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About the author: Tom Davenport, professor of Information Management at the University of Texas, Austin, is best known for his research on how organizations bring about major innovations in their work processes. His 1993 book, *Process Innovation: Reengineering Work through Information Technology*, was the first book to describe what has become known as “business reengineering.” More recently, Davenport’s research interest has shifted to the question of whether “knowledge work” is characterized by processes and amenable to process improvement. Last year, he published “Improving Knowledge Work Processes” in *Sloan Management Review*. He also has two books forthcoming on related topics.

Hewlett-Packard is a large, successful company with over \$38 billion in 1996 revenues. Its fast annual revenue growth—approximately 30%—from such a large base has astounded observers. The company competes in many markets, including computers and peripheral equipment, test and measurement devices, electronic components, and medical devices. It has 112, 000 employees and over 600 locations around the world.

HP is known for its relaxed, open culture. All employees, including the CEO, work in open cubicles. Many employees are technically-oriented engineers who enjoy learning and sharing their knowledge. The company is perceived as being somewhat benevolent to its employees, and fast growth has obviated the need for major layoffs. All employees participate in a profit-sharing program. The company is also known for its decentralized organizational structure and mode of operations. Business units that perform well have a very high degree of autonomy. There is little organized sharing of information, resources, or employees across units. HP managers feel that

the strong business-specific focus brought by decentralization is a key factor in the firm's recent success. Although culturally open to sharing, few business units are willing to invest time or money in "leveraged" efforts that do not have an obvious and immediate payback for the unit.

If ever there were a "knowledge-intensive" company, it's Hewlett-Packard, the huge and hugely successful hightech firm. There is widespread recognition at HP that its knowledge—about markets, products, and customers—is its biggest source of competitive advantage. But because the firm is highly decentralized, its knowledge is dispersed across business units that have little perceived need to share with one another. In such an environment, it's no surprise that knowledge management efforts have proliferated. Three notable ones have been: the "Trainers' Trading Post"; the "Connex" guide to internal experts; and "HP Network News," a resource for HP dealers. All have been successful, leading managers to the conclusion that knowledge, like the firm that houses it, may not require a central management function. Instead, the emphasis is on building awareness of and sharing lessons from the many projects underway.

Common, however, for employees to move from one business unit to another; this mobility makes possible some degree of informal knowledge transfer within HP. In mid-1995 it became apparent that several knowledge management initiatives were underway in various HP business units. Some had been in place for several years; others were just beginning. Noticing this phenomenon, Bob Walker, HP's CIO and Vice President, and Chuck Sieloff, Manager of Information Systems Services and Technology (ISST), decided to attempt to facilitate knowledge management at HP by holding a series of

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workshops on the topic. Their idea was to bring together a diverse group of people within the company who were already doing knowledge management in some form, or who were interested in getting started. The corporate ISST group had previously sponsored similar workshop initiatives in the areas of reengineering and organizational change management. Key objectives for the workshops included the facilitation of knowledge sharing through informal networking, and the establishment of common language and management frameworks for knowledge management. Walker and Sieloff appointed Joe Schneider, an ISST staff member who also focused on Web-based systems, to organize the workshops.

The first workshop was held in October of 1995. An outside consultant facilitated the meeting, and presented some proposed definitions and frameworks. About 20 people attended the first session; from corporate units, and the rest from various business units. Joe Schneider asked participants at the meeting if they were aware of other knowledge management initiatives. From this discussion Schneider compiled a list of more than 20 HP sites where some form of proactive knowledge management was underway. Several of the initiatives are described below.

Trainer's Trading Post One knowledge management initiative involves HP educators. Bruce Karney is a member of the infrastructure team for the Corporate Education organization, part of HP's Personnel function. Karney estimates that there are more than 2,000 educators or trainers distributed around HP, most of whom work within small groups and find it difficult to share knowledge. About two years ago, in response to complaints by the education community that "we don't know what's going on," Karney began

work on approaches to knowledge sharing for HP educators. He hoped to make the group more of a community; until this effort, it had no shared history, process, or tool set.

