


# Expertise Locator Systems: Finding the Answers



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CONSORTIUM LEARNING FORUM  
**BENCHMARKING REPORT**

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## **STATEMENT OF PURPOSE**

*The purpose of publishing this report is to provide a reference point for and insight into the processes and practices associated with certain issues. It should be used as an education learning tool and is not a "recipe" or step-by-step procedure to be copied or duplicated in any way. This report may not represent current organization processes, policies, or practices because changes may have occurred since the completion of the study.*

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# Sponsor Organizations

**Aventis Pharmaceuticals**

**Schlumberger**

**Baker Hughes**

**Solvay**

**Boehringer Ingelheim Pharmaceuticals Inc.**

**State Farm Insurance**

**Bristol Myers Squibb**

**U.S. Census Bureau**

**Chevron Texaco**

**U.S. General Accounting Office**

**CODELCO**

**U.S. Department of State**

**Crown Castle**

**UT MD Anderson**

**E.I. Dupont**

**Washington Mutual**

**Exxon Mobil**

**Halliburton**

**GlaxoSmithKline**

**IBM – Enterprise on Demand Transformation**

**Intel\***

**Johnson & Johnson**

**National Defence Canada**

**Petrobras**

**PriceWaterhouseCoopers**

\* This organization also participated as a best-practice partner organization.

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# Partner Organizations

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**Air Products & Chemicals (Air Products)**

**Eli Lilly**

**Honeywell**

**Intel**

**Northrop Grumman**

**Rockwell Collins**

**Schlumberger**





## Executive Summary

As organizations become more complex and more globally dispersed and as expertise becomes more specialized, leaders are looking for methods to help employees determine where to search and find answers. They want to minimize the amount of time employees spend looking for existing knowledge and information and to design and deploy approaches to find expertise that are effective and that people will use.

Organizations are turning to expertise locator systems. An expertise locator system (ELS) is an integrated approach involving people, process, technology, and content that is designed to:

- connect people to people,
- link people to information about people,
- identify people with expertise and link them to those with questions or problems,
- identify potential staff members for projects requiring specific expertise,
- assist in career development, and
- provide support for teams and communities of practice.

APQC has worked with and studied hundreds of organizations and their KM initiatives, from early adopters to recent entrants. To help organizations design, implement, or enhance their ELS based on innovative practices and real-world experience, APQC and the study sponsors collected information from and conducted site visits with five organizations with outstanding ELS approaches. Two additional partners presented their approaches at the study knowledge transfer session.

The study addressed the following key issues related to expertise locator systems:

- **Objectives and approaches**—determining user needs, establishing a business case, defining expertise, identifying experts, and targeting user groups
- **Design components**—making build versus buy decisions for technology acquisition, integrating applications, creating and maintaining profiles, adopting a taxonomy, and controlling vocabulary
- **Pilot and launch**—establishing project methodologies, managing change, ensuring participation, communicating and training, and rewarding and recognizing
- **Measures and results**—measuring the use and success of ELS
- **Costs**—funding, staffing, and maintaining

A brief summary of the findings follows, with details in the sections of the report and in the partner profile section of the best-practice site visit partners.

**BEST-PRACTICE PARTNERS**

To find best practices in ELS, APQC identified more than 40 potential partners, screened seven who met the criteria of having an integrated ELS, conducted phone interviews with this group, and selected five best-practice organizations for site visits. The five organizations were Air Products, Honeywell, Intel, Northrop Grumman, and Schlumberger. The following is a brief description of the partners' ELS approaches.

**Air Products**

Air Products built its ELS on a well-established manual process of identifying the R&D staff members who asked to be alerted to developments in their areas of interest. Two technology scouts monitored the not-yet-published literature from universities and laboratories and alerted the staff according to interests indicated in their profiles. Providing technology alerts was inducement enough for R&D and technical staff to keep their profiles current.

Air Products' KM group assumed oversight of the ELS and supported the automation of the existing manual system. Using internal resources, Air Products designed its own MS Windows-compatible application, which has allowed it to continue to refine the system at minimal cost.

**Honeywell**

When an internal review found few formal initiatives existing to help knowledge flow across boundaries, Honeywell analyzed user needs, the company culture, and potential pilots. Based on the analysis, it decided to create knowledge networks.

To enable these networks, Honeywell adopted an expertise locator system. Rather than designate "experts"—a concept that would not be accepted by other employees—the company designed its system based on knowledge seekers and knowledge providers. Pilots in Six Sigma and customer support areas provided measurable proof of concept and led to a roll out in other parts of the company.

**Intel**

The mission of KM at Intel is to increase the rate of learning and innovation by connecting knowledge workers and enabling the capture and reuse of their actionable knowledge. Strategic initiatives in the KM function are divided into people, process, and technology categories. After conducting an internal assessment of business needs from the users' perspectives, Intel's information technology (IT) organization identified the need for an ELS system to serve the people category and prioritized it as the most-needed capability.

The ELS system serves to link employees to the ELS database via e-mail, intranet, shared servers, and instant messenger. Once connected to the system, the user can perform a natural language search for existing people or solutions. If the search does not provide the sought-after information, then the user can query the system (an expert or a group of experts). Once an expert answers the question, the system automatically captures and stores the solution. In some instances, the system may share the solution with a subscriber-base interested in the particular area of discussion.

**Northrop Grumman**

Northrop Grumman's initial impetus to create an ELS was the need to find staff experienced in the B-2 bomber program in order to maintain ongoing support for the program. This initiative expanded to

the XRef system, in which employees can complete profiles that identify skills and experience. Employees are eager to keep the profiles up to date because candidates for future programs and projects are identified through the profiles in the XRef system. XRef has also benefited the “discipline management” process—the process of anticipating and managing work force skill requirements.

### Schlumberger

Schlumberger has been focusing on connecting people to people and people to content since 1993, when an Austin-based team began a grassroots effort to create a directory. Knowledge management grew from the bottom using a Darwinian approach: certain ideas survived and others did not. Some of the more successful ideas began as little skunkworks projects: small developments in localized areas. The projects received the recognition of management and gained credibility. Now, Schlumberger does not have one ELS; it has four: the corporate directory, the Knowledge Hub (the portal), Eureka communities of practice, and InTouch expertise support for field engineers.

Detailed profiles on the five site-visit partners’ ELS approaches are included in this report.

### OVERVIEW OF MAJOR FINDINGS

1. **Partners designate expertise, not necessarily experts.** Often a first concern raised by someone considering an ELS is the potential burden on anyone designated as an expert. After all, experts are in short supply and do not have extra time to answer questions from colleagues in the field. Further, providing answers may not be part of their job responsibilities. The study shows that most partners help employees find expertise and knowledge providers while not designating individuals as “experts.” Honeywell employees who are reluctant to identify themselves as experts were willing to participate in the system as knowledge providers. When experts are designated in mission-critical situations, as they are by Schlumberger and Air Products, the expert’s job description includes this role. The implications of this shift from expert to knowledge provider are explored in Chapter 1.
2. **Partners design the ELS to meet unique objectives.** The study team identified three different models for positioning ELS in the organization. Model one, the knowledge provider and seeker model, focuses on connecting people to people. All partners use this model in some form. Model two, used by Northrop Grumman and Rockwell Collins, positions the ELS as a way to staff projects and support competency management in the firm. Model three positions ELS in the traditional mode of identifying designated experts. In addition to Models one and two, Schlumberger and Air Products use model three. Each partner’s ELS is part of a larger knowledge-sharing strategy.
3. **Partners allow people to self-report skills, expertise, and interests.** Providing employees with control over the data that they report keeps many privacy concerns at bay and helps companies abide by U.S. law and international law. The privacy issue is explored more fully in the report and the partner profiles.
4. **Partners understand work process, needs, and culture before designing an ELS.** The partners who have the greatest global reach and enterprise ELS coverage collect information regarding the needs and culture of the target groups before implementation. Data collection includes interviews, surveys, and work flow analysis. As a result, the ELS enjoys a high degree of acceptance and use.

