COLLABORATION
WORKING TOGETHER APART

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All of us have encountered businesses that operated as if the right hand didn't know what the left hand was doing. Or called an 800 number for information or to get something fixed and had to repeat the request and other tedious background information to two, three or even four different people. Whenever that happens, it's hard not to wonder, "Don't these people ever talk to each other?" But while it's easy to criticize, the old adage "People who live in glass houses shouldn't throw stones" is worth keeping in mind.

Just about any group that takes a critical look at how it does business winds up concluding that it needs to do a better job of communicating—internally as well as to customers, clients, distributors and suppliers. That is why corporate reengineering and Total Quality Management (TQM) efforts, for example, often result in the establishment of highly focused market-driven teams and workgroups, which are characterized by efficient workflow and communication processes.

The essence of what members of workgroups do is known as "collaborative" work. Workgroup members need to overcome barriers of time zones and geography to document what's been accomplished and to update each other on progress, problems, successes and new ideas. They need to be able to brainstorm and debate with one another, even if some or most of the team aren't physically located within the same room.

Communications networks and information technology are the tools that make "working together apart" possible, and here are just a few examples of how this is happening today:

- Every evening, ComputerLand uses Lotus Notes software to distribute current pricing and product availability information to its sales force. The same data are also used in internal meetings of the workgroup and in sales presentations to customers.
- Viacom, which owns and operates the cable channels MTV and Nickelodeon, links its advertising agencies to its programming centers via a private internetwork. Simultaneous use of graphics workstations and the telephone system enables artists, programmers and advertisers to match commercials to the most appropriate television timeslots.
- In the New York City office of Chiat/Day, an advertising agency that had over $800 million in billings in 1993, about half of the employees no longer have permanent desks. Instead, when they arrive for work each day, they are assigned ROLMphone 900 wireless handsets (part of the ROLMphone wireless communications system), and phone calls are directed to wherever the employee happens to be. The staff can also check out laptop computers.
- Price Waterhouse requires that its accounting workgroups use Lotus Notes to exchange information within the workgroup and with corporate management. This permits workgroups to function efficiently while members are away from the office, but the group can still draw on corporate resources when the need arises.

These companies have a common objective: To enable workgroups to coordinate activities among themselves and with other organizational units. To meet that

objective, the team members need the freedom and flexibility to work together whenever and wherever it's appropriate, in whatever format they choose—voice, data or image—and either in real time or on a deferred (store and forward) basis.

Below are some of the ways these capabilities are being applied to make workgroups more productive.

■ **Telecommuting—Working from Home:** With modern telephone, cellular and wireless systems, fax machines, voice messaging and computer E-mail, it's no longer necessary to go to work in order to *be* at work. There are, of course, certain jobs that require a full-time physical presence in the workplace, but a huge number of jobs don't—more than 25 million of us already are working from home on either a part-time or full time basis (see Figure 1). Some states, most notably California, are actively encouraging telecommuting to reduce traffic congestion and help meet clean air standards.

When telecommuting is applied to a workgroup situation, all kinds of new possibilities open up.

■ Even if neither time nor budget allows for travel, individuals with critical expertise can be part of a workgroup no matter where they're located—across town, the state, the country or the globe.

■ The fact that a workgroup member has to care for a family member need no longer result in missed deadlines or unfair distribution of work among other members of the team.

■ "Virtual" project teams consisting of both full-time and contract staff can be created, with reduced costs for physical space, office equipment and related overhead expenses.

At one level, telecommuting isn't new—we've been connected by telephone and E-mail systems for years. But technologies are emerging that provide much richer capabilities. For example, workgroup members can talk to one another via a telephone while sharing a spreadsheet or word processor document over a network. The requirements are either traditional telephone lines and dial-up modems or an Integrated Services Digital Network (ISDN) connection, and a PC running screen-sharing software—what is typed on one screen appears on the screens of all the participants.

