Communication Trends and the On-Demand Organization
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EXECUTIVE SUMMARY

IBM has defined and popularized the notion of eBusiness on demand and is focusing its product and consulting businesses on enabling customers to transform themselves into on-demand organizations. An on-demand organization will be nimble, fast, and responsive:

- It will be able to exchange information smoothly across organizational boundaries.
- It will respond quickly to changing market conditions and rapidly form, revise, and reinvent relationships with external partners and customers.
- It will serve its own employee population more efficiently with crisper focus on business goals and customer value.

Technology deployment plays a key role in transformation to being on demand, but the transformation also requires organizational change and new communication patterns at all levels. IT investments have driven fundamental changes in organizational information flows, revealing the potential that technology has to shape organizations. This paper examines organizational technology and communication trends from a number of perspectives:

Bottom-up worker empowerment: email and Instant Messaging (IM). Research shows that email has changed work habits, increased efficiency of business operations, and reduced dependency on hierarchies. It is particularly noteworthy that this was an evolution, as people found ways to apply the technology in new situations. Email and its close cousin Instant Messaging are malleable media that have empowered individuals to work with people they have never met and who are not related to them in the formal organizational hierarchy. One side-effect of this success is that users are hard-pressed to keep up with communication demand: more sophisticated support for attention management (priority setting, threading, retrieving context to support activities) will be essential to enabling further evolution.

Top-down impacts: portals and workflow. Businesses have deployed internal web sites or "portals" that offer entry points into corporate information and business process. This allows the company to publish messages about strategy, to deploy cost saving line-of-business applications and to promote community-building and common understanding of business goals. Even fairly rigid forms-based workflows deployed through portals have been accepted widely. While the portal is not yet as overwhelming as the inbox, we anticipate workers managing large numbers of processes through the portal. Technology for activity management (explicit representations of workflows, monitoring and reporting status, notifications when actions are needed) will be required on the portal to sustain the rapid pace of enterprise system deployment.
Team technology. Teaming is about shared goals and shared views, and technology can facilitate both. When utilized well, team software is capable of producing large productivity and morale gains. Yet most companies have felt more organizational impact from email and enterprise-wide portal technologies. Research has identified success factors for team software deployment, including measures of collaboration readiness and technology readiness. Effective deployments of email and portals are significant indicators of readiness for team support products, suggesting many organizations are now poised for a next wave of organizational change.

Ultimately, it is the convergence of these three perspectives that should be the focus for effective IT investment. The associated technologies each entered the corporate world by different routes and gave voice to a different constituency: the individual, the enterprise, and a wide range of formal and ad hoc teams. Email evolved to become the daily milieu for a large percentage of workers; portals gave the corporation a powerful way to roll out cost saving systems; and teams have found support in various collaborative software, sometimes "simply" adapting mail to their needs and sometimes working with support of "groupware" technologies designed explicitly to support teams.

There are trends that limit technological adoption but that may be reversed by new technologies that impact all three perspectives. To keep on-demand technologies from overwhelming individuals with interruptions requires a new body of integrating software services aimed at attention management – since enterprise and team technologies must also reach out to individuals, attention management will impact all three perspectives. To anticipate the increase in volume of data that results from successful communications deployments requires new data archiving and retrieval capabilities as well as new composition tools that support composition tuned to collaboration and workflow integration. Email, portals, and team spaces are all used in context of activities that cut across communication medium so a rich representation of activity and workflow will benefit all. And finally, assuring that IT policies can support desired work practices such as spontaneous creation of discussion forums, will require new and more flexible administration policies and supporting infrastructure.

These trends inform IBM's approach to software design. The IBM Lotus Workplace will integrate services from mail, portal, and team technologies, and will apply other technologies – search, text analysis, and autonomic infrastructure – to attention and activity management and IT administrative services.