## KEY POINTS

### Highlight of the Findings

- Partners designate expertise, not necessarily experts
- Partners design the ELS to meet unique objectives
- Partners allow people to self-report skills, expertise, and interests.
- Partners understand work process, needs, and culture before designing an ELS.
- Partners use a staged approach (which includes a pilot) for design, implementation, and launch.
- Technology is a key enabler for ELS
- Marketing, communication, and training are essential for increasing system use.
- Cross-functional representation is a characteristic of successful ELS design teams.
- Partners link and leverage the ELS by attaching it to another accepted process or group of practitioners.
- Most business cases are based on compelling need to enable processes, not financial return.
- Ongoing maintenance costs for the ELS are modest by IT standards.

5. **Partners use a staged approach (which includes a pilot) for design, implementation, and launch.** Several partners began with small or defined pilots and found them to be key enablers in refining the ELS and building a business case for expansion. Keys to pilot success include using criteria to select the right pilots, designing the launch to accommodate the existing culture, and having robust measures in place to evaluate the pilot.
6. **Technology is a key enabler for ELS.** Many of the partners purchased their ELS applications, and two built their own. The right technology is critical for scalability and to expand networks of contacts beyond immediate communities or functions. The technology should be compatible with existing platforms and databases. The “build versus buy” decision is explored fully in the technology section, as is how ELS applications integrate with other applications such as HR databases.
7. **Marketing, communication, and training are essential for increasing system use.** All of the partners devote significant design time and resources to this aspect of launching and maintaining an ELS.
8. **Cross-functional representation is a characteristic of successful ELS design teams.** Cross-functional teams ensure better designs and higher acceptance. The teams are instrumental in developing the taxonomy used in the ELS.

9. **Partners link and leverage the ELS by attaching it to another accepted process or group of practitioners.** Partners increase the legitimacy and reach of the ELS by having a group (such as the knowledge management team or a steering committee) provide oversight and coordination.
10. **Most business cases are based on compelling need to enable processes, not financial return.** Partners' initial business cases were typically based on demonstrated need and a KM or KM-like strategy. All partners have measures (both usage and success), which they track and report. The measures provide continuing proof to the organization that the ELS is meeting its objectives.
11. **Ongoing maintenance costs for the ELS are modest by IT standards.** Partners report that an ELS requires a relatively small number of IT and KM staff for maintenance. Low maintenance costs make the system less susceptible to budget cuts.

## ORGANIZATION OF THE REPORT

This report is organized around the key steps in the process of designing, deploying, maintaining, and measuring an ELS. It begins with a description of these various steps and best practices and then proceeds through the detailed descriptions of partners' approaches and design choices. The first section of this report provides an overview of the study findings and best practices in all aspects of ELS. It begins with a discussion of the various perspectives regarding what constitutes "expertise," which was a defining characteristic of the partner approaches. It also includes the original business cases and needs that drove the decision to implement ELS. The second section covers the ELS design details, implementation and launch strategies, cultural design factors, technology choices and implications, measures, and results. The final section includes the detailed case studies of the partners' expertise location systems, how they selected their technology, change management approaches, lessons learned, and the measures they used to evaluate their ELS.

## BENCHMARKING METHODOLOGY

APQC's benchmarking methodology was developed in 1993 and serves as one of the premier methods for successful benchmarking in the world. It is an extremely powerful tool for identifying best and innovative practices and for facilitating the actual transfer of those practices.

**Phase 1: Plan**—The planning phase of the study began in May 2003. During that period, secondary research sources were used to identify potential best-practice organizations. Each identified organization was invited to participate in a screening process. Based on the results of the screening process, as well as company capacity or willingness to participate in the study, the final list of seven partners was developed. A virtual meeting with the sponsors and a kickoff meeting were held in July 2003, during which APQC and the sponsors developed the site visit guide.

**Phase 2: Collect**—Two tools were used to collect information for this study.

1. Screening survey—qualitative and quantitative questions designed to determine if organization has best practices that fit within the study scope
2. Site visit guide — qualitative questions, which serve as the structured discussion framework for all site visits
3. Five partners participated in virtual site visits. The APQC study team prepared written reports (partner profiles) of each site visit and submitted it to the partner organization for approval or clarification.

## KEY POINTS

### APQC's Benchmarking Model: The Four-phased Methodology

- Plan
  - APQC conducted secondary research to identify innovative organizations.
  - Potential partners were invited to complete a screening survey.
  - The APQC study team selected partners.
  - Conference calls were held to develop the site visit guide and meet the sponsors.
- Collect
  - APQC conducted five virtual site visits with best-practice partners.
  - Partner profiles were developed.
- Analyze
  - APQC analyzed site visit data to develop final presentations.
- Adapt
  - Readers apply key findings to their own operations.



**Phase 3: Analyze**—APQC analyzed data collected from virtual site visits. An analysis of the data, as well as examples based on the site visits, is contained in this report.

**Phase 4: Adapt**—Adaptation and improvement stemming from the best practices identified through a consortium study occur after the sponsor organizations apply key findings to their own operations. APQC staff members are available to help sponsors create action plans appropriate for the organization based on the study.

## Study Findings

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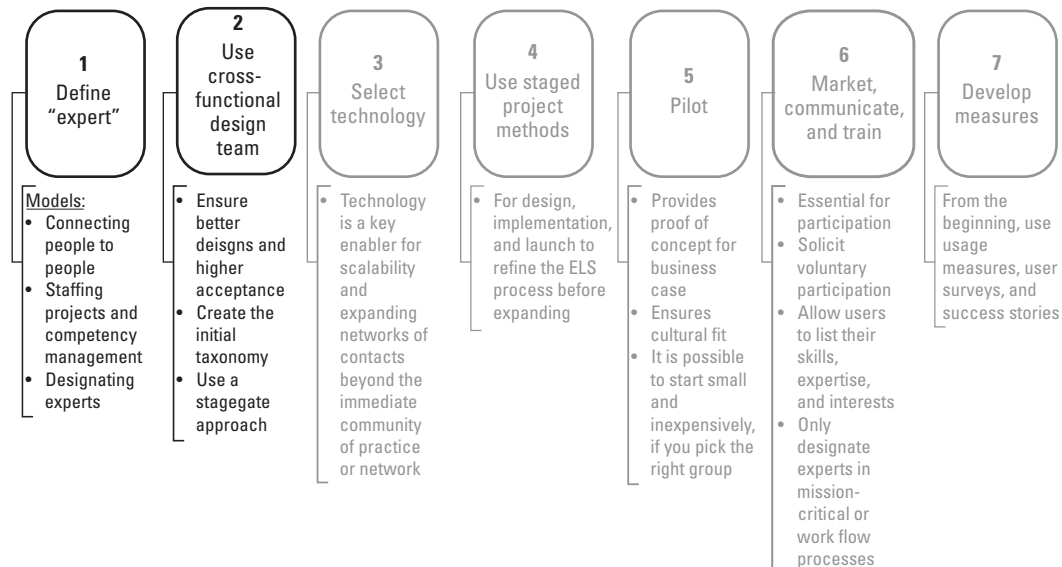


# Design and Details

## KEY POINTS

### Design and Detail

<b>ELS DESIGN AND DETAILS</b> Analyzing needs, the design process, profiles and profile management, taxonomy development, privacy policies, and roles	<b>TECHNOLOGY AND MAINTENANCE</b> Support, application, integration, build vs. buy, owners, and FTE requirement	<b>IMPLEMENTATION AND LAUNCH</b> Implementation and launch approaches, communications, training, and rewards and recognition	<b>MEASURES</b> Design, use, selection, and reporting (lessons learned)
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**WHY EXPERTISE LOCATOR SYSTEMS?**

Why are organizations so interested in an expertise locator system (ELS)? The immediate goals of an ELS are often tactical: connecting people to people and identifying skills and expertise. But in all cases, the ELS serves a larger strategic initiative and purpose, such as to enable faster learning, innovation, better practice and to share better processes. For this reason, this study did not find any ELS installations as stand-alone activities; all were embedded in a larger knowledge-sharing initiative.

For example, the mission of KM at Intel is to increase the rate of learning and innovation by connecting knowledge workers and enabling the capture and reuse of their actionable knowledge. Intel provides a host of capabilities that the KM and IT teams used to achieve this mission, of which the ELS is just one.

At Northrop Grumman, the ELS is owned by a central KM team that is chartered to enable:

- the reuse of “what we know,” regardless of location;
- learning, deciding, and adapting faster than the competition; and
- collaboration across boundaries.