Similarly, integrated messaging (discussed in more detail below), enables workgroup members to attach voice messages to E-mail (this is called "voice-annotated messaging"). So, for example, not only can a spreadsheet be sent that contains the latest project financial projections, but an attached voice message can explain the rationale for any changes. The result is more complete and rapid access to information, improved decision making and fuller participation by all the members of the workgroup.

■ **Reengineering Call Centers:** Is a call center a physical place or a set of capabilities? Increasingly, the answer is both.

When callers dial an 800 number, they have one objective: To complete their business as efficiently as possible. That means getting to the agent who has the knowledge and skills to help them in the shortest possible time.

During the past few years, there has been a revolution in the systems and services that link together call center locations. Modern PBX/ACDs can be interconnected so multiple call centers can appear to the outside world as a single entity.

A HEALTH CARE REFORM WE CAN ALL AGREE ON

Lexington Medical Center, a 300-bed facility that serves South Carolina's capital city of Columbia and the surrounding counties, wanted to give its mobile employees more time to provide patients with the most efficient and personal care possible. The ROLMphone wireless communication system from Siemens Rolm has proved a valuable tool in achieving this goal.

The ROLMphone wireless system works in conjunction with any Siemens Rolm CBX. Lexington, which uses the ROLM 9751 Model 50 CBX, initially implemented the wireless system for nursing personnel on two floors of the eight-floor facility.

Like many hospital employees, nurses are constantly on the move. The ROLMphone 900 handset allows them to make and receive calls, as well as check for messages while moving from room to room or floor to floor. They aren't tied to wired phones at the nurses' stations, so they can spend more time caring for patients.

The wireless handsets weigh less than eight ounces and fit easily in a person's hand or attach to a belt, and they can be used to activate any of the CBX's many functions. Nurses on the two floors at Lexington Medical Center use 20 such handsets and make between 700 and 900 calls a day.

The system enables the nurses to communicate more quickly with doctors, nurses' stations, nurses elsewhere on the floor or the pharmacy. It also has eliminated the need for loud paging on the floor and in rooms, which often disturbed patients. A nurse at a station needs only to punch a preprogrammed rep dial key (i.e., one-digit dialing) on a wired ROLMphone to make contact with a nurse on the floor. Some nurses have given their personal wireless extension numbers to patients' family members so they can maintain close contact.

The medical center will soon expand use of the ROLMphone wireless system to all other floors and a new wing. The system eventually may be used by doctors and other employees who are also on the move.

Calls are held in queue at the switch and then forwarded to the first available agent, no matter where the agent is located. When call centers are linked together and can overflow calls from one location to another, callers spend less time in queue, fewer calls wind up abandoned and the productivity of the call center operations shows dramatic improvement.

That capability is being enhanced and combined with network-based services like Automatic Number Identification (ANI) and Dialed Number Identification Service (DNIS) to identify whether a specialized agent—e.g., one who speaks a language other than English or is trained to handle technical questions—is needed.

In short, network services are evolving to identify as much about the caller as possible, and that information is passed to the call center infrastructure, which consists of switching systems, integrated voice response (IVR), fax, voice messaging and computer-telephony integration (CTI). Each call is routed to the person who is best equipped to handle it, whether that individual is working at a primary call center, a remote facility or even at home.

CTI also enables call center agents to work collaboratively. Completing one or more transactions via an 800 call often requires interacting with several different agents. Information about the caller—for example, his or her account number, the reason for the call, the steps that have already been taken during the call, etc.—can be passed from one agent to another, or from an agent to a supervisor if special questions or problems arise. The caller doesn't have to endure what often seems like endless repetition of basic information, and the agents don't have to waste time on questions that have already been asked and answered.

Integrated Messaging: Perhaps no single application has revolutionized the way workgroups operate more than messaging. Messaging systems are everywhere—at the end of 1994, over 20 million voice mailboxes had been installed worldwide, and every day, over 10 million text mail and store-and-forward text messages are sent across the public Internet and private corporate networks.