This will be the Workplace for eBusiness on demand.
INTRODUCTION

Since the earliest days of office automation, industry pundits have been touting the power of technology to change the shape of business organizations. There’s no doubt that businesses have changed enormously in the decades since the personal computer made its way onto desktops. Middle management has been squeezed, teamwork dominates individual contribution, and the very nature of communication within and across organizations has been transformed. For many, IT tools have been a double-edged sword, causing as many problems as they solve. Consider information overload, spam and nuisance mail. Yet, as businesses feel increasing pressure to move quickly to cut expenses, improve customer satisfaction, and be more responsive to ever changing requirements, they are turning to IT to facilitate that change.

This is the promise of IT to what IBM has termed the "on-demand" business: to be nimble, fast, and responsive. The business will be able to exchange information smoothly across organizational boundaries. It will respond quickly to changing market conditions and form, revise, and reinvent relationships with external partners. It will innovate in its interaction with customers and will serve its own employee population more efficiently, translating savings into crisper focus on business goals and customer value.

Communications trends based on already-deployed technologies confirm that technology can indeed change organizations. Social scientists offer explanations of the characteristics of these media that make them effective change agents. Research shows that the impact has emerged from a combination of new technologies with changes in the way people work as they adapt to the technology. We can trace reduced dependency on hierarchical operation to qualities of email and instant messaging that empower individuals and facilitate a bottoms-up reshaping of the enterprise. In contrast, portal and workflow favor top-down driving of corporate messages and processes into the organization. Team technologies – a very wide class of offerings that we can barely touch on in this paper – show both kinds of properties, enabling grassroots efforts but also having a place as carriers of corporate initiatives.

Strategic IT investment involves planned organizational change that can be effected by drawing on a variety of technologies that have well understood impact on communication and organizational structure. Companies that need to react quickly must be sure their organization is aware of change indicators at all levels of the organization. They need to empower individuals while enabling teams and corporate entities to speak with a single voice. Meeting this set of complementary communications requirements is a challenge. This paper examines communications trends from three perspectives – individual worker empowerment, enterprise leadership, and team work – and then identifies three issues – attention management, information management, and strategic alignment with IT – that cut across these perspectives.

A unified technology addressing all three perspectives is the design center of the IBM Lotus Workplace.

EMPOWERING INDIVIDUALS:
EMAIL AND INSTANT MESSAGING

Email and the First Wave of Organizational Change

Email technology has always had the potential to carry with it an egalitarian work style that would change hierarchical business operations.
Researchers have argued that communication is integral to organizational form. Over the years, as email usage in corporations was growing, there was widespread speculation about whether the new technology would precipitate organizational transformation. Introduction of email does indeed seem to have enabled, if not caused, organizational changes, breaking down time and distance barriers by allowing for both planned and opportunistic organization redesign.

What are the characteristics of email that could cause these changes? An early study of email use by researchers Hinds and Kiesler showed that email was particularly well suited for unstructured work, which is generally complex, context-sensitive, and often interdependent with other work activities. Three primary characteristics of email readily support these unstructured tasks.

- Email provides a malleable work surface in which collaborators can author, edit, and share information with each other.

- Email provides the ability to store and combine conversation and work artifacts, enabling the rapid retrieval of the context of the work.

- Email provides asynchronous, scalable conversations, which allows groups of workers, separated by distance and working at different times, to coordinate work.