Northrop Grumman’s ELS activities are designed for peer-to-peer interaction via a cross-reference tool named the Xref system. Locating peers was the original purpose of the Xref system. The tool was created in 1995 specifically for the B-2 engineering project that was coming to a close, in order to maintain profiles of staff who could be used for future B-2 support.

At both Northrop Grumman and Air Products, the KM team was assigned oversight for an already-existing ELS, thereby bringing it into the fold of a larger strategic initiative.

Partners gave a variety of reasons for establishing their ELS. These reasons were important in shaping the ELS design and the model they adopted. The following are verbatim reasons given by partners for establishing their ELS. The figure below depicts the reasons given by partners in their screening survey.

**KEY POINTS****Why Expertise Locator Systems?**

- Connect people with knowledge to people who need it, quickly and more precisely.
- Uncover previously unknown skills or experience that may apply to today’s or tomorrow’s projects and problems.
- Supplement a broader corporate knowledge-sharing strategy.

### Air Products

“We needed to send technology alerts to carefully targeted individuals within the company. To ensure that the right information reached the right people in a timely fashion, we collected profiles of individuals throughout our R&D community, including their interests and professional experience. Once these profiles were made available on the intranet, other community members began using it to locate individuals with key skills, especially in other geographic locations; and many functional groups outside of R&D adopted the system.”

### Eli Lilly

- “We didn’t know what we knew or who knew it. Too many instances of not knowing who to call.”

### Honeywell

- “Increasing replication of project successes, sharing of failure modes, increasing knowledge transfer across boundaries.”

## KEY POINTS

### Partner Reasons for Establishing an ELS

	Air Products	Eli Lilly	Honeywell	Intel	Northrop Grumman	Rockwell Collins	Schlumberger
Locating the right person in a timely fashion							
Develop communities of practice, linking geographically dispersed work groups/networking							
Project staffing							
Knowledge sharing							
Training needs identification/skills inventory							
Reuse body of information							
Reduce cycle time, increase quality and improve productivity							
Not knowing what the organization knew/lack of sharing experiences							
Operational support							
Develop employee profile and directory							
Improve customer satisfaction							

**Intel**

- “Increase the rate of learning and innovation through connecting knowledge workers, enabling capturing and reusing actionable (tacit) knowledge.”

**Northrop Grumman**

- Agile staffing
- Location of experience
- Rapid reaction and response
- Customer satisfaction

**Rockwell Collins**

- Connect people to experts
- Skills/Competency management
- Training needs identification

**Schlumberger**

- Operational support
- Knowledge sharing
- Organizational efficiency

**WHAT IS MEANT BY “EXPERT” VARIES**

The study sponsors were very interested in how companies deal with the possible burden an ELS might impose on subject matter experts. One of the most important findings of this study has been the way “expert” is operationally defined in the partners’ ELS approaches. Partners found that employees were reluctant to be labeled as an expert unless they had been formally designated as such by management.

**KEY POINTS****What is Meant by “Expert” Varies**

- Sponsors’ greatest interest concerned the issues around designating someone as an expert and tasking employees with answering questions.
- Most partners bypass the issue by focusing on helping people find expertise and “knowledge providers,” not designating individuals as “experts.”
- Partners clearly define the role of expert and communicate the expectations for the role, which is critically important in companies such as Air Products and Schlumberger that rely on experts for mission-critical decisions.
- Three different models of expertise location were used by the partners.

This reluctance, along with the desire to connect people to people to find answers, caused most of the partners to choose an approach that focused more on allowing people to indicate areas of interest and possible expertise, rather than on a formal designation.

This approach had a number of benefits: experts were not overburdened, anyone with experience or expertise could voluntarily provide it to a colleague, resources were not required to validate the answers, and many more people felt comfortable providing their areas of interest in profiles in order to be helpful. This dramatically increased the participation rate in ELS for the partners.

The APQC study team found partners' approaches to ELS fell into one or more of three different models depending on the objectives for the ELS.

### Model One

Model one, linking knowledge providers and seekers, was the dominant model found in the study. As an example of this model, Honeywell's perspective is that expertise location is about connecting people across a network, enabling collaboration, and getting assistance. This orientation away from "experts" is characteristic of many partners and a major learning from the study. Intel also uses the terms "user or knowledge seeker" and "expert or knowledge provider."

## KEY POINTS

### Model One: The Knowledge Provider and Seeker Model—Connecting People to People

- Need: Find help or answers
- No a priori designation of "experts"
- "Experts" are usually volunteer knowledge providers who have information, expertise, or perspective that is useful to the current problem
  - Honeywell
  - Northrop Grumman
  - Intel
- Integrated into communities of practice and networks
  - Intel
  - Schlumberger—Eureka and InTouch
- Users sometimes rate the value of a contribution or the advice they get as one method for quality control

Model One Example: Honeywell

Honeywell conducted an extensive cultural analysis before designing their ELS system. As a result, the Honeywell design team reversed their focus away from experts and toward knowledge providers.

KEY POINTS

Model One Example: Honeywell

- Fundamental choice in solution design

Experts

- Exclusive
- Accuracy
- Verification
- Certification
- Authority monitoring
- “The” answer is...

Knowledge Provider

- Inclusive
- Point of view
- Reader discretion
- Choice
- Peer monitoring
- “An” answer is...

Choice depends on key use and company culture

Model Two

The second ELS model used by some of the partners involves staffing projects and competency management. Because one of its goals is to understand the current and future skill needs of the organization, Northrop Grumman, as well as Rockwell Collins, based their ELS value proposition on the ability to map the current and future skills in the organization.

Model Two Example: Northrop Grumman

As an example of model two, XRef (the ELS system in Northrop Grumman) is a key tool in work force planning and discipline management. Discipline managers (functional area leaders) are responsible for knowing levels of expertise in their area of responsibility and planning for the future work force needs.

An important implication of knowing competencies is the ability to win business based on expertise. Northrop Grumman uses winning business or response time to a customer request as evidence of the value of the ELS.

## KEY POINTS

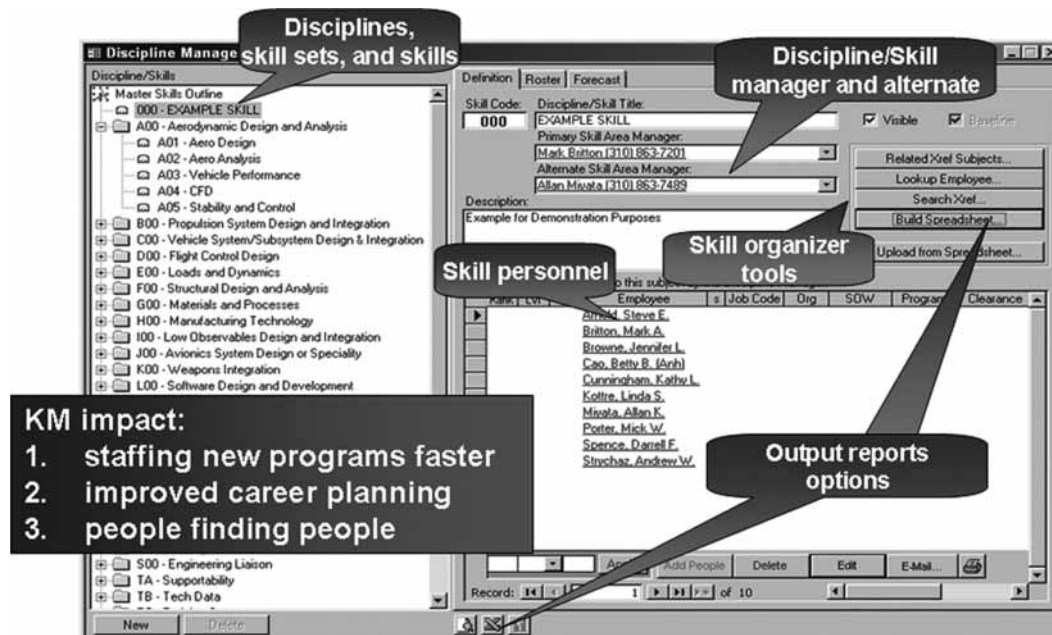
## Model Two: Staffing Projects and Competency Management

- Work force planning and development, used by management to identify background, experience, expertise, and skill sets needed for projects
  - Northrop Grumman
  - Schlumberger
  - Air Products
  - Rockwell Collins
- Identifying people who need to receive alerts on a topic
  - Air Products

## KEY POINTS

## Model Two Example

### Northrop Grumman: Discipline Management Support



**Model Three**

The third model used by the partners involves designated experts. Intel and Schlumberger both designate experts as well as allow self-designated knowledge providers. Identification of Intel “experts” can occur in one of four ways:

- employees designate themselves as experts in their ELS profile,
- employees specify proficiency in a knowledge category,
- a community assigns or nominates employees in any type of knowledge category, or
- an organization assigns employees in any type of knowledge category.