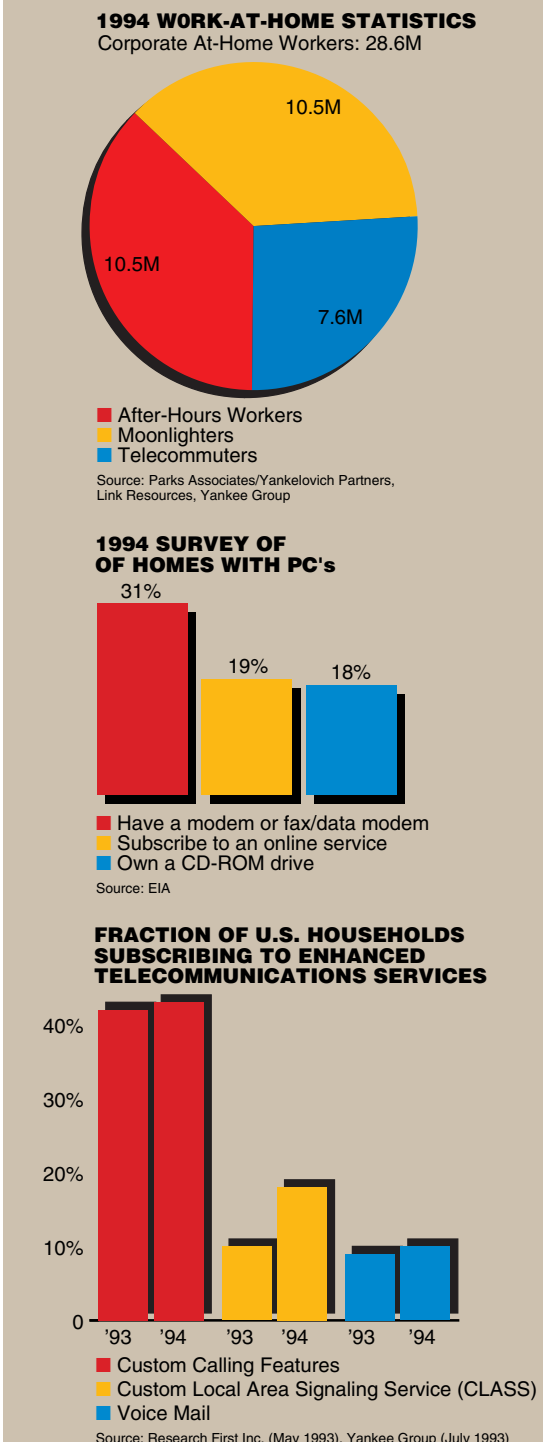
While each of the various forms of messaging—voice, E-mail and fax—evolved independently, they are becoming more tightly integrated. The familiar message-waiting lights on telephone systems that notify users if they have a voice message also can let them know when fax messages have arrived. The faxes can be stored in servers, and the telephone key pad can be used to send the fax to the nearest fax machine for printing. Similarly, public and private E-mail systems enable users to create, send and receive either regular text messages or facsimiles from PCs. And, as noted above, voice messages can be "attached" to E-mail.

Video communications is perhaps the ultimate form of integrated messaging. There are now more than 100,000 videoconferencing sites around the globe, and companies like Boeing, Mobil, Xerox and American Express have incorporated videoconferencing into their day-to-day operations.

Just as traditional messaging technologies are becoming more integrated, video is being packaged with more familiar communications systems. For example, video can be implemented in a standalone network or operate in conjunction with a PBX and take advantage of the PBX's bandwidth management capabilities. Similarly, video can be distributed to desktops over ISDN facilities or via a local area network.

While there are many technological options for how the concept of integrated messaging can be implemented and administered, there is one clear implication for

FIGURE 1. WORK-AT-HOME CAPABILITIES GROW



MODERN COMMUNICATIONS—EVERYTHING IT'S QUACKED UP TO BE

Ugly Duckling is in a tough business—it specializes in selling used cars to customers with credit problems. In order to achieve top-quality customer service, track accounts more closely and drive productivity, it has turned to a modern integrated network dubbed DuckNet.