In part what this means is that email seems very informal – it's a very malleable medium – yet it actually gives message composers a lot of control over how they present themselves in their messages. People who might not speak up at a meeting could find ways to express themselves in a message, and then could send that note to people they might not otherwise have felt comfortable approaching. They know that the email is a "soft" interrupt, to be dealt with when the receiver has the time. They don't have to be working simultaneously with the other person, and yet work could be turned around for iteration far more rapidly than in a paper-mail-based world. Since the work products of the knowledge worker are on-line and relatively unstructured, the work and the communication become interwoven in the body of messages and their attachments, forming a very natural, and tightly intertwined combination of content and communication technology over time. This synergy fed the accelerated growth of email usage in recent years. Did email actually break down hierarchy? One detailed study of technology use in a large enterprise did reveal evidence of a more horizontal organizational structure. Heavy email users with less structured jobs were observed to be more likely to communicate laterally in that company. (The lack of structure in the job is relevant because it meant these were jobs naturally carried out in an unstructured communications medium – so these workers became heavy email users earliest in their companies.) Sproull and Kiesler have suggested that email supports a more networked organization through increased prevalence of weak communication events. (Social network researchers refer to these connections as weak ties – links among people that are informal and infrequent but often critical to good decision making.) Today, visualization software can examine an email file and show quite explicitly that this is the case – the networks of relationships are revealed in the to and from fields of interconnected email threads. More recently, Millen and Fontaine have shown that email is the dominant form of communication in support of work-based communities of practice that span traditional organization boundaries.
Email also enabled transformation of many pre-existing work processes. Email has improved work coordination for global teams, allowing work objects to be passed from one geographical location to another in support of round the clock work processes. Shared electronic mailboxes have created novel forms of schedule management and work coordination for manager/assistant work. Larger shared mailboxes allow customers to interact more efficiently with support and sales staff. Personal networks embedded in address books and distribution lists have allowed office workers to rapidly mobilize work teams for collective action. What Michael Hammer refers to as "vertical collaboration" – the fast iteration in email between executives and subordinates during creation of reports – replaces the hierarchical operating style of formal passing of information up and down organizational lines. This keeps more people involved in information creation and makes all better informed and better able to act on their knowledge. This efficiency in email communication may eventually play an even greater role in organizational change as it cuts into coordination costs incurred when ad hoc teams are pulled together. This resulting flexibility will be a key ingredient in a corporate environment that fosters innovation.

**Instant Messaging and SMS**

As much as the qualities of asynchronous email might be valued, many tasks require the immediate, synchronous focus of a small set of people. In an email-only world, that ability to work together at the same time would be sorely missed. Of course, face-to-face meetings never completely went away, and on-line eMeetings have increased in popularity for planned synchronous collaboration. But the more unexpected recent trend has been the transfer of chat technologies from consumer to business settings. No longer for teenagers, chat has become an integral part of how people work, complementing email by adding an immediacy that is often just what is needed to keep work on track.

Usage of Instant Messaging (IM) has evolved quickly, from a method for synching up for a phone call ("Are you there? What's your phone number?") to a transaction execution medium ("Got a minute? I have a question ..."). IMs have been shown to displace other communication media over time, lowering use of email, phone calls, and other slower or higher cost forms of communication. Messages are typically shorter, though people are increasingly finding that archival information is sometimes typed into a chat, and they are beginning to save – and occasionally forward to larger groups – the transcripts of chat sessions. Even further along the spectrum on rapid turnaround is the Short Message Service (SMS) that is restricted today to short, cryptic messages, and causing excitement for its ability to mobilize "smart mobs." ("Go 2EDSA, Wear blck" is the message that Howard Rheingold credits with bringing about the demonstrations that were the last straw in the downfall of the Marcos regime in Manila.) SMS is primarily a mobile device technology, but the enforced shortness of the communication – a brevity that begs for a meeting to complete the thought – may well be the key enabling feature of SMS. (It's not yet clear how SMS will show up in corporations: Will it still have a unique ability to mobilize teams? Will it emerge as an important capability in business centers, or is its proper place the mall or political rally?)
As people blend the way they work across synchronous and asynchronous modes, the distinction between the two has come to be mostly about interruptions and responsiveness. The sender can get an answer faster through IM, but as a receiver, it's a disturbance. Successful IM use is therefore tightly linked to awareness and sensing. The instant message was a capability of many systems far earlier than the explosion in use associated with "buddy lists," and particularly buddy lists that have awareness indicators. Having a sense of whether someone is available or not starts to approximate social cues that you can get at a glance in the real world – is this person approachable? Should I interrupt? For the urgent transaction that demands fast interchange, catching a person on line can make all the difference. With "away" messages, recipients are now making it clear whether they can be interrupted, what is keeping them off-line, and when they can be expected back.