The means by which an expert is identified often reflects the degree of complexity of the knowledge to be shared. As one moves down the list above, the number of experts decreases significantly. Organization-assigned experts are the most stringently evaluated and may own their process or have functional responsibility. The designation may also be based on competency evaluation or subject matter expertise resulting from years of service, industry recognition, or academic credentials.

In Schlumberger, InTouch engineers, as well as other subject matter experts, are on call to respond to technical questions. In contrast, in the Eureka communities, participants often self-report their areas of interest and expertise and can choose to reply, or not, to an inquiry.

**KEY POINTS****Model Three: Designated Experts**

- Need: To have validated experts available to answer mission-critical questions
- Approach: Management or functional groups assign experts
  - Air Products—designated safety experts
  - Schlumberger—InTouch has service desk experts as well as staff SME’s designated
  - Intel—some communities and functions have designated experts



The benefits of self-reported expertise are clear. First, there are less privacy and legal concerns about sharing information about an employee when the employee has control over what is being shared. Second, less validation is required, and peer pressure tends to provide enough policing.

## KEY POINTS

### Expertise Identification

- All partners indicate that expertise is identified by self-report, in which individuals complete their own profiles. Some partners have components of the profile automatically inserted through links to the personnel directory.

	Air Products	Eli Lilly	Honeywell	Intel	Northrop Grumman	Rockwell Collins	Schlumberger
Self-report							
Automatic							
Management identifies experts							
Experts identifies experts							
Communities identify experts							
Anyone who is willing							

**Selecting a Model**

Each partner had to decide what the purpose of the ELS was to be. For all of them, it was important that connecting people to people not be hindered by the validation of the expertise required to answer questions from a colleagues.

**KEY POINTS****Selecting a Model**

- Based on their experiences, the partners would give the following advice to readers:
  - Before designing a system, ask “What is the real problem, need, or opportunity you are trying to address?”;
  - Is designating experts going to address it?; and
  - If not, use the concept of a knowledge provider.
- Partners are often using more than one model because they are addressing more than one issue.

## KEY POINTS

**Best Practices in ELS**

- Allow people to voluntarily list their skills, expertise, and interests, and only designate experts in mission-critical or work flow processes.
  - Voluntary control addresses many of the privacy concerns and laws.
- Understand work process, needs, and culture before designing an ELS.
  - Is it a tool to find knowledgeable providers or experts? What is the culture?
- Use a staged approach for design, implementation, and launch to refine the ELS process before expanding.
  - It is possible to start small and inexpensively if you pick the right group.
- Technology is a key enabler for scalability and to expand networks of contacts beyond the immediate community, function, or network.
  - ELS started manually and then expanded through automation.
- Marketing, communication, and training were essential for participation.
- Cross-functional representation is a characteristic of successful ELS design teams.
  - Cross-functional design teams ensure better designs and higher acceptance.
  - Use a cross-functional group of users to create the initial taxonomy of work processes and discipline domains.
  - Link and leverage ELS by attaching the initiative to another accepted process or group of practitioners, such as the KM group.
- Most business cases are based not on financial return, but on a compelling need to enable processes. Often, surveys were used to establish the need.
- Use pilots for proof of concept and to refine the approach.
  - Design “global;” deploy locally (i.e., plan for expansion and scalability)
- Select a technology approach that ensures ongoing maintenance costs will be modest.
- Establish measures from the beginning, through both usage and success stories.

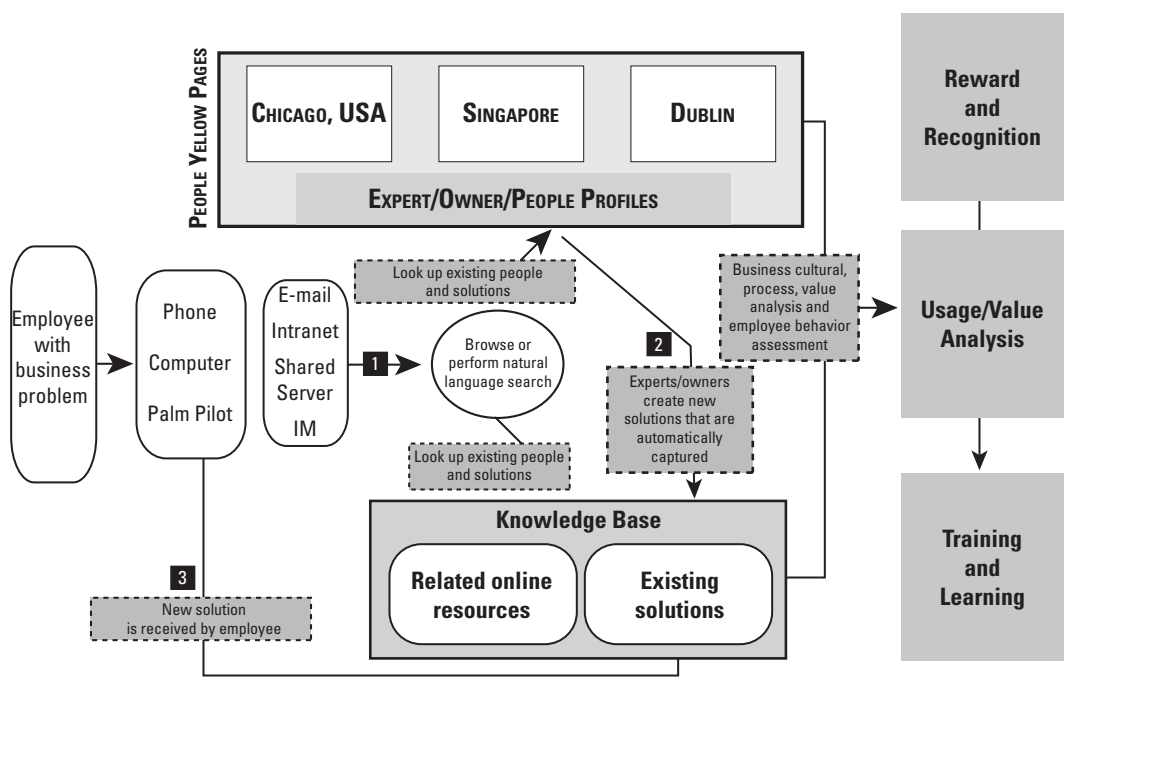
## Site Visit Partners' ELS

### Intel

Whereas Intel detailed a number of different ELS value propositions, the overall purpose and design of the ELS is to link employees with business problems to the ELS database. Once connected to the system, the user can browse his or her concern to perform a natural language search for existing people or solutions. If the search does not provide the sought-after information, then the user can query the system (an expert or a group of experts). Once an expert answers the question, the system automatically captures and stores the solution. In some instances, the system may share the solution with a subscriber base interested in the particular area of discussion.

#### KEY POINTS

### ELS in Action: Intel



## Honeywell

Honeywell employees submit questions to AskMe via Outlook or the Web portal. The user asks the question, and previously given answers come back from the knowledgebase. If the employee still needs more help, then he or she can send an e-mail to a knowledge provider, whose profile indicates he/she would be willing to respond to questions.