“Trainer’s Trading Post” is a Lotus Notes-based forum to help HP’s thousands of internal trainers and educators share ideas, materials, and methods. This group obviously appreciates the value of knowledge transfer, but motivating them to participate still requires an “evangelist.” “Connex” is short for “connection to experts.” It’s a guide to knowledgeable people within HP Laboratories, the company’s research arm. “Knowledge Links” was prototyped by a group supporting new product generation, and was to have housed a variety of knowledge important to that function. The design was overly ambitious, however, and in the end the system was not built.

Using Lotus Notes as the technology vehicle, Karney established three different “knowledge bases” for educators to use: “Trainer’s Trading Post,” a discussion database on training topics; “Training Library,” a collection of training documents (e. g., course binders); “Training Review,” a “Consumer Reports” collection of evaluations of training resources. Training Review never took off; educators were reluctant to opine online about the worth of course materials or external providers, and there was no reward structure for participating. It was therefore merged with Trainer’s Trading Post. Training Library did receive many contributions, but as participants discovered that they could attach materials to submissions to Trainer’s Trading Post, that knowledge base became the dominant medium for educator use, and Karney expects that it will be the sole offering in the future. Karney adopted innovative tactics to get submissions to the knowledge bases. He gave out

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free Notes licenses to prospective users. When a new knowledge base was established, he gave out 3,000 free airline miles for the first 50 readers and another 500 miles for anyone who posted a submission. Later promotions involved miles for contributions, for questions, and for responses to questions. By early 1996, more than two-thirds of the identified educator community had read at least one posting, and more than a third had submitted a posting or comment themselves. Still, Karney was frustrated. Despite his countless attempts with free miles and e-mail and voice mail exhortations, he still felt the need to continually scare up fresh contributions.

“The participation numbers are still creeping up,” he notes, “but this would have failed without an evangelist. Even at this advanced stage, if I got run over by a beer truck, this database would be in trouble.” Building a Network of Experts Another knowledge project was initiated by the library function within HP Laboratories, the company’s research arm. The goal of this project is to provide a guide to human knowledge resources within the Labs and, eventually, to other parts of Hewlett-Packard. If successful, the guide will help to address a problem identified by a previous director of the Labs: “If only HP knew what HP knows.” The directory of HP experts, called Connex, is being developed by Tony Carrozza, an “Information Technical Engineer.” He has been working part-time on the project for almost a year; the system is scheduled to go into its pilot phase soon.

It uses a Web browser as an interface to a relational database. The primary content of the database is a set of expert “profiles,” or guides to the backgrounds and expertise of individuals who are knowledgeable on particular topics. By browsing or searching Connex, it will be easy to find, for

example, someone in HP who speaks German, knows ISDN technology, and has a master's or PhD in a technical field. Upon finding someone, the searcher can quickly link to the individual's home page if it exists. One concern Carrozza has is how to create a manageable list of knowledge categories in the database that will be widely understood and will accurately reflect the Labs' broad universe of knowledge. Carrozza plans to rely on the experts themselves to furnish their original knowledge profiles and to maintain them over time.

He expects that this will be a challenge, and speculated that experts might be given incentives—for example, Carrozza suggested, “ a Dove Bar for each profile”—to submit and maintain profiles. As a back-up, a “ nag” feature is built into the system to remind people to update their profiles. Carrozza also anticipates that there may be problems with the term “ expert”; he is trying to identify less politically laden terms. Connex will be implemented initially for the Labs, but Carrozza hopes that the expert network will eventually expand throughout all of HP. He knows that other parts of the company will be developing their own databases, but he hopes that they will use the Connex structure. He is already working with the Corporate Education group described above to create a network of educators using Connex. He adds, “ I know other people are building expert databases. I just don't know who they are.”

Knowledge Management on Product Processes HP's Product Processes

Organization (PPO) is a corporate group with the mission of advancing product development and introduction. It includes such diverse functions as Corporate Quality, Procurement, Product Marketing, Safety and

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Environmental, and Organizational Change. The Product Generation Information Systems (PGIS) group serves each of these functions. Bill Kay, the PPO director, put PGIS at the center of the PPO organization chart because he felt that information management needed to become a core competence of PPO. As part of that competence, Kay asked Garry Gray, the manager of PGIS, and Judy Lewis, another PGIS manager, to begin a knowledge management initiative. As a “proof of concept” the PPO knowledge management group developed Knowledge Links, a Web-based collection of product development knowledge from the various PPO functions. Consistent with the philosophy of the knowledge management group, Knowledge Links contained knowledge contributed by “knowledge reporters and editors,” who obtained it through interviews with experts. The system prototype has been used many times to demonstrate the concept of knowledge management with PPO “customers,” but the goal of summarizing knowledge across PPO proved overly ambitious, and the system was never built.