The social contract for on-line conversation is still being developed. People are deciding how much to interrupt and how much effort to put into explaining how interruptible they are to help others decide whether to approach them. They are deciding what's private and what's publishable and forwardable. We see teenagers being quite public about their state, referring people to their detailed on-line personal profiles, and also taking the time to keep "away" messages updated hourly or more often. Technologists predict that there will be automatic updating of these messages based on calendar and meeting schedules – but perhaps the personal quality (and personal control) of the manual away message brings something extra that will be the way that IM will next influence corporate culture.

Just as email or IM usage has evolved over time in the corporation, moving in from academic and government institutions, the same is true for the newest kid on the block – the corporate portal – which is also a transplant from another setting. The corporate portal evolved from a variant of the popular external Internet web site for corporate "presence." Companies that joined the frenzied first wave of adoption developed rich external web sites explaining themselves to their customers. It wasn't long before they discovered that their own employees could learn more about the internal workings of the company from the external presence than from internal information sources. Soon the internal web site emerged, as did departmental web sites, personal and team web sites, and a plethora of internal information sources, including company-confidential information securely posted within the company firewall. The explosion of departmental intranet sites further fueled the need for corporate sites that integrated across this growing set of sites. Once in place these corporate sites took on the added role of offering corporate services.

Paralleling the trend on the Internet from presence to eCommerce, corporate web sites took on a transaction-oriented quality and became internal self-service sites that in many cases realized significant cost savings.

Still in its infancy compared to email, the portal is also changing how people work. Portals are the home of self-service applications that reduce costs and eliminate jobs. They are portals in the earliest Internet sense of being the one place you go to get access to everything, often providing a long menu of other on-line services in the company, from HR to expense forms, to travel arrangements.
Portals as corporate message centers are more formal than emails – with crafted messages and teams of writers behind the scenes. Most portal-accessible applications are formally structured, actually falling into the domain of workflow. This is where employees find their expense forms, 401K contribution forms, etc. that are the current state-of-the-art communication medium for business processes. Ironically, the portal is not necessarily top-of-mind as a way to reach the entire workforce for business processes. Many companies, trying to roll out processes to their entire employee population – some not currently email users – are purchasing low-end email that will give them the reach without the cost associated with the knowledge-worker levels of functionality of currently deployed email systems. This may be due in part to the fact that it's quite typical for these applications to reach out to users in their inbox to draw attention to the process when action is needed. This is the attention management issue that we'll return to as a common concern across all perspectives. Another issue is the need to complement structured workflows with informal exchange, the topic of the next section.

Enterprise Workflows: Line-of-Business Applications and Corporate Portals

Portals are the starting point for most corporate-initiated workflows that streamline business processes. They have indeed become the carriers of top-down organizational change, reducing costs and eliminating jobs by removing service provider staff from processes. End users and approvers participate, but their communications are all mediated through the system as forms. The technologies behind these applications might be legacy or web-based – so it's a stretch to call all workflows portal applications. But they are deeply intertwined since both the portal content and the structured workflows emerge from a corporate point of view. The mix of structured and unstructured information accessible on portals recalls "office automation" research from the early '80s.

From the earliest days of office automation, researchers have been able to show the importance of the tight integration of formal and informal communication. Lucy Suchman and other anthropologists observed essential work transactions happening in the conversation between two people at the moment of transfer from hand-to-hand of a paper form. Others documented processes gone awry when put on line. After doing the detective work the anthropologists could associate problems with key informal opportunistic conversations that had inadvertently been eliminated when forms moved on line.

Linking informal communication to formal communication requires formal representation of work processes and of objects being passed around. We can look again to the external web where we will see that visibility into work processes is already being leveraged to integrate applications. Amazon makes its workflow very apparent to purchasers, sending emails at key stages and maintaining state at the web site. They cooperate with UPS to make visible the progress of the actual packages through tracking sensors and reporting technologies. Communications facilitated by web services standards can cut across these businesses to give a relatively unified view of the process to the customer. Integration to support full end-to-end service is the next trend we can hope to see migrate from Internet to intranet, bringing coherence to the growing set of internal self-service capabilities.

