnamese history, culture, news, and community, Vietnamese immigrants have generated a "Virtual Vietnam," establishing social links and reconnecting with their cultural heritage.

How to explain these differences in experiences of the same (Internet) technology? The answer lies in the difference between espoused technologies and technologies-in-use. Stories of the WELL and Virtual Vietnam are descriptions of technologies-in-use. The HomeNet project's measures of "Internet use" -- number of hours connected to the Internet -- are measures of 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 can be associated with the specific technologies-in-use (not yet described in the research) generated by 169 people in Pittsburgh, and not the result of some general and universal "Internet use." Other technologies-in-use generated by using the Internet -- as suggested by the experiences of WELL users and immigrant Vietnamese -- may result in different social and psychological outcomes. The same distinction between espoused technologies and technologies-in-use may help us make sense of and deal with the broader "productivity paradox."

So, what does this all mean for practice? It suggests that we need to shift our attention from one primarily focused on technology to one also focused on *use,* and our energies from primarily managing technology to also managing the *use of technology.* It requires us to take seriously the difference between the technologies we buy and the actual use that is made of them. While acquiring appropriate technology and implementing it adequately is clearly necessary, simply managing the technology is insufficient to ensure effective use, or for that matter, any use. Taking use seriously requires dedicating resources to helping users generate effective use habits with the new technology.

For example, my colleagues and I studied the implementation and use of a new computer conferencing technology within a 150-person product development group in a Japanese firm.[4] The introduction of the technology was managed by nine group members, who had the requisite technology skills, but more importantly – as members of the user community – they had the requisite use skills to translate features of the technology into recommendations for effective use. The conferencing tool was thus presented to the users, not as a new technology but as a specific solution to a particular problem in their work practices – in this case, the coordination of product development activities across six subgroups, two buildings, and seventeen months.

Taking use seriously requires having resources on hand and available over time to support not just the evolving technology but also people's evolving use. It suggests expecting variation in use over time and as conditions change. Static use in dynamic circumstances is ineffective. Shifts in use over time are not deviations to be corrected, but improvisations to be rewarded, encouraging those innovations that improve practice, and not punishing those that don't. Taking use seriously assumes learning happens through practice, through experimentations in, and reflections on, use.

For example, a software firm that successfully implemented *Notes* to assist its customer support activity, assigned two technical experts to the customer support department – not just to assist the deployment of *Notes* and not just for the duration of the implementation project – but permanently dedicated these technical resources to facilitate the users' initial adoption and ongoing use of *Notes* in their work. Managers of the customer support department understood that in practice and over time, technologies break down, requirements change, use evolves, and learning happens, and that to ensure users' continued effective use of *Notes,* on-hand, technical assistance – with knowledge about and credibility with the users -- would be needed. Over time, these local technical experts also became experts in the use of *Notes*

for customer support, and were able to implement improvements in the design and performance of the technology which enhanced users' work quality and productivity.[5]

More than anything, managing use of technology rather than only the technology requires a shift in mindset. Such a shift should facilitate the dedication of time, attention, resources, and measures -- not only to managing or fixing technology (the easy "hard" stuff) -- but also to managing and improving the *use* of technology (the hard and more critical "soft" stuff). In over a decade of studying the use of information technology in the trenches, I have more often than not seen people stuck in less than effective technologies-in-use because organizations were managing technologies rather than use. It need not be so.

Steps towards Managing Use of Technology:

- Recognize the difference between the technologies installed in your organization and people's use of those technologies in practice.
- Understand that only use of technology can produce organizational results, and that such use will be both anticipated and unanticipated.
- Help people understand how their use of a technology will relate to their everyday work processes and problems.
- Acknowledge that effective use of technology must evolve over time.
- Allocate at least as much attention, effort, and resources to the ongoing use of the technology as to its installation and maintenance.
- Assign multiple resources – human, financial, temporal, and technical – over time to assist people's evolving use of technology.
- Promote evolving use of technology over time through creating expectations of ongoing change in practice.
- Encourage evolving use through supporting ongoing innovation and improvisation in the use of technology.
- Reward the effort of innovation in use, not the outcome.
- Assess the effectiveness of use of technology, not the technology installed.

Endnotes:

[1] Kraut, R. et al. "Social Impact of the Internet: What does it mean?" *Communications of the ACM,* **41, 12, December 1998, p. 21.**

[2] Rheingold, H. *The Virtual Community: Homesteading on the Electronic Frontier.* **Reading**, MA: **Addison-Wesley, 1993.**

[3] Lam, A. "Virtual Vietnam," *National Public Radio: All Things Considered,* **Washington, D.C., November 20, 1998.**

[4] Orlikowski, W.J. et al. "Helping CSCW Applications," *Proceedings of the Fourth Conference on Computer-Supported Cooperative Work,* **Chapel Hill, North Carolina: October 1994: 55-65.**

[5] Orlikowski W.J. and Hofman, J.D. "An Improvisational Model of Change Management: The Case of Groupware Technologies,"** *Sloan Management Review,* **38, 2, Winter 1997: 11-21.**