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The Changing Communication Patterns of Engineers

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In the 21st-century workplace, communicating information effectively is essential for organizational success. It is only with a proper understanding of the power of communication—and the multiple channels through which information is sent—that problem solving, creativity and innovation are fostered. As workers face increasing demands on their time, they are finding new and unique ways to use technology in order to communicate. Further, for the communication to be effective, workers must understand cultural differences and overcome cultural barriers, as for many in the high-tech industry, the workplace is now global. In the global environment, meetings are common, but due to distance, actual face-to-face interactions between and among colleagues are becoming less frequent.

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While the workplace has undergone many changes, one subtle, yet profound change will have lasting implications in the years to come. In the traditional 20th century workplace, when a worker left the office-place, work on the project stopped. When the worker returned the next morning, the work resumed where it ended the night before. In the 21st century 24/7/365 global workplace, it is the project, not the worker that controls the pace of work—The project is now “in charge”—it is equivalent to a virtual assembly line and sets the pace and agenda of the workday. When one worker leaves, the project moves electronically to another worker who is, most likely, in another place. As the day goes by, the project circles the globe. For example, at the end of the workday in the United States, the worker goes home and the project moves west, to China and/or India then to Israel and Europe before landing back in the U.S. worker’s in-box the next morning. If there are questions along the project’s journey, workers in any office will simply e-mail or call—day or night—and expect their colleagues to respond quickly. Time-zones are irrelevant, as the project is in control.

This and other changes to the workplace have changed the communication patterns of engineers. Practitioners and researchers are beginning

to question how this ground-breaking technology impacts the manner in which engineers communicate and attempting to understand how engineers are incorporating new communication patterns into their workday. An equally important question centers on the type of information these workers need in order to complete their tasks. High-tech firms need to understand both how and where engineers find the information necessary to perform their jobs.

Our research team was given extraordinary access to four high-tech firms in the United States and two in India in order to answer these questions. We observed both the workers and the workplace in order to understand the communication and information needs of high-tech workers. The firms that we observed were all multinational organizations as well as diverse workplaces, and much of the communication was between co-workers in different offices and from different backgrounds. The findings paint a picture of a new 21st-century workplace, one where technology has influenced many of the standard assumptions. For example, our observations supported the notion that employees spend much of the workday in meetings. However, while in these meetings, we discovered an increase in multitasking behaviors and the need for these workers to use multiple channels of communication in order to complete their work assignments.

We observed that most engineers spent over half of their workday engaged in some form of communication—using telephone (landline and cell), e-mail and various forms of messaging. While no longer the primary channel of communication, the wired/landline telephones were still important within the workplace. Rather than getting together in a conference room to participate in a meeting or a teleconference, workers were likely to stay at their desks while participating in these conferences via landline.

One common myth that was quickly dismissed was the importance of voicemail. Almost every engineer

we observed reported that a voicemail message was likely unimportant (and probably from a vendor); they felt that if the message were vital, the sender would make use of other channels to get the information or question to them more quickly.

Regardless of the field, time is, in fact, money, and we found that the time required to access information is a major consideration for engineers. As noted above, engineers spend half their day communicating, and we found that they spend an additional one-quarter of their day engaged in some type of information-related event, such as information retrieval or dissemination. It is here that communication and information intersect. Our observations suggest that the search for information does not rely only on technology. Whenever possible, engineers seek out information from their colleagues whom they believe have the expertise needed to answer the question. Impromptu meetings were commonplace as these engineers still believe that the best source of information may be seated in the cubicle next door. If not, it is likely that the neighbor will likely know the “real expert” or suggest the use of the appropriate institutional repository. When workers searched for information, they were more likely to use some type of electronic database (document repository or search engine) rather than use a physical library or a printed journal.

The use of electronic communication is even more important in the workplace than expected. E-mail and messaging have become the primary means by which information is documented and transmitted. In terms of information-seeking events, the use of journals, books, and articles followed the use of e-mail and messaging when engaged in information gathering. E-mail itself is a multitasking medium. It is partly a memo, and partly a channel through which attachments and URLs are disseminated. However, it is not simply the ease of sending an e-mail that the engineers found helpful, rather the e-mail becomes a

historical record of the communication event. It was commonplace in our observations to find that before a meeting, the electronic presentation slides would be sent to all the participants for review. Afterwards, follow-up e-mails have become modern day “minutes” thus eliminating the need to take formal notes at every meeting. As such, everyone has access to both the presentation and the minutes of every meeting they have attended, and when information is needed, these employees simply search their desktops to obtain the material. In the end, this new type of record keeping will save time, and the information will be easier to access.

The duration of meetings in the United States is slightly longer than those in India. Further, we found that in the United States, the entire team would attend all the division’s meeting. In India, only those employees directly involved with the material to be discussed attended the meetings. Additionally, the use of presentation technology in meetings was more prevalent in the United States than in India. We found these differences to be both interesting and notable, but we were unable to conclude that one system was better for either efficiency or information sharing.

Of particular note was multitasking. Multitasking behavior is the ability to perform different tasks either simultaneously or in rapid succession ([2], [3]). Additionally, Bresnahan, Brynjolfsson, and Hitt [1] suggest that by making both communication and information technologies more affordable, the task demands on workers increases and thus mandates the need to multitask.

While multitasking is not unique to the high-tech workplace, the engineers we observed were frequently engaged in this behavior. Interestingly, while we found that multitasking occurred more frequently in the United States than in India, we observed that the engineers in both countries pursued both concurrent and overlapping activities. The multi-

tasking behaviors we observed tended to include a communication event as one of the tasks being accomplished. For example, word processing and e-mail is the most common form of multitasking we observed. Other typical multitasking behaviors included

- 1) listening and sending an e-mail,
- 2) messaging while researching, and
- 3) face-to-face and word processing.

We noted that employees in the United States firms are much more globally diverse than in the Indian firms. Thus, communication between and among workers of different backgrounds is an everyday occurrence in the United States workplace. National and ethnic culture is a strong predictor of communication patterns, however

the organization's culture is also a strong indicator of the channel (face-to-face versus electronic) and content (task versus relational) of the communication in the workplace. Overall, there were subtle difference between the firms in the United States and India. However, when examining the overall concept of culture, it appears that the differences were not solely based on location. Thus, the results suggest that organizational culture may be more related to the particular industry and to each specific firm rather than to the national culture. In sum, organizational attitudes towards communication, innovation, and collaboration, influenced how engineers used and communicated information.

The engineer's national/ethnic culture emerged only when it is not perceived to be in conflict with the organization's culture.

These observations are both a snapshot of the present-day high-tech workplace and also a benchmark for understanding the workplace and the impact of technologies yet to come. As engineers work on their virtual assembly line, they will encounter new ways to communicate and access information and eventually find ways to make the technology work for them. Further, as the project rather than the employee sets the pace of work, effective and efficient communication will remain the key to success. ■

REFERENCES

- [1] F. T. Bresnahan, E. Brynjolfsson, and L. M. Hitt, "Information technology, workplace, organization, and the demand for skilled labor: Firm-level evidence," *Quart. J. Econom.*, vol. 117, pp. 339–376, 2002.
- [2] F. J. Lee and N. A. Taatgen, "Multitasking as skill acquisition," in *Proc. 24th Annu. Conf. Cogn. Sci. Soc.*, W. D. Gray and C. D. Schunn, Eds., Erlbaum, Mahwah, NJ, 2002, pp. 572–577.
- [3] J. S. Rubinstein, "Executive control of cognitive processes in task switching," *J. Exper. Psychol.*, vol. 27, pp. 763–797, 2001.