For example, let's look at the potential value of tight linkages between travel planning, HR, and expense systems. An employee planning a trip to a
Structured email and forms

Structured email has been tried and abandoned in the past: The Coordinator, an early groupware market entry, attempted to model speech acts such as promises and commitments, so that they could be managed carefully in email inboxes. With rare exceptions, this was too formal. The structured conversation features did not match user expectations for natural communication in email and went unused.

Calendar scheduling represents a point on the spectrum that is closer to success than The Coordinator. Appointments represented as formally structured records can show up as email invitations for easy calendar processing, negotiating, and rescheduling. But when mixed in with other "regular" email, the appointment form – received as a form and not text – may have a peremptory tone that is not intended. The workaround of choice for many people is to do the additional work of communicating first through "friendly" emails, and only later in forms for formal confirmation. The good news is that it’s a workaround and not feature abandonment. But an ideal solution would support “apparently informal” communication with (hidden) underlying data structures that can be interpreted by the calendar. Today's text analysis technologies are capable of providing this support in text editors that are smart about content and can recognize features like meeting times and dates. [See "right weight editor" box on next page.]
Formal documents vs. informal documents: the case for "right weight editors"

As teams work in on-line spaces, more documents will be created simply for sharing and collaboration. Formal documents – formatted for printing, lengthy explanation or as required documentation of decisions – will not go away, but their relative numbers will decrease compared to the amount of writing happening in conversation. This has been the way of virtually all new communications media – they may displace some small percentage of use of other existing communications media, but they primarily augment and enrich the set of media choices. Many IT departments today are looking for correlations between different kinds of document preparation and worker segments so that they can deploy full-power personal productivity tools only as needed. The results are not in yet, but it may well be that the trend in this case will be the same as it was with phones, meetings, etc. Although we can't necessarily expect formal documents to go away, the growing amount of new on-line communication will require better support for the kind of content creation done in collaboration and workflow contexts. They will be "light weight" to match their casual use, but they also need to be made "right weight" by including features not usually seen in personal productivity tools.

When looking for light weight editors that will flesh out an on-demand software suite, it's important to factor in the ways that content should integrate with work processes and formal workflows, as well as the long-term storage and retrieval requirements. In email, the apparently informal nature needs to be preserved. People may not get the same result if they send a form or computer generated text to ask a question. A text editor that recognizes dates and times in unstructured text allows natural composition of a "friendly" invitation while still having the advantage of a form, highlighting certain fields for later processing. Remember also that despite the power of informal communication, it is still only apparent informality. People know emails will be saved and forwarded, and they are often trying to make a good impression in their emails. They don't want to send email with spelling errors. (In the '80s when John Seeley Brown predicted this trend towards careful writing in email forming, he recommended "despellers" be included in email editors to preserve their informality!) Today, even light weight editors will require spell checkers in many contexts.

Other forms of correction to email could be even more helpful. Think about each time you write an email late at night about meeting “tomorrow.” By the time it is read, that reference to “tomorrow” probably should read “today.” A potentially ambiguous date could be noticed and augmented with the actual date in parenthesis. For collaboration in context of a workflow, pattern matchers can recognize keywords in text that relate to the activity so that an email thread or chat conversation can be connected to the context. A clarifying question could then be saved with the workflow for later reference, or the key datum from the conversation could automatically be moved into the workflow to complete filling in the form. For project work, these "right weight editors" will be tuned to the task at hand – recognizing code snippets, legal terms, and so on – supplying simple composition capabilities combined with text analytics that extract the feature needed for forms-processing.
enough to map team work onto them. One of the challenges for team-specific software is designing it so that it is better than the generic software. What will make a team space work better than email for a group discussion? And, how can you make it sufficiently better for all of the required participants?