### KEY POINTS

## ELS in Action: Honeywell

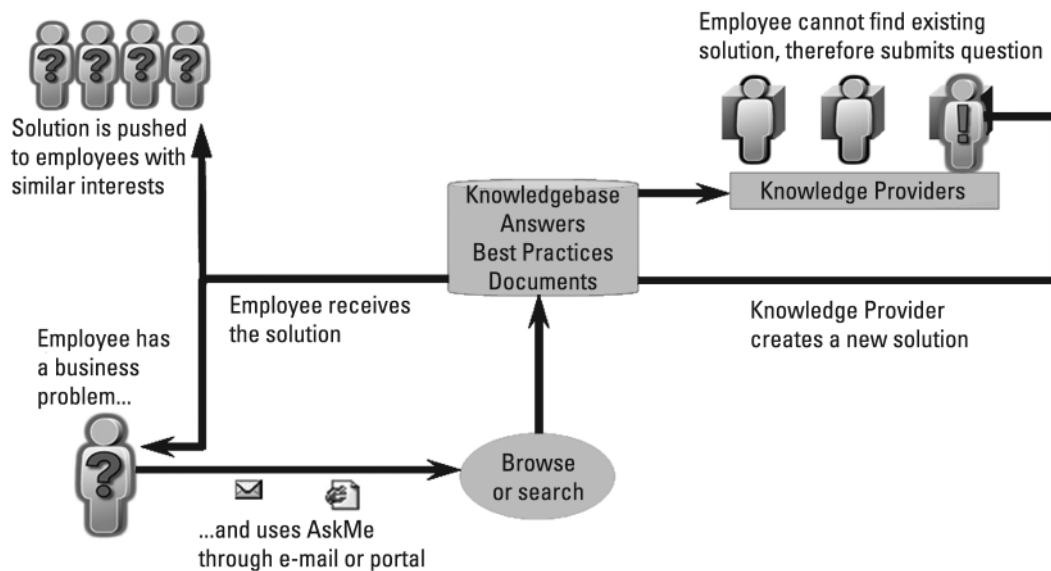
- The Knowledge Network enables sharing of expertise and best practices across departmental and geographical boundaries.
- Deployed initially in Six Sigma and customer service



The current population of knowledge users and providers is approximately 2,000. Honeywell has not found that AskMe usage creates an increase in e-mail traffic because it does not necessarily increase the total number of questions asked by people in the organization. If anything, the number of e-mail messages decreases because previously answered questions can be found in the knowledgebase.

## KEY POINTS

### ELS in Action: Honeywell



## Schlumberger

Schlumberger's strategy for expertise location is part of their organic approach to knowledge management. Over time, in response to needs, four scenarios and approaches have emerged for identifying experts, each responding to a different context. Schlumberger does not have one ELS; it has four: the corporate directory, the Knowledge Hub, Eureka, and InTouch support. Each have related but distinct roles to play in expertise location. The KM strategy has been to connect people to people through the directory, connect people to communities of practice through Eureka, connect people to information through the Hub, and connect people to best practices through InTouch. All of the four systems have an element in them that relates to expertise location.

Schlumberger uses both "push" and "pull" strategies to increase the number of ELS users. Because the experts create directory records for themselves, they pull people toward them and are advertising themselves as publishers of content. The system "pushes" by sending e-mail to groups created by the directory or bulletin boards.

### KEY POINTS

## Schlumberger's KM Approach Has Four ELSs



**Air Products**

The Air Products technology scouts try to find information that is not normally available. They do not duplicate the secondary research conducted by the library or anything published. A technology scout scours the “gray literature” for important advances and research that can be applied to in-house research efforts. Gray literature includes the Web sites of universities, research laboratories, government agencies, and journals not usually reviewed by researchers.

Technology scouts monitor 900 Web sites. If a newsworthy item appears, the scouts rewrite it into an alert and send it to the employees who have indicated in their profiles that they are interested. The technology scouts are located in the corporate technology evaluation and planning group and work closely with the KM team.

**KEY POINTS****Air Products’ Approach to ELS: Technology Scouting**

- Technical employees in R&D indicate in their profile the topics for which they would like to receive alerts.
- A technology scout scours material not publicly published for important advances and research that can be applied to in-house research efforts.
- When a scout finds relevant information, he or she creates an alert in the ELS that contains:
  - a synopsis of the information,
  - the source of the information, and
  - a link to the complete source (Web site, URL, or journal name, volume, and issue).
- Scout searches the profiles to find the people interested in the topic and/or selects the appropriate distribution list from the ELS.
- The ELS sends an e-mail to the people with a summary of the alert and a link to the full information.



## Northrop Grumman

Northrop Grumman employees use the XRef system to find someone with experience or expertise to help with a question or problem. A profile allows the reader to differentiate skill levels by learning level and life experience. Employees provide a self-assessment of expertise on a scale of one to five, and the reader can view the projects on which the employee has worked.

Lead engineers use XRef to find people who have worked on the projects earlier. Management uses it to keep track of the depth of employees' capabilities and rapidly staff new programs, which can help win business. Anyone internal can use the system, including customers and suppliers if they are on the Northrop network.

By using XRef as part of the talent pool, Northrop Grumman has cut the staffing time for new projects in half and has avoided laying people off in one program while another project needs that skill level.

### KEY POINTS

## Uses of the Northrop Grumman Xref System

- Technical employees in R&D indicate in their profile the topics for which they would like to receive alerts.
- A technology scout scours material not publicly published for important advances and research that can be applied to in-house research efforts.
- When a scout finds relevant information, he or she creates an alert in the ELS that contains:
  - a synopsis of the information,
  - the source of the information, and
  - a link to the complete source (Web site, URL, or journal name, volume, and issue).
- Peer finder
  - Allows employees to find people and talent
    - Skills, expertise, programs, talent, etc.
    - Global search and address book
- Discipline management
  - Skills proficiency assessment
  - Career development planning
  - Personnel resource management
- Career development
  - Profile maintenance, self-advertising, and self-assessment
- Skills database
  - Aggregate reporting

**BUSINESS CASE AND INITIAL INVESTMENT**

Intel is a good example of the ELS business case and funding process. The Intel ELS team received approval from four business managers with cross-functional responsibilities to launch the pilot project. These business managers approved funding of \$500,000, which came largely from the IT budget; and they were willing to allocate human resources to support the planning and launch of the pilot and provide their own associates to serve as constituents for the pilot project.

**Intel**

Intel approved the enterprise license based on a ROI to recoup all costs in three years. Intel has a goal of 20,000 users (or half the estimated base) within three years. The ROI calculation was made by assuming 10 hours per year per user, multiplied by an average salary of \$25 per hour. The finance team conducted a more sophisticated analysis and completed computation to move the ROI through the approval phase by taking into account tax rates for savings and other details. The headcount to support the system during production was fewer than three people. These individuals were tasked with product management, implementation, marketing, and value calculation.

**KEY POINTS****Business Case**

- When a scout finds relevant information, he or she creates an alert in the ELS that contains:
  - a synopsis of the information,
  - the source of the information, and
  - a link to the complete source (Web site, URL, or journal name, volume, and issue).
- For partners, the initial business case was based on user data and a compelling argument tied to the business strategy.
  - Several partners found that about 10 hours per week are spent searching for knowledge and expertise, which provided a time-saving rationale for the ELS.
  - Intel's ROI calculation was based on a three-year payback, which assumed a savings of 10 hours per year at \$25/hour.
- Pilots served as proof of concept for additional funding for expansion.
  - Honeywell's pilot results indicated that users could save 40 hours per year spent searching for information and people. ROI was calculated by multiplying by the number of users and the average cost per user.

**Honeywell**

Honeywell's accepted ROI is greater than or equal to 12 percent and can be estimated using costs eliminated and costs avoided. The savings were calculated from the baseline of 10 hours per week that employees use to search for information or for people who have the knowledge they need. Pilot results indicated that users could save 40 hours per year searching for information and people. The team calculated the ROI by multiplying by the number of users and the average cost per user. Hard numbers, such as savings from problems avoided, were captured in the system through feedback mechanisms, but these numbers were harder to validate and attribute correctly. They were valuable as anecdotal support for the system.

**INVESTMENT IN ELS**

The following examples involve investment and cost data for ELS design and implementation.