Ugly Duckling is headquartered in Phoenix and has 11 sales locations in the Phoenix and Tucson areas, which are 125 miles apart. The company ran into difficulty coordinating data that was needed to track accounts. For example, delinquent customers were able to come onto Ugly Duckling's lots, get service or make loan payments and then leave—even if there was a repossession order on their automobile.

If an agent was trying to collect on a delinquent loan and the customer claimed to have just made the payment, the agent had to call Tucson and ask someone to look up the customer's file. Agents were spending a lot of time manually retrieving records from file cabinets instead of bringing in revenue. Large phone bills were being incurred because of toll charges between locations.

Then Ugly Duckling turned to Siemens Rolm, and together they created DuckNet. T1 links now connect ROLM 9200 CBXs in Phoenix and Tucson, and employees at any sales location can reach other sales offices with simple, five-digit dialing. This saves dialing time and minimizes long distance charges.

DuckNet also relies on the NetAsset 1200, part of Siemens Rolm's family of internetworking products, which combines frame relay, packet switching and circuit switching. DuckNet uses frame relay to allocate bandwidth among data, voice and video more efficiently.

The sales staff now uses PCs that are connected to a host through local and wide area networks to get fast responses to credit applications and questions. The system tracks the status of nearly 10,000 loans, and when payments are received, the information is immediately logged into the system, which any agent can access.

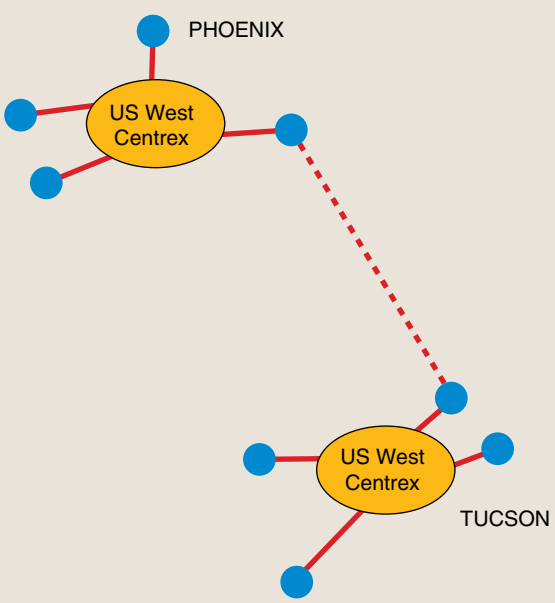
All this translates into greater productivity, revenues and profits. At the beginning of 1994, Ugly Duckling had about 2,000 active accounts; by September, the number was 8,000 and growing. Accounts receivable had increased from $5.5 million to $20 million. "With this network, we have information at the car lots—where we need it—when we need it," said Steven Darak, president of Ugly Duckling Credit Corporation.

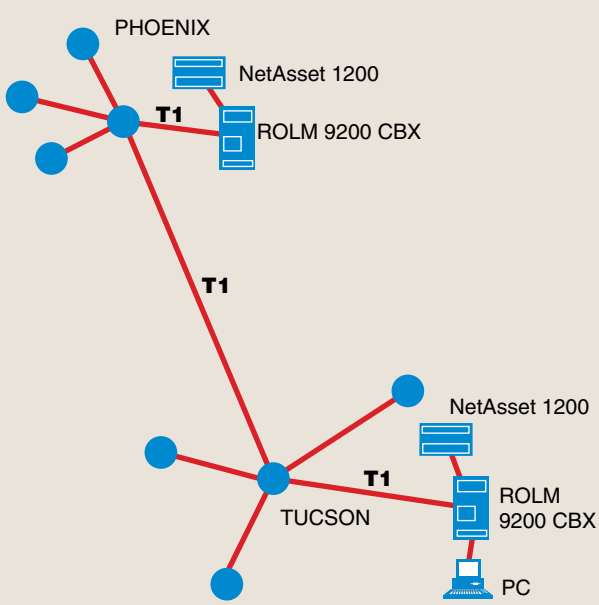
The company intends to implement imaging, so copies of documents such as credit applications and loan documents can be scanned into online records. This will further reduce the amount of time agents have to spend away from their stations checking files. Ugly Duckling is also studying other Rolm offerings, such as predictive dialing, which can increase agent productivity by sending agents only those calls answered by people. It is also studying the ROLM CallBridge switch-to-host link, which delivers caller information to an agent's screen at the same time the call arrives.