While the impact of email on the organization had some time to evolve, most group products were expected from the outset to cause organizational change. Issues of culture and incentives have been prominent from the beginning. Because of high expectations, the technology didn't always get the same chance as email to evolve along with the organization. Deployments were declared successes or failures quickly. Explanations of failures abound. One of the more telling ones is the lack of proper assessment of cost-benefit trade-offs. The technology has to be sufficiently better to be worth learning, but, perhaps even more importantly, it has to be better for all involved, or critical mass of participation won't be reached. The classic example was the early joint editing system "For Comment" that was great for the person who needed to collate comments, but was actually very inconvenient to use for all the people who had to read and comment on the paper. Both groups needed to accept the product for it to succeed.

In their paper, "Distance Matters," University of Michigan professors Judith and Gary Olson move from failure analysis to some principles on which to build success. Looking at team technology through their lens also reveals a number of ways that team technology success can be linked to email and portal plans. The Olsons talk first about building common ground. When teams work at a distance through technology, they may not have the chance to build common understanding through informal conversation and common culture that is a natural part of working with people in the same location. The Olsons emphasize that face-to-face should not be set out as the ideal that one tries to attain with technology. Nevertheless, it is important to get people the background they need to accomplish their work. Technology could be brought to bear on this issue of common ground: Portals are carriers of corporate themes and the home of community forums. Both can provide context that will enable team work to be performed effectively, even without face-to-face meeting.

Most interesting, given the advanced state of evolution of technology in so many organizations, are the Olsons' "readiness" criteria: collaboration readiness and technology readiness. Organizations have to be ready and willing to share information, and individuals throughout the organization have to buy in to that directive, perhaps even at the cost of changing personal work habits to facilitate sharing. Much was made in early groupware literature of failures of organizations to match up incentives to their deployments of groupware – if people are not encouraged and rewarded for sharing, they won't use the technology. But when corporate messages and personal incentives align, technology need not even be perfect – people will accommodate to it, adopt it, and change it. Consultants report that a high percentage of organizational change engagements are to accommodate organizations to a cost saving Enterprise Resource Planning (ERP) technology. When the need is great enough, the organization will invest a lot in cultural change to rally people and support usage. Today, with widespread use of email and IM giving individuals a comfort level with computer-mediated collaboration, and with portals being accepted even if they are imposed for cost-saving reasons, many more organizations are poised for success in the next wave of team technology deployment.
CROSS-CUTTING ISSUES

Although in different stages of deployment and impact, technologies associated with all three perspectives, individual, team, and enterprise, face common challenges. This section looks at three issues that are by-products of successful deployment. Increased on-line communication means increasing demands on people's attention and increasing challenges to individuals and organizations for managing on-line information. The expense associated with unmanaged information storage can also contribute to IT policies that undermine team technology deployments. Tackling these issues will be critical to extending the life of current communication products and allowing new ones to be deployed as part of strategic business transformation.

Attention Management

It was only a matter of time before email use achieved critical mass and the volume began to be a challenge for many users. An early study of email users by Sidner and Whittaker described a widespread feeling of email overload and identified several strategies for dealing with the situation. More recently, Belotti et al. have confirmed that there is a correlation between that sense of overload and the number of conversation threads being juggled in parallel. In effect, people are managing many ongoing activities in parallel in their email (and IM) environments, without explicit support for time management and attention management. For email, where knowledge workers have been able to blend content and process, the current research focus is on teasing apart the two, so that new designs can preserve the informal nature of the content of email, while adding formal structure that represents activities. With added structure, the inbox experience can be transformed from today's relative chaos to helpful attention management support.

These same issues of attention management also arise for people who live in applications other than their email inbox. Anyone who multi-tasks needs similar support, so we'll see that people who use portals and workflow tools will need more support for noticing what line-of-business application needs attention. Today, although enterprise portals allow for personalization, that personalization tends to be about surface preferences like choice of screen layout and look and feel. Personalization needs to go deeper to help the end user figure out how to manage time, when to attend to a specific process, or when to look to another supporting application system for work related to an ongoing task. Much of this information will derive from monitoring the state of various business processes. Just as IM usage has been refined based on awareness of people's availability on line, workflow process participation will be enhanced by monitoring and displaying summaries of process state and progress. [See the box on "Re-engineering" on the following page.]

