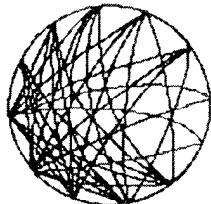


Lessons from the Past

Stories about World-class Collaboration

by Jessica Lipnack and Jeffrey Stamps



Through the Wormhole

NCR

“Hey, Gene. I’ve been meaning to talk to you,” Cathy Black, a computer engineer for NCR Corporation, called out, walking into the conference room. “Is this a good time?”

“Just great,” her colleague, Gene Young, a computer architect, replied. “I need to talk to you too. Have a seat.”

Cathy, the manager of “Scaleable Systems” for the project, spotted Gene, an NCR Fellow, “sitting there” as she was going down the hall to get a cup of coffee. Nothing unusual about this scene—one person needs to talk to another, asks if this is a convenient time, and sits down. Then why are the words “sitting there” in quotation marks? Because Cathy was in San Diego, California, and Gene was in Columbia, South Carolina, and suddenly they were both sitting down at the same table. Is this possible?

Not literally, but almost. Cathy and Gene, both members of the same team, worked together on a daily basis even though a continent separated them. They discussed strategy, argued points, solved problems, made presentations, exchanged documents, used flip charts, and shared files. Nor did they work only with each other. Their project colleagues numbered more than 1000 who worked for more than 11 months in three locations (including Naperville, Illinois) to develop a next generation computer system.

The three-site virtual team was connected by the a high-speed full-bandwidth continuously available audio/video/data linkⁱ that they affectionately nicknamed “the Worm Hole.” The Worm Hole—think of it as “a portal of instant transport from one place in the universe to another”—comes from the *Star Trek* TV show *Deep Space Nine*, which suggests such an intergalactic phenomenon in its opening credits sequence.

Making Its Mark With WorldMark

Cathy and Gene and their colleagues were all members of Dayton, Ohio, based NCR's new product development team for its WorldMark™ line of enterprise computer servers. These servers are today what mainframe computers used to be—places that house massive amounts of data and shared software made available to myriad individual users (known in the computer trade as clients).

The WorldMark development process accomplished something that few technology projects do: It met the market four months ahead of schedule. (So frequent are delays in technology development that there is no commonly used word to describe a project which does the opposite of “slip.”) WorldMark is a great example of a globally distributed, cross-organizational virtual team. Guided by a clear purpose, the team used the most advanced communication links that we have encountered in the course of our research.

WorldMark's product family spanned, rather than simply filled, major market segments. The product can scale from relatively small computer configurations that link a few processors (the chips that are the computer's brains) to huge ones—very large scale massively parallel processors. Such behemoths can only be meaningfully described to lay people by the weight of the disks they use: In 1996, its 11 terabyte (a million megabytes) version weighs 20 tons. Such “terabrutes,” as the NCR people jokingly call them, are used in organizations that manage massive amounts of data, such as banks, large retailers, telecommunications companies and other organizations with global data infrastructures.

For NCR, the development of the WorldMark line turned into an epic project for the rebirth of the company. Founded in 1884 as the National Cash Register Company, the maker of the first mechanical point-of-sale devices initially got into the computer business in 1952. AT&T acquired the company in 1991, renaming it AT&T Global Information Solutions (GIS) in 1994. When AT&T announced its decision to break up into three separate companies in 1995, it named GIS as one of the units to be spun off. It would become an independent publicly traded unit—as the “once and future” NCR. While renewed independence was appealing to NCR and its newly named Chairman and CEO Lars Nyberg, its corporate challenge was considerable. With 1995 losses of \$722 million, NCR was looking to WorldMark along with several other initiatives to help return the company to growth and profitability.

It did. By the second quarter of 1996, NCR reported operating income of \$11 million and the company appeared to be on the upswing. WorldMark's expedited entry into the highly competitive computer server market was a significant contributor to increased revenues. It represented both a process and a product success.

Instant Communication through the Worm Hole

“We used various communications mechanisms to keep this very, very far flung team together,” says Dennis Roberson, Chief Technology Officer and an NCR senior vice president. “The activities between San Diego, Columbia, and Naperville in particular were kept together through the Worm Hole.”