Is Darak a believer? You bet. He said, "We couldn't be in the business we're in without this technology."

BEFORE DUCKNET
- Leased Centrex lines
- Voice only
- Toll calls between Phoenix and Tuscon

AFTER DUCKNET
- All T1 lines
- All headquarters and sales location networked
- Voice and frame relay to every location
- Video
- Imaging
- Revenue quadrupled in 9 months
- Customers tripled in 9 months





Source: Siemens Rolm Communications

workgroups: It makes them more productive—whatever information needs to be shared becomes available in whatever format is required.

The Architecture for Collaborative Work

In order for team members to "work together while apart," there has to be a solid foundation of networking and information technology. The overall system and the rules that govern it are referred to as an "architecture," and the most popular architectures are called "distributed networking" and "client-server."

Distributed networking involves interconnecting multiple networks, such as LANs and PBXs, to a wide-area backbone network. This enables capabilities like enterprise-wide voice mail and electronic text mail.

Client-server architectures involve specifying interfaces between end users (they're the "clients") and the resources they use (such as a storage server for multimedia messaging, or a communication server for accessing a T1 backbone network).

The early client-server architectures were found in mainframe environments, and they have since migrated to LANs. Client software now resides on PCs and workstations, while server software is found on network-based computers. A high-speed LAN interconnects the client and server so the end user can enjoy adequate response time. Similarly, voice switching systems such as PBXs have client software resident in terminals and server software in the main switching system.

A successful IT architecture needs several characteristics:

- Well-defined interfaces between the various hardware and software elements so that each properly interacts with all the components connected to it. For example, the interfaces define how a PC on someone's desk and a computer located elsewhere on the network will interconnect to share information.

- Ease of use: The architecture has to be designed in a way that shields the workgroup from all the details about how the subsystems perform. Most end users could care less about terms like "distributed networking" or "client-server" architectures. What they want—and deserve—is easy access to information in whatever form is most appropriate, whenever and wherever they wish. However, don't underestimate what it will take to meet that goal—typically, millions of lines of software code and hundreds of hardware components need to be masked and managed.

  The telephone network provides a effective model for how this should evolve. Even though millions of us use it every day, only a tiny fraction know how the global network processes telephone calls. The network computing industry is striving to be equally "user friendly," and while we've come a long way, there is still a long way to go. Providing effective and easy access to information remains the most significant hurdle to overcome before workgroup collaboration can evolve to the next plateau.

- A high level of system integration: No single entity—user, equipment vendor or service provider—can deliver all of the capabilities to meet the requirements for backbone networks, the hardware and software that supports decentralized workgroups and the management systems associated with modern information technology and communications networks.

  The need to mix and match products and services from multiple vendors translates into the need for open (i.e., nonproprietary) interfaces that are supported across the industry. The key is to enable network managers, acting either as their own system integrators or working with specialized third parties, to rapidly assemble the infrastructure to support workgroup collaboration. Open systems—information systems with public (nonproprietary) interfaces—enable us to have more choices in hardware, software and network services than closed/proprietary interfaces.