Attention management is almost by definition a property of the individual perspective – even the discussion above of attention management for enterprise applications is about how to help an individual tend to those enterprise processes. But a broader interpretation of attention management will allow modern corporations to benefit from technological support for shifts in corporate and team attention. We know that team software fails when it can't grab individual attention, but for team software to be better than email it will also
Revisiting re-engineering

One of the classic stories of re-engineering is the restructuring of an insurance claims process. Take for example a company where an insurance claim moves slowly through a number of different departments, each one responsible for filling in, confirming, or approving a specific aspect of the form under consideration. An old-school time-and-efficiency expert might have designed the process to ensure that each department is expert at its specific part of the process, so workers in each department with narrowly specialized skills can be most effective at their part of the process. But over time, as regulations increase and the complexity of claims grows, the process bogs down: it touches too many different people; takes weeks, if not months, to complete; makes customers unhappy; and leaves customer contact people at a loss for how to respond when something goes wrong. It’s hard to find out where in the process the form is or whether intervention is needed. What’s more, no one is really in charge, so no one is really empowered to intervene if there is a serious problem.

You could try to get more of the process on line by pushing the forms through more quickly, but the re-engineering approach would be to step back first and rethink the whole thing. What if one person is in charge of a claim and sees it through its life cycle? That person might have to reach out to other departments for help, but he or she will now have the context of the full end-to-end process to inform their actions and help them anticipate and process exceptions.

Organizations that have taken this approach have seen dramatic reduction in overall processing time, with a related increase in customer satisfaction as well as job satisfaction. To maintain that level of job satisfaction, technologies typically associated with Knowledge Management (KM) will play a role as intermediaries, taking raw data from sensors that monitor the process state and refining the data before delivering the information to programs that touch the user’s display. In IM we see this as a next stage for buddy lists. Keywords will be extracted from the main screen activity and handed to an expertise locator that will populate a context-sensitive buddy list. This way, rather than displaying people whose names were manually entered, the buddy list will display people relevant to the process at hand.
of the main application of the professional – the lawyer in a word processor, the finance analyst in a spreadsheet, programmers in their development environments. And for the factory worker, salesperson, or retail manager who is rarely in front of a computer screen, attention management might take the form of notification via pagers and PDAs or large screen ticker displays on factory floors. Portal technology will not only deliver information to browsers. It will increasingly be used as a behind-the-scenes service that looks across sources of information and sources of interrupts to process and prioritize these interruptions, and then deliver information to a variety of devices. It will fill the attention management gaps by becoming the aggregation point for activities, user state, and corporate context. Notifications will be based on explicit representations of activities, status, and context that can be maintained within the portal technologies and can be delivered to a variety of user interfaces besides the conventional browser-based intranet site.

Managing Information Resources

Organizations continue to bemoan the fact that it is hard to manage documents that embody corporate knowledge assets and corporate memory. One of the keys to storing and retrieving documents effectively in any repository – email, IM, portal, or a team space – will be contextual information that can be stored in "meta-data." That meta-data can be collected at all levels of the organization.

Researchers have noted that people often have more success finding attachments to emails than they do finding the same files in the file system. The added clues remembered from the context of the conversation are helpful. It has also been noted in team spaces that individuals are not mindful of other people's needs when they post information. Conversation often happens outside the online space, and the documents lose their connection to those conversations. If archival storage of documents is a desired outcome of collaboration, then, first, memorable conversation must be encouraged in the team space. But then, team discussion should be preserved and connected as context for archival document. It is a powerful search criterion for the individuals who participated in the project.