- Air Products' investment for the initial manual ELS was only a few hundred dollars, with existing database software and four months of part-time effort by one employee to collect and manage profiles and distribute technology alerts. For the conversion to a Web-based ELS, Air Products spent \$20,000 for internal IT resources, one full-time programmer for five weeks, and two technology scouts to create and distribute alerts.
- Honeywell explored and implemented its ELS in phases. The first phase focused on the identification of the need, which required part-time effort from two to three people, no formal budget, and about six weeks. During the planning phase, 10 to 15 people were involved part time for about four weeks in the cross-functional team, but the budget was still minimal (less than \$5,000). During the pilot phase, 800 people participated; and the budget was approximately \$100,000 (primarily for the culture study that preceded the pilot). The pilot lasted for about 16 weeks.
- Intel spent about \$320,000 out of an approved budget of \$500,000 for their exploration, development, and pilot phases.

### Who Funds the ELS?

Funding for the ELS is primarily from the IT budget. None of the best-practice partners treat ELS as a stand-alone technology initiative; it is related to other knowledge management approaches. Four of the partners indicated that the KM core group has accountability for ELS and works with the IT team to determine how to proceed within the budget. Intel, Northrop Grumman, and Schlumberger indicated a shared responsibility across multiple groups, again with funding coming from the IT organization.

All partners take a blended approach to operating on ELS by relating it to their KM initiatives. Honeywell's ELS is the enabler of the collaboration efforts within and across group boundaries. In Intel, expertise location is part of five business cases: communities of practice, escalation/consultation, best-known practices, people directories, and business operation. In addition, as part of Intel's content management system, experts are associated with online documents. Northrop Grumman's KM group supports the use of XRef to provide product and project managers with information about personnel resources. Communities also use the resource. Air Products' KM group champions the ELS as a corporate initiative. In Schlumberger, ELS is an element of several KM initiatives.

#### KEY POINTS

### Who Funds the ELS?

- Most ELSs are designed, "owned," and paid for by a corporate group, which is usually the IT organization.
  - At Honeywell, maintenance of AskMe lies with the IT group for infrastructure-related issues and with business units for expansion-related decisions.
  - At Intel, the ELS is owned and funded by the IT organization.
  - Northrop Grumman's KM team owns the core database. Human resources, business management, engineering, and production functions built the interfaces. Ongoing funding comes from IT.
  - All four of the Schlumberger ELS components are owned by corporate IT, and they are funded centrally as part of corporate overhead.
  - In Air Products, technology scouts are part of the corporate technology group; KM provides coordination and oversight; IT provides funding for the infrastructure.
- The KM organization provides thought leadership and monitors the initiative.
- Business units are asked to provide endorsement and staff time.

### Cross-functional Design Team

Elaborating on a cross-functional design team, both Honeywell and Intel had large, cross-functional teams. Intel team members represented cross-functional units and had diverse backgrounds. Two team members had previous ELS experience: one with another company and one with an earlier, unsuccessful ELS effort at Intel. The team was divided into a core team, a business team, and a technology team. Each had specific responsibilities and deliverables. The efforts of each team were carefully orchestrated to manage the critical paths of the overall project.

The Honeywell team charter defined deliverables, but also limited and defined the scope to avoid unnecessary expansion into unrelated domains. The initial charter of the Honeywell team was “to accelerate Honeywell productivity initiatives by enabling knowledge transfer from topic experts to knowledge seekers.” During a culture study, the charter shifted. Interviewees said they were not experts and would not sign up to be an “expert.” The Honeywell team charter then changed from a focus on experts to a focus on knowledge providers.

## KEY POINTS

### Characteristics of a Successful ELS Design

- A critical success factor in successful design is understanding the culture of the target group, their work processes impacted by the ELS, and their needs.
  - Intel, Honeywell, and Air Products spent extensive time during design to conduct interviews with users.
- A cross-functional design team aids in business buy-in and provides the skill sets needed for both the technology and the change management aspects of implementation.
  - Honeywell and Intel had a large, cross-functional team
  - Northrop Grumman and Air Products involved the business units and user groups in the design process
- Use a formal project management or stage-gate process during design and implementation.
- Limit customization of technology at the outset.
- Profiles must be easy to maintain.

The purpose of the Honeywell team was to accomplish the following:

- prove the economic value of a people-to-people knowledge-sharing network for the corporation;
- reduce and eliminate redundant problem-solving, duplicated efforts, and overlapping projects;
- hasten project execution through faster mobilization time and faster problem-solving;
- improve customer satisfaction levels and meet customers' increasing performance demand levels;
- show (via anecdotal evidence) the inherent value of a knowledge-sharing network; and
- help cultivate a culture of strong information sharing.

The boundaries established for the team were to implement a pilot, measure results, recommend a company-wide strategy, use a Six Sigma methodology and stage-gate approach, and get broad representation.

Northrop Grumman and Air Products involved the business units and user groups in the technology and design process rather than having a cross-functional design team.

### **Stage-gates and Product Management**

Both Intel and Honeywell used formal project management and design methodologies for their ELS design and deployment. Intel used its standardized project life cycle process with six distinct phases. Honeywell used a stage-gate approach.

### **Profile Maintenance**

Profiles need to be easy for users to create as well as maintain. Partners use automated processes whenever possible for populating a profile with demographic information and frequently use automated alerts to users to update their profiles.

### **Understanding the Culture**

Intel piloted the ELS to understand its cultural and behavioral impacts before launching the system enterprise wide. As a part of the pilot, value and behavior baseline surveys were deployed before and after the launch. The surveys provided the team with insight into how specific job codes would react to knowledge sharing and the value that the ELS might bring. Survey results showed dramatic differences in the behavior of engineers compared to that of marketing personnel. Consequently, the team built flexibility into the system so that it could be modified and adapted to make each group feel comfortable and demonstrate the value of sharing knowledge.

On the advice of Intel, Honeywell also conducted an in-depth culture study prior to beginning their design process. The findings from the culture study significantly impacted the system design. Honeywell uncovered the following information about the user group from the culture study.

- People spend about 10 hours per week searching for information and people who have the right knowledge.
- The focus should be on connecting people, not just making information available.
- The success of the system depends on constant, visible executive and organizational support.
- Information providers need to be rewarded; and the most effective reward is reciprocity, repute, and altruism.
- Groups have diverse work styles and needs.
- The system needs to fit with employee's current work flow and tools.
- Some employees are concerned about the repercussions of sharing what they know.
- Some employees have preconceived perceptions from previous application roll outs.

## KEY POINTS

### Understanding the Culture

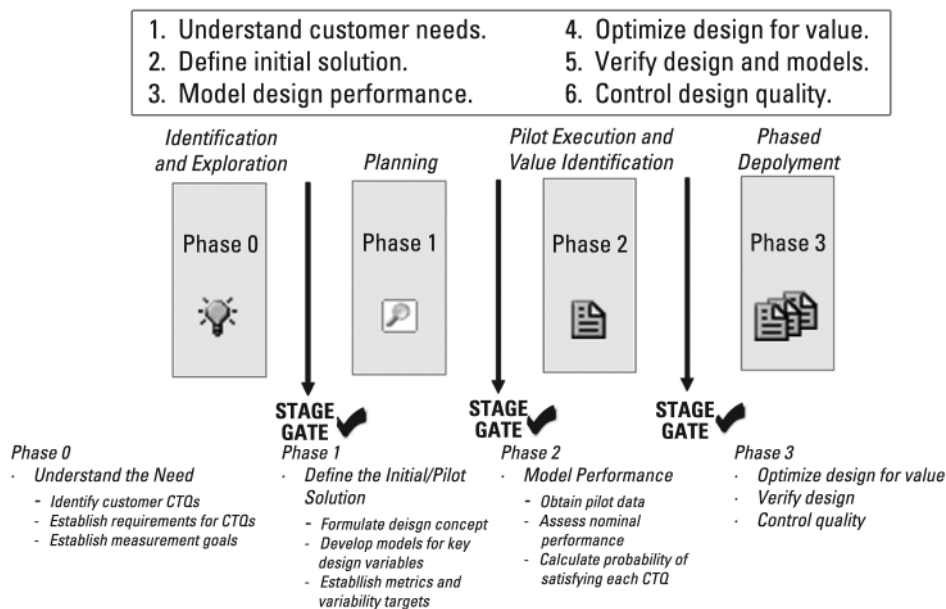
- Honeywell conducted an extensive cultural study of the pilot groups before launch. The results led them away from "expert" and to "knowledge provider."
- Intel conducted preliminary and post surveys, which led them to design different features for engineers and marketing staff.