Roberson is a veteran of 25 years of doing projects involving people situated in geographically separate locations. “Misunderstandings are always a part of it,” he says. “They are something you have to work very hard to fix from a management stand-point. In projects like these, there is always a characteristic lack of trust, particularly when you have groups in different time zones. The boundary lines between groups are not always clear. You’ve got existing groups and existing emotions and the challenge is to make everyone feel like part of the same organization.”

One solution was the Worm Hole, which is, in Roberson’s words, “video conferencing taken to its logical next step. It is a continuously open lease line so that you can have a meeting any time you want to. With the high performance of the link, it’s just like being there.” Because of the quality of the telecommunications connection, there was “no strobe light effect and the sometimes not so humorous delays,” Roberson says. He refers to the annoying aspects that people associate with what he dubs “traditional” video conferencing. “All of that was overcome by the technology and great bandwidth,” he explains.

“We did some nice things with the link between Columbia and San Diego. The grain of the wood on the table is the same in both sites so it looked the same,” he recalls. By angling the cameras properly—there were two or three in each location along with 32-inch television screens—the desk in one location blends right into the desk in the other location. “It was just a bright engineer who thought of that level of detail,” Roberson remembers. “That sort of thing really helps create the feeling of ‘being there.’ It’s the only room of its type that I’ve experienced where you really do forget that you’re not in the same place.”

This proved so true to the group that it created its own standing joke. With its three-hour coast-to-coast time difference, one group always seemed to be having lunch while the other was not. “Someone was always saying, ‘Can I pass you a sandwich?’ People thought they should because they felt like they were in the same room. People couldn’t help but make the offer and then laugh about it.”

Each of the screens in the Worm Hole served a different purpose. One showed the people at other end. A second was the equivalent of an overhead projector that electronically projects foils onto the screen. The third was a standard PC monitor that facilitated information sharing and distribution.

As important as the Worm Hole was for organized meetings—the system could accommodate up to three sites simultaneously with as many people at each site as could comfortably fit into the 18-by-24 foot conference rooms—“the next step is even more amazing and more desirable,” Roberson says. “When the rooms are not being used for meetings, the doors are left open and people do in fact ‘meet in the hall.’ Someone yells out through the tube and you have meetings that take place on the fly. It’s an extremely valuable way to do distributed product development. It keeps people in sync and creates the feeling of one team rather than several teams.

“It [the Worm Hole] lets you feel much more tightly connected. However, it doesn’t completely reduce the requirement for travel. You still have some need for being together and sharing meals and for very large meetings where you can’t fit everyone into the lens of the camera. But it certainly reduces the frequency of trips.”

Network of Partner Teams

The three-site hardware and systems software engineering group was only one team within a network of WorldMark development program partners. It comprised internal groups, external partners, and customers. First, there were the groups that were internal to NCR:

- The core development groups in California, South Carolina, and Illinois, which were supported by groups in two locations in India and one in China;
- The database development group in El Segundo, California;
- A communications software group in Lincroft, New Jersey;
- Marketing and administrative groups which were located at NCR's headquarters, Dayton, Ohio; and
- The manufacturing sites in South Carolina and Dublin, Ireland.

Then there were the outside partners:

- Intel in California and Oregon, which provided the basic processors;
- EMC in Massachusetts, which provided disk arrays that supply the system with memory capacity,
- Symbios Logic (which was a part of NCR when the project began but was sold to Hyundai while the product was being designed) in Wichita, Kansas, which also provided disk arrays;
- Informix in California and Oregon, which provided database systems for the new line of machines;
- Microsoft in Washington State, which provided operating system software support; and,
- Many others including customers as well as additional suppliers.

Each of these partners had an internal team focused on WorldMark, with its own communications needs, as the system development group did. Sets of different partners then needed different mixes of connections depending on the work they were doing together (i.e., the need to exchange large files). The program as a whole needed to communicate across the many physical and organizational boundaries represented by the network of teams—the WorldMark teamnet.

Many Modes of Communication

Although few organizations today have such communications power available to them, the glimpse of the future that NCR offers carries important lessons for all virtual teams:

Use multiple media to offer many pathways for interactions and the development of relationships.

“You need to carefully blend in and utilize each tool for its intended purpose,” Roberson says.