“HP Network News” began as a simple database of the questions frequently asked of the Computer Products Organization by HP’s network of dealers. Because dealers have direct access to it, it has significantly reduced the number of phone calls to HP technical support. The database is constantly mined and carefully managed for even greater usefulness. This is a classic example of leveraging knowledge, and has been highly successful.

The PPO knowledge management group is currently working on three projects. One involves competitor information for HP’s Components group. The goal of the second project is to create a Web-based interface to primary

and secondary research information. The third system manages international marketing intelligence. Each of these projects is being developed in a collaboration between PGIS and other PPO groups, e. g., Product Marketing and Change Management. The goal is not for PGIS to manage knowledge by itself, but rather to facilitate the process of structuring and disseminating knowledge through the use of information technology. Managing Knowledge for the Computer Dealer Channel Perhaps one of the earliest initiatives to explicitly manage knowledge at HP was an effort to capture and leverage HP product knowledge for the Computer Products Organization (CPO) dealer channel. It began in 1985. Technical support for the dealer channel had previously involved answering phone calls; the business unit was growing at 40% annually, and calls from dealers were growing at the same rate. Eventually, answering all the phone calls would require all the people in Northern California. HP workers began to put frequently-asked questions on a dial-up database, and the number of dealer support calls began to decline. According to David Akers, who managed the project, the development group views each support call as an error.

The system came to be called HP Network News. It was converted to Lotus Notes and has been remarkably successful in reducing the number of calls. One key reason for the system's effectiveness is the developers' close attention to the actual problems faced by dealers—not their own ideas about what knowledge is important. Another important factor is the constant effort by developers to add value to the knowledge. For example, lists are constantly made of the most frequently asked questions, frequently encountered problems, and most popular products. These lists are publicized

and dealers are encouraged to download the information from the Notes database. Less valuable information is pruned away. HP Network News is still going after 10 years, and it has been a significant factor in the high support ratings HP receives from its dealers. Summary Chuck Sieloff and Joe Schneider are committed to advancing the state of knowledge management, but in a decentralized company like Hewlett-Packard, it is not clear what steps should be taken. They discuss whether there are actions they could take beyond facilitating the Knowledge Management Workshop. They feel that knowledge is already exchanged well within work groups and even business units, but there is little support in the culture for sharing across units. However, for ISST to try to change the culture just for the purpose of knowledge management seems like the tail wagging the dog.

Schneider and Sieloff also wonder just how different managing “knowledge” is from managing information. Many of the HP initiatives are arguably a mixture of knowledge and information, and drawing the line between the two is difficult. Sieloff feels that the same fact could be either data, information, or knowledge for different people. Of course, the various information systems groups at HP have a great deal of experience at managing data and information. How relevant is the experience gained in these areas to problems of knowledge management? Schneider believes that facilitating knowledge management at HP can be viewed as a knowledge management problem. The company has both internal expertise and external sources of knowledge on knowledge management.

At the corporate level, Schneider is using the workshops as one mechanism to understand who needs this knowledge and how best to transfer it. He also

wants to get the workshop participants involved in an ongoing knowledge management network that shares best practices and transfers emerging knowledge. However, neither Chuck Sieloff nor Joe Schneider has knowledge management as the only component (or in Sieloff's case, even a major component) of his job. They know that other firms are establishing permanent, full-time positions overseeing knowledge management issues at the corporate level—a " Chief Knowledge Officer," for example. When Sieloff and

Schneider discuss the concept with regard to HP, they question whether a corporate knowledge executive would make sense in such a decentralized company. The current HP approach, which emphasizes awareness-building and the development of common vocabulary and frameworks through workshops, is a subtle one. The two managers feel it is appropriate for HP's culture, but they are always looking for other techniques and methods that might be introduced. This case was prepared with research assistance from David De Long.