## Honeywell's Stage-gate Process

Honeywell used the Design for Six Sigma methodology to design the ELS and the disciplined stage-gate approach to evaluate the ELS and to determine the “fitness” for expansion and meeting its intended goals. Each stage gate had defined critical-to-quality factors that had to be achieved before the gate had successfully been passed and the phase was considered complete.

### KEY POINTS

## Honeywell's Stage-gate Process





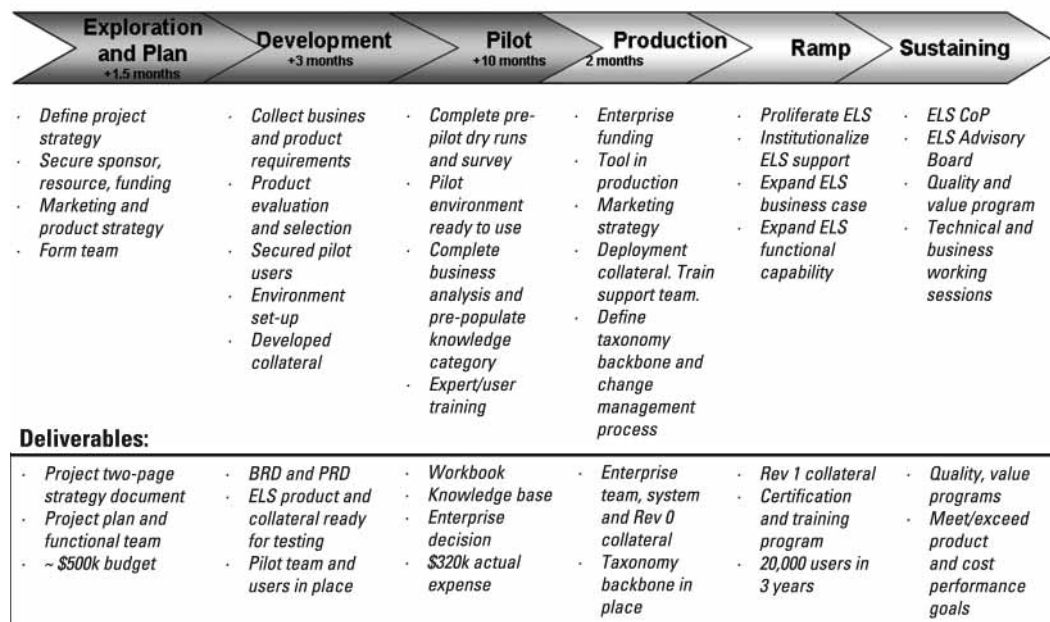
### Intel's Project Life Cycle (PLC) Process

To guide the design of their ELS, Intel used their standardized project life cycle (PLC) process. The process has six distinct phases. Using the foundation laid in the development phase, the Intel pilot phase engaged 1,200 users, populated the knowledge base, and cost approximately \$320,000. An important deliverable of the pilot phase was the workbook, which contained more than 500 pages of documentation to support the decisions made throughout the completed phases, lessons learned, and collateral for future decisions.

Currently, Intel is in the early ramp-up phase. There are currently 3,000 users, and 5,000 are expected by the end of 2003. The goal is to have 20,000 active users of AskMe (out of 40,000 targeted potential users) by 2006. (Intel has 80,000 employees.)

#### KEY POINTS

### Intel's Project Life Cycle (PLC) Process



## Profile Maintenance

In most cases, partners allow employees to determine the content displayed in their profiles.

### KEY POINTS

#### Profile Maintenance

- When possible, link to other resources and repositories to ensure ease of accessing all relevant information and dynamically building and finding profiles.
- Include the opportunity to voluntarily include personal information.
  - Include pictures.
- Use reminders and other automated approaches.
  - Use periodic e-mail reminders to update one's profile every six or 12 months.
  - Run profiles against an employee directory to determine whether employees are still with the firm.

### KEY POINTS

#### Profile Maintenance

Process in place for updating profiles

- No partners have formal process in place for validating the information in profiles.
  - Validated content in profiles is not considered a critical success factor, given the design decision on how the information will be used.
- Most partner organizations have a process for automatic alerts to encourage people to update their profiles. Honeywell does not.
- When an employee leaves, the profile is hidden, but the searches and dialogues are maintained. In Schlumberger, the profile and access to the system terminate, but past contributions remain in the system.

**Profile Maintenance: Taxonomy**

Intel and Schlumberger have controlled vocabularies in use for profiles and the ELS. For Intel, a critical piece of the development process was building the knowledge content into the taxonomy backbone and knowledge category systems. The backbone was based on the taxonomy employed by the Intel library. This backbone was tested in interviews with 20 experts across 16 divisions. The moderator develops specific categories during and following the training sessions. A moderator is responsible for category maintenance and can change subcategory words up to (but not including) the highest level backbone. The highest level can only be changed with the approval of an oversight committee.

**KEY POINTS****Profile Maintenance: Taxonomy**

- Partners varied in their use of controlled vocabularies for user self-description.
  - Controlled vocabulary
    - Intel and Schlumberger have detailed processes for taxonomy management, usually involving the library.
    - The Schlumberger master classification of skills and expertise is used across all components using ELS.
  - For others the taxonomy was established initially by library or user groups.

**SPECIAL ISSUES IN DESIGN: PRIVACY POLICIES, COSTS, AND ROLES**

Many of the employee concerns and legal restrictions, especially in Europe, are addressed by making participation in the ELS voluntary and allowing employees to approve all content displayed.

**KEY POINTS****Best Practices: Privacy Policies**

- Make participation voluntary: provide users with levels of security, privacy, and control to increase participation.
  - Privacy concerns can be overcome by making sharing voluntary and providing user control over what is displayed in their profile.
- Adopt privacy, use, and liability rules currently enforced for e-mail.
- Involve the legal and human resource departments in these decisions.
- Distinguish between paranoia and legitimate concerns when designing safeguards.

**KEY POINTS****How Partners Adhere to Privacy Laws**

- **Air Products**—Participation in the ELS is strictly voluntary. All information in the system is provided by the individuals, who maintain their own profiles. Individuals can change or delete the information in their profiles at any time.
- **Eli Lilly**—Employees can opt out, which hides data to all except owner (employee) and human resources.
- **Honeywell**—Participation is voluntary.
- **Intel**—Adheres by training and auditing against e-mail standards.
- **Rockwell Collins**—Adheres through controlled access and has no personal information and no “protected class” of information.
- **Northrop Grumman**—Found that most privacy issues were moot and were based on fear and misperceptions.

**Example: Intel's Approach to Privacy and Security**

The Intel ELS adheres to company security and privacy rules. Because use is voluntary and users are warned that they are involved at their own risk, Intel has not encountered any issues or constraints. When an audit uncovers potential issues or violations, the support team or moderators contact the user directly and ask him or her to resolve the problem. In all cases, the user has resolved the problem quickly and without issue. In a severe instance, the security team would be contacted to resolve the issue. The Intel partner profile provides more detail on how Intel addresses security and privacy questions.

**KEY POINTS****Example: Intel's Approach to Privacy and Security****Privacy**

- Users share what they want to share.
- User applies the knowledge in ELS at his/her own risk.
- Content must comply with company privacy policy.
- The support team and/or moderator audit content periodically.
- The disclaimer is available/accessible during training, log in, and newsletter.

**Security**

- Encryption is applied wherever it is mandated by company.
- Individual conversations or a knowledge category can be locked.
- Content must comply with the company's security policy.
- The support team and/or moderator audit content periodically.
- The disclaimer is accessible during training, log in, and in the newsletter.

**Example: Honeywell's Privacy Policy**

For the ELS, Honeywell applies the same rules already in place for e-mail in Honeywell. The legal department has approved these policies.

**KEY POINTS****Example: Honeywell's Privacy Policy**

- Participation is voluntary.
- All foreign nationals are tagged to allow their activity to be audited by the legal department.
- Any question can be marked "private" at any time, which takes it out of public view. Any section can be authorized as "entry-only" and/or as a restricted view.
- Knowledge network did not get "special treatment." It is no different than e-mail. The same guidelines apply.
- Security is maintained by corporate LDAP, with employee ID numbers used for access.
- Europe was not treated differently because of the voluntary nature of the ELS application.

