

Getting the Most from R&D Information Services

Graef, Jean L., Research-Technology Management

Traditional IS organizations are restructuring to meet new needs. Here's what that means for R&D leaders.

OVERVIEW: To provide better service for R&D users and get a higher return on investments in information technology, some companies in the chemical, pharmaceutical and engineering industries are moving from a hierarchical, functional IS organization structure to a "mixed" structure. In the new structure, certain "generic" IS functions, such as telecommunications and hardware maintenance, are migrating to the corporate level or being outsourced to third parties. Other IS functions serving specialized R&D needs are moving closer to individual business units, being handled by cross-functional teams, or being performed by strategic partners. The new structures often require new roles, such as the "account representative" who services the R&D IS "customer" and represents its interests at the corporate level. Benefits include faster time to market as well as higher return on both physical and intellectual assets.

In recent years, many R&D-intensive companies have reorganized the information services (IS) functions that support research. These changes are being driven by business, scientific and technical factors. On the business side, global competition requires business functions to work more closely together to reduce costs and shorten time to market. On the technology front, scientists and engineers are producing many more new products or compounds in a shorter time. Meanwhile, advances in information technology have made possible global information sharing, large-scale conversion of paper documents to searchable databases, and a reduction of both the time and expense in collecting data. The phenomenal growth of the Internet has allowed people to access sophisticated information capabilities such as global E-mail, hypertext publishing, and information retrieval from home-long before they are available at work.

As a result, R&D users of information services are becoming more sophisticated, demanding and intolerant of poor service. At the same time, finance and IS managers are looking for ways to get a better return on corporate as well as R&D investments in information technology, and to reduce the costs associated with acquiring and supporting new technology.

From Hierarchy to 'Mixed'

To accommodate better service for users, as well as to contain or reduce costs, many companies are moving from a hierarchical, functional IS organization structure (Figure 1) to a "mixed" structure. Here, certain R&D IS functions migrate to the corporate level, others remain in R&D or move to strategic business units, and the remainder are contracted to an external service organization or performed by strategic partners (Figure 2).

Research conducted at 19 pharmaceutical, 3 engineering and 4 chemical companies during the summer of 1996 revealed that the new organization structures have some or all of the following characteristics:

1. Centralizing telecommunications, hardware, and "generic" software functions in a corporate MIS department under a chief information officer (CIO).
2. Assigning corporate IS staff to R&D for special projects, and billing each R&D project as if R&D were a "customer."
3. Appointing IS "account representatives" for R&D clients who "sell" IS services to R&D project directors, manage the projects so that R&D remains a "satisfied client," and advocate R&D interests with corporate IS management.
4. Linking R&D information technology and content with the rest of the organization via Lotus Notes or a private Internet subnetwork ("intranet").
5. Incorporating R&D information technology and content needs into corporate financial, technical and security plans.
6. Appointing a corporate CIO who is "customer-oriented," focusing on delivering IS services that support corporate strategy, and meeting corporate financial goals.
7. Moving from a physical to a "virtual" library (where primary and secondary information resources can be accessed electronically from anywhere in the world), and moving proprietary and scientific information services under the R&D IS umbrella.

Old vs. New Organization Patterns

Our interviews revealed pros and cons for both traditional and "mixed" organizational patterns. Benefits of the old pattern include:

It serves the specialized IS needs of researchers better than corporate IS.

In companies where R&D has a strong political position and good funding, the information technology and content units are more likely to get the resources they need without having to compete for them at the corporate level.

Problems with the old pattern are:

Some people reported "political battles" between corporate and R&D MIS departments, gaps of understanding between information content and information technology, and "finger-pointing" between members of the R&D IS group and the corporate IS group. The liaison roles in the new organization structures are designed to ameliorate this problem.

R&D IS resources are needed outside the R&D division by other parts of the corporation, but it isn't easy to service outside requests. An example in the content area is patent information; in the hardware/software area, it is the Internet. The new organization structures allow R&D to "buy" services from corporate IS, and corporate users to "buy" them from R&D.