  If you think about what you can do with familiar voice telephones, the importance of open systems becomes clear. No matter where you are in the world, you can pick up a phone and call home, the office or virtually anywhere or anyone you wish to reach. The person on the receiving end can put your call on hold, transfer you to someone else in the organization and often conference your call with a third and even a fourth person. The recent Versit announcement by Siemens Rolm, IBM, AT&T, and Apple promises similar breakthroughs in computing and computer networking.

Open interfaces enable network managers to rapidly assemble the infrastructure they need

Workgroups will proliferate and productivity will improve when fully featured smart telephones, multimedia personal computers, and personal information management software begin to support public open interfaces.

■ Consistent capabilities: "Working together apart" is an achievable goal, but the underlying networking and IT architecture needs to make the process easier, more comprehensive and more portable. Despite the advances described above, the capabilities that individuals enjoy in the office (with fully featured telephones and PCs connected to a network) are usually superior to what can be accomplished outside the office—at a customer site, or when working at a hotel, on an airplane or at home.

Here is what the not-too-distant future might hold. Suppose you use an airport payphone to retrieve your messages. You dial into the corporate telephone network and are transferred into the integrated messaging system. It uses voice response technology to inform you that there are six messages—three voice mail, two text mail and one fax.

If you need to know who sent you the fax message, you would use your telephone key pad to direct the architecture to convert the information on the fax cover sheet to text. Then, since the payphone terminal can only communicate voice, another conversion—this one from text to speech—would take place.

The technology to implement this application is still evolving, but work is already under way to provide a single point of access—either a telephone number or a character string (e.g., a name)—that enables a workgroup member to access the full range of corporate IT and networking capabilities, regardless of their location. In the same way that automatic teller machines provide a consistent interface with well-defined capabilities, this single point of access will be the entry point into a workgroup's information system. It will provide a consistent set of menus and forms and enable workgroup members to interact and share information quickly and efficiently.

Conclusion

"Working together apart" isn't just a slogan, it is how modern organizations carry out their mission. The underlying information and communication systems that support collaborative work empower individuals, workgroups and the entire organization by enabling information to be shared whenever and wherever it is appropriate and in whatever form is most convenient. It has already had dramatic implications for how businesses are structured and how we balance the competing demands on our personal and professional lives.

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INFO TECHNOLOGY'S LONG HISTORY IN COLLABORATIVE WORK

The power of information technology to support collaborative work was realized over 150 years ago, when the telegraph was used to coordinate local railroad operations, first across regions and then across nations. Similarly, in the 1880s, telephones began being used to coordinate local business operations before going national and then international.

What we now know as fax first came into the market during the mid-1920s, and the application was to transmit photographs. It helped reshape the news-gathering and reporting business, as local organizations and workgroups were reorganized into national wire services.

During the 1970s, computer-controlled private branch exchanges (PBXs) began to link companies with features like call forwarding and conference calls, and also for specialized, dedicated applications such as call centers. During that same decade, mission-critical operations began to be deployed on terminal-mainframe data networks, and we were introduced to electronic text mail systems such as PROFS.

The pattern repeated during the 1980s, with workgroups deploying new voice mail and modern facsimile technologies, videoconferencing and local area networking with electronic mail. Today's E-mail systems go beyond simple text to support fax, voice and, over time, even video. By the end of the 1990s, workgroups with members located virtually anywhere around the globe will be able to communicate in multimedia—text, images, motion video and voice/audio will be combined within a single transmission or message.

INFORMATION SYSTEMS TECHNOLOGY TIMELINE

Technology	Initial Service	Global Installed Base (1994)
Voice telephone	1878	700+ million
Voice switching	1879	100,000+ systems
Fax	1926	10+ million fax modems
Electronic mail	1952	30+ million E-mail boxes
Computer PBX	1962	25+ million computer-controlled PBXs
Toll-free calling	1965	5+ million 800-like global phone numbers
Videoconferencing	1969	1+ million video codecs
Voice mail	1975	20+ million voice mail boxes
LAN ports	1979	15+ million ports

Source: ITU, AT&T, IBM, Wall Street Investment Banking Research