Even if team spaces were more memorable to participants, additional steps should be taken to make the same information be more valuable to people who did not participate. Other meta-data, such as corporate context and goals set at enterprise level for this team, will provide essential clues when someone from outside the team with a similar mission is searching for information at a later date. How is this document related to the overall mission of the team? How was this team formed? What is the team mission? These and other features, supported by the system, and perhaps furnished by the team members looking forward to use by others, will make team documentation have long-term value to corporations. Automatic feature extraction will also play a role, connecting text as it is being written to goals and other key features of the work at hand. [See box on "Right weight editors" on page 7.]

Aligning Corporate, Team, and IT missions

Rules of governance and deployment policy can directly contradict the design goals of products. This is most evident in products aimed at enabling communications qualities of great importance to enterprises today. The informality of email
A struggle for control: IT vs. work practices

Lotus is very familiar with the tension between individual initiative and IT control, as it was founded on the grassroots popularity of 1-2-3, a product that really could be bought by individuals independent of IT and put to use immediately and effectively for the long haul. (Word processors had a somewhat more interesting journey, as they had clear potential to reduce jobs from the outset, with word processing pools and empowerment of principals to do work that assistants had done in the past.) When Lotus entered the groupware business, it had a new challenge of assuring that it was selling its groupware to IT departments that would supply the networking and server infrastructure necessary to support teams. But Lotus still envisioned the team and the individual group member as independent actors, able to create their own workspaces, manage access control and tailor their applications. In fact, this became a defining characteristic of groupware - that it enabled departmental action without database administrators and application designers.

There have been products since-from IBM/Lotus and other companies-that give control back to the user, small team and department. But as soon as much server infrastructure is needed, or when archival documents are produced and stored by teams, the tension arises and IT takes back control.

Email and IM have for the most part escaped this struggle. Email is an infrastructure deployed by IT, yet it has been allowed to empower the end user and has therefore been able to create the organizational changes described in the paper. (We say “for the most part” because many IT organizations have a focus on reducing storage space for email that is in conflict with the needs of individuals to develop personal archives.) IM made its way into the organization in a manner almost closer to 1-2-3, largely because the infrastructure that was needed to enable it became available as free services on the Internet. (The only obstacle was the firewall, and technologies started to circumvent this by http tunneling.) IT had to get involved at some point, to keep the chats inside the company, but now, with IT-run servers, the social impact is still on its own path to self-determination. This trend should be supported and extended to areas where IT management and corporate strategy share a goal of empowering on-demand teamwork.
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This is the first in a series of Workplace White papers that will detail trends, success factors, and technologies underlying attention management, activity representation, team support, and IT alignment.

products – and particularly the underutilized team category – can only thrive if they address both user and administrator concerns together. That way, IT can manage the costs of offering instant access to end users, and organizations can have the full benefit of fully-empowered teams.

CONCLUSION: HOW CHANGE "HAPPENS"

This paper has examined technology and communication trends in organizations from a number of perspectives: bottom-up empowerment through email and IM; top-down impacts of portals and workflow; and trends in software that support team formation. Cutting across all three are the need for improved attention management and information management, as well as strategic alignment across the organization to support deployment.

Each technology had a different entry into the corporate world and gave voice to a different constituency. Email evolved to become the place of business for a large percentage of workers; portals gave the corporation a powerful way to roll out mandated use of cost-saving systems; and team spaces have held a place in the middle, subject to the tension between sometimes conflicting corporate and departmental needs.

Aligning IT with corporate commitment to transformation is essential, as it is so easy for work practice design goals to be at cross purposes with cost-containment missions of IT departments.

Workflow systems have been based on formal representations of activities for some time, but the trends reviewed in this paper suggest that explicit representations of activities will also be needed in other communication tools. The individual needs help identifying and managing activities embedded in the inbox. The enterprise needs to define and drive activities to execute on strategy and to increase efficiency of day-to-day business operations. Documents created in team spaces have more lasting value in the context of larger business activities. Across all perspectives, the "activity" is emerging as the basic building block for encoding strategic information and supporting effective work processes, both formal and informal.

Software at the point of convergence of portal, email, and team technologies, bolstered by activity-based technologies for attention management, information management, and IT alignment, is at the sweet spot of corporate readiness for change. It is at this intersection that
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