The cost of duplication of resources, incompatible hardware/software, and lack of a single technical standard in two separate IS departments is hard to justify, especially when companies are trying to build seamless networks to support global collaboration. "Knowledge mapping" (identifying and locating formal and informal information sources) and "information auditing" (identifying information gaps and strategies to fill them) are common techniques for avoiding redundancy and incompatibility.

Security measures are difficult to manage when they are decentralized.

Benefits of the new, "mixed" organizational pattern that surfaced in our interviews are:

Centralizing certain IS functions saves money. An "information audit" conducted by a librarian at one pharmaceutical company resulted in a \$350,000 savings by reducing duplication, promoting more information sharing and negotiating better deals with vendors. At DuPont, corporate spending on IS was reduced from 3.8 percent to 1.8 percent by consolidating data centers and reducing the IS head count (both employees and consultants) by 40 percent (1).

* IS contributes more directly to corporate objectives. One IS staffer at DuPont reported, "three years ago we were a techie organization, priding ourselves on being the first beta site for a new technology. There was friction between IS and business people. Now we are a business-driven organization" (2).

* Better utilization of intellectual assets and specialized skills (e.g., patent database searching) through increased global collaboration and information sharing.

* Faster, more effective integration of merged or acquired organizations.

* More effective security measures.

Problems with the new organization structures that surfaced in our interviews are:

* Roles and responsibilities can become confused during the transition from one organizational model to another. Who should maintain which kind of information? Who is accountable when systems break down, security breaches occur, and project budgets are overrun? Liaison roles help sort out the confusion.

The new structures require new skills and new roles that were not taught when employees received their formal education. Training in both "hard" (technical and scientific) and "soft" (people relationships) skills must be made available. There is also a shortage of scientists with computer skills. To overcome this problem, companies are using new modes of training-e.g., "competency-based training" (3)-and easier access to the knowhow of company experts through "knowledge bases" of tips, techniques and best practices.

Successful collaboration, a key component of the new model, can be expensive when all the costs are tallied: reorganizing both work and equipment, educating people about new technology and collaborative working patterns, paying termination costs for those who cannot function in the new environment, and developing new systems for measuring problems and performance. However, some companies find that these costs can be minimized or absorbed by unlocking dormant "human capital" with collaborative information technology, in which participants develop solutions and then share them with other groups.

Upgrading and standardizing telecommunications networks, hardware and software in order to share IS resources and information content can also be expensive. However, use of the Internet as a corporate networking standard can reduce the outlay, providing that funds are spent wisely on both administrative and technical security.

Impact on People

It was striking how often "people" issues surfaced in our research: "culture clashes" between corporate and R&D IS departments; concerns about information security and privacy; anxiety about changing job roles; and shifts in corporate power structure. These issues were not only raised in our interviews, but also widely reported in the literature, indicating a new openness and sophistication about the "soft" side of computing. A new cross-functional discipline of knowledge management has emerged to help managers in finance, strategic business units, human resources, information technology, and information content resolve overlapping human/business/management issues.

As companies move toward a "mixed" IS organization structure in which certain R&D IS functions migrate to the corporate level, they often have to confront what Dan McNicholl, CIO at Whirlpool, calls the "mutual suspicion that flourishes between many IS and R&D communities." He goes on to say, "We really can't afford the luxury of having two [IS] communities basically doing the same thing and not having to be accountable to each other" (4).

Companies must also deal with the social aspects of computer security and with information privacy issues. For example, our Internet survey revealed that while corporate IS had set up firewalls (computers that filter out unwanted Internet traffic), there is still concern about the ease with which authorized users can unwittingly create security leaks (5).

New Job Roles

The careers and job prospects of information technology managers, corporate librarians and others involved in the R&D IS function are undergoing rapid and fundamental change. IS managers are being called on to be more proactive, responsive to customer needs, and aware of corporate strategic objectives. They are also under pressure to manage increasingly complex global networks, protect confidential data, reduce costs, and "sell" their services to internal and external "clients." Not everyone is able or willing to make the transition. Between 1993 and 1995, large pharmaceutical firms including Eli Lilly, Pfizer, Bristol-Myers Squibb, Upjohn and McKesson-all put new people in the top information systems jobs. Tom Trainer, new head of IS at Eli Lilly, was formerly CIO at Reebok International. The new IS manager at Wyeth Ayerst Labs came from Bank of America (6).