Voice

Because the telephone is so basic to work-at-a-distance, we scarcely reflect on how remarkable this voice-extension capacity is—and how it is continuing to evolve.

The WorldMark project made modifications to its voicemail system to ease the complexity that springs up among multiple players. “Voicemail had been around for a long time and it was a very good capability. But we decided that wasn’t really good enough because we were doing team development and our teams were spread around the world,” Roberson says. So they enhanced the addressing ability of their voicemail system to create one “virtual site.” Usually, people have to dial different codes on the system for different buildings, cities, or countries and leave separate messages for each person. Instead, the enhanced system allowed people to send a single message to any subgroup of the team or, if appropriate, the entire team.

Video

Beyond voice connections that are basic to all virtual teams, video channels also can be interactive. For the WorldMark virtual team, the Worm Hole was not the only type of video link used to bind the disparate project group.

The team used “traditional” video conferences to link project partners, including the Indian and Chinese sites where high-quality telecommunications links are scarce. “This was one of the handy features of having AT&T as a part of us,” Roberson observes. With AT&T’s global communications infrastructure, the team minimized problems that most companies face in countries where telecommunication is still under development.

The WorldMark program also used desktop video conferencing—where a camera is mounted on the top of a person’s computer monitor. Desktop video conferencing allows a small number of people to hear and see one another through small windows on their personal screens, as though they were gathering informally in a colleague’s office.

Computer

In addition to numerous audio and video links, “the group also used more standard secured computer-based communication connections heavily,” Roberson says. They used basic e-mail, available to everyone, with the capability of “embedding

information”—the electronic equivalent of attaching multiple packages of any size to a letter. It was not atypical for an e-mail to contain ten embedded files each containing 25 pages of documentation—marketing plans, service plans, detailed schedules, product specifications, spreadsheets, charts, even near-photographic-quality images. “The extent to which we embedded files probably took the state-of-the-art up a level,” he says. The team also used intranet-based discussion groups to keep members updated on the project.

With all of this data and communication speeding around the world, the team naturally built its own knowledge center. It was linked to NCR’s corporate information repository (data warehouse) that houses most of the relevant information for the company. The repository is available through conventional file access as well as through the company’s internal Web-based intranets.

Face-to-Face

Like most virtual teams, WorldMark members also met face-to-face. Coming full circle, Roberson remarks, “We still met, of course. There were lots of meetings. You still need all-hands meetings. With all this wonderful technology and shared information, they still don’t replace the need to get together with the whole team in a particular site and communicate with them on what’s going on, on what the direction is, and on the importance of their contributions.”

However, unlike many major virtual team projects, this one had no memorable kick-off event nor did the *entire* group ever come together face-to-face. “We didn’t have to because we had greatly enhanced other forms of communication,” Roberson says.

Communications Is A Process

As exciting and effective as the technology used on this project was, the WorldMark project had something else. It never would never have hit the mark without a comprehensive planning and project management system that kept information flowing to the right people at the right time. Using what it calls its “Global Realization Process,” the team was able to track and measure its progress on monthly, weekly, and even daily basis. The process convened cross-functional team leaders for monthly meetings to evaluate where the project stood relative to the plan. They in turn reported their progress to a senior executive team that closely monitored development.

Even though this very large effort successfully combined all the elements of a virtual team—the people, the purpose, and the links—Roberson says that there was “still more to learn and more to do. The engineering side was done in a pretty spectacular fashion but we didn’t have as complete a connection to all of the stakeholders as was needed. The people in sales groups particularly outside the U.S. could have been involved earlier and we had to mount a double-time effort with sales training. When you pull the schedule forward, you don’t always pull everyone with you. It was a pretty massive development activity sited around the world and yet we accomplished it in record time.”

Overall, links made the difference for the WorldMark virtual team—links of media, interactions, and relationships.

- WorldMark paid attention to its need for *physical connections* with face-to-face, audio, video, and computer media.
- The program managers set action items, articulated processes, and blazed new pathways for *boundary-crossing interactions* using its Global Realization Process.
- And, they laid the basis for strong *trusting relationships* that developed over time as people worked together.

ⁱ Technically, this high speed, high bandwidth connection is called a “switched T1 line.”