The deployment of global networks such as the Internet, and collaborative programs such as Lotus Notes, changes the balance of power-sometimes positively, other times negatively. Without a sharing culture and real incentives to do so, employees are reluctant to contribute their knowhow to a knowledge base or to work collaboratively with colleagues in other functional areas. On the other hand, one IS executive reported, "We used to be right up there [in importance] with building services. Now, IS is being viewed as a key strategic resource in our industry and treated accordingly" (7).

Special Needs of Research Scientists

A key question in our research was which IS functions belong at the corporate level and which ones, if any, should remain within R&D IS. Nearly everyone we interviewed felt that research scientists do have special IS needs that can best be served by a dedicated IS department. Thus, while certain "generic" IS functions (e.g., network management, administrative systems, standard software support) are migrating to corporate IS, some specialized functions remain within R&D. Two reasons for keeping certain functions within R&D are:

1. Scientific research often requires custom software to run laboratory instruments, do specialized data analysis, or keep track of lab notes. Experimental hardware and software systems can exist in isolation within small work groups, thereby minimizing the need for elaborate documentation, security measures or compatibility with other systems in the corporation. (However, when knowledge management and other collaborative systems are implemented to share information across departments, issues of documentation, security and compatibility transcend R&D.)

2. Scientists and engineers under pressure to produce results in ever-shorter time frames (i.e., several months) cannot depend on development schedules that are the norm for a corporate IS department (typically several years). Many, if not all, of corporate IS applications (e.g., payroll, accounts receivable) are "mission critical," requiring extensive testing, documentation and often parallel operations. The smaller projects undertaken by R&D often don't need-and cannot afford-this level of sophistication.

Intellectual Capital: An Underlying Theme

Our interviews made it clear that companies are reorganizing the R&D IS function, not only to produce operating efficiencies but also to leverage their intellectual capital-the skills and knowhow of employees as well as their intellectual output (e.g., patents, research reports, databases). At companies like Dow Chemical, this means not only earning more revenues by better patent management but also developing a method of "knowledge base publishing" to capture and make available the informal knowhow of scientists and engineers (8). The emerging discipline of knowledge management has the potential to resolve some of the problems reported by those making the transition to the new, "mixed" model of organizing R&D IS-especially how to measure the results of information technology investments and how to overcome the social and cultural barriers that impede its deployment (9).

[Sidebar]

Recommendations for Managers

[Sidebar]

Consider centralizing "generic" IT functionstelecommunications, hardware maintenance, standards, information security-at the corporate level.

Consider organizing the R&D information services function by strategic or business objective (e.g., client project management, new technology assessment) rather than around physical assets (e.g., network services, telecommunications).

Conduct a "knowledge audit" to locate sources of information, identify gaps and develop a plan to close the gaps.

[Sidebar]

Appoint IS "account representatives" that "sell" IS services to R&D, manage R&D IS projects, and advocate R&D interests at the corporate level.

Link R&D information content (both proprietary and scientific information) to corporate content through a global telecommunications network such as an intranet. Be alert to the need to create and staff new roles, such as "database steward" or "information integrator."

Be proactive about informing those with a vested interest in R&D information technology (e.g., Corporate IT, Safety, Regulatory Affairs, subcontractors, hardware/software vendors) about specific opportunities and risks.-J.G.

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[Author Affiliation]

Jean Graef is a principal of The Montague Institute and Limited Edition Publishing, in Montague, Massachusetts. The Montague Institute conducts professional and executive seminars with a focus on information management and knowledge base publishing. Limited Edition Publishing is a knowledge base publisher and developer of "virtual libraries." Graef holds a master's degree in library/information science from the Peabody School of Vanderbilt University. She has worked as an information professional, corporate executive and entrepreneur, helping science professors to use microcomputers in their classrooms and laboratories (in the early 1980s) and offering seminars in business uses of the Internet since 1990.

E-mail: jgraef@montague.com

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Graef, Jean L.

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