### Costs to Design and Launch

Partners were not at liberty to provide the APQC study group with detailed cost figures for their software purchases. Based on their reports, it appears that total costs of design and launch varied greatly.

At the high end of investment, the Intel ELS project team had a budget of \$500,000, and the team consisted of seven people who dedicated 30 percent of their work time to developing and launching the ELS. When the team was convened, Intel had already made the decision to roll out the ELS enterprisewide, but the team focused on the group and/or community level for the pilot phase.

At the low end of initial investment, Air Products began their ELS as a grassroots effort, with one person dedicated part time to interviewing 100 technology specialists on the kinds of information and alerts they would like to receive. There was no formal budget, and alerts were manually sent. Greater investment was required in later years when the technology alerts were automated, but the investment was based on using internal staff time and not purchasing software.

(Detailed descriptions of the design process, resources, and roles may be found in each of the partner profiles.)

#### KEY POINTS

### Costs to Design and Launch

- Some partners took a very low cost approach to ELS.
  - Air Products began with a manual process and then used internal IT resources to automate it.
- Intel's, Honeywell's and Schlumberger's approaches were more expensive but also had a more extensive set of enterprise-wide objectives and were supporting much larger groups of staff.
- Partners were not at liberty to share their software costs. Applications and technology appear to be the smallest costs in ELS. The bigger costs are for staff or consultant time in order to understand users' requirements, build those requirements into the launch plans, and communicate and market the system to users.

**Examples of ELS-specific Roles**

At Intel, moderators are individuals with a broad base of business and/or technical knowledge and operational skills. They work with the implementation manager or champion to define, set up, and maintain knowledge categories for the business group. These people “own” the knowledge category where they act as moderators and are responsible for maintaining the local taxonomy within the context of the larger Intel taxonomy, which is more controlled.

In Air Products, technology scouts are information specialists with technical training who provide technologists with alerts on interesting findings or research.

**KEY POINTS****Examples of ELS-specific Roles**

- In all cases, the IT organization manages the technical system.
- The KM organization provides oversight and coordination.
- Content-related roles are in detail in the appendix. Examples include:
  - Air Products—two technology scouts
  - Intel—moderator to update taxonomy and encourage profiling
  - Schlumberger—Approximately 200 InTouch engineers (ITE) staff the service desks 24/7 and also call on designated subject matter experts



## KEY POINTS

**Intel: ELS Roles and Responsibilities**

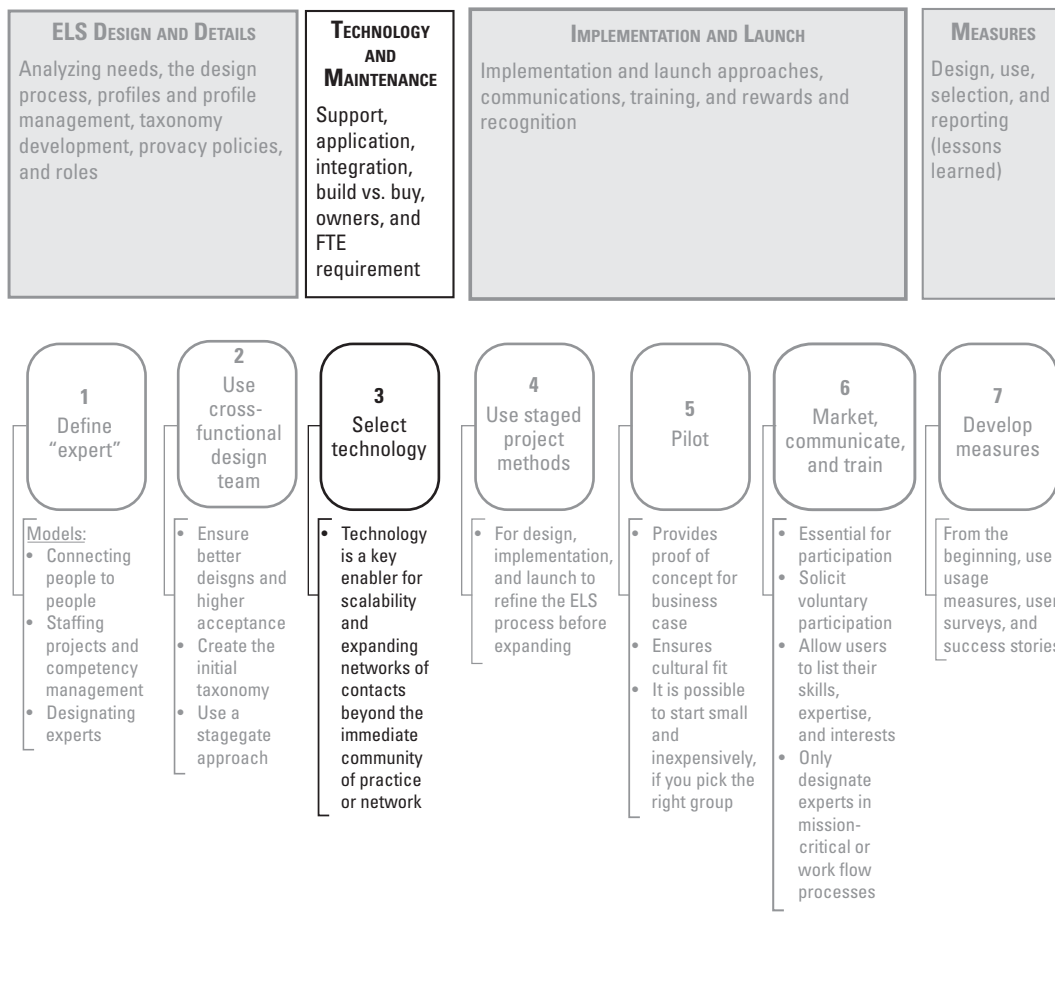
<b>Roles</b>	<b>Responsibilities</b>
User/knowledge seeker	Access ELS to ask question or retrieve knowledge.
Experts/knowledge providers	Knowledge providers have expertise in one or several knowledge categories defined by the moderator and champions. This person is responsible for answering users questions and posting useful documents within the category where he or she acts as expert.
Moderator	Individual(s) with a broad base of business and/or technical knowledge and operation. He or she works with the implementation manager and champion to define, set up, and maintain knowledge category for the business group. This person "owns" the knowledge category where he/she acts as moderator.
Champion	The business program manager is responsible for working with implementation manager and moderators to explore, implement, and sustain ELS use. Champion represents the business group.
Implementation manager	Market, explore, and implement ELS for business groups with taxonomy design consultant and trainer.
Ramp leader	Marketing, training strategy, and collateral, as well as overall ramp progress.
Quality/value leader	Value measurement methodology; quality assurance program and execution.
Support agents	First-level call support, second-level application and infrastructure support, and third-level vendor support.



# Technology and Maintenance

## KEY POINTS

### Technology and Maintenance



**TOP ISSUES IN ELS TECHNOLOGY**

The term “expertise locator system” is relatively new in the software industry. Employee directories, on the other hand, have been around for a long time. The term “directories” refers to a list of names that contains specific information about an individual such as his or her title, role, manager, and department. In most organizations, these directories are maintained by human resources personnel to keep a current list of employees at an organization.

Some organization’s have considerably expanded the use of these directories to list employee skills or interest areas in an effort to promote communication and knowledge sharing among employees. These enhanced directories are the simplest form of expertise locator systems.

Until early 2000, however, an enhanced expertise locator system was not yet available as a software product. Some organizations may have used existing vendors to expand their applications to incorporate expertise location functionality; but as a whole, no ELS applications existed. Therefore, organizations such as Air Products decided to build their functionality in-house in order to enable them to promote knowledge sharing across their organization.

The decision to build a custom system from scratch or to buy an off-the-shelf product has always plagued technical teams. Building systems used to be the only choice. When an organization needed new functionality, it either charged its programmers to build it or hired outside technical help to get it done. Building from scratch is no longer the norm. With plug-and-play applications now available in the marketplace, organizations are opting to purchase off-the-shelf software in order to save time and money and to get functional quickly.

**KEY POINTS****Top Issues in ELS TEchnology**

- Buy-or-build decision
- Selecting a vendor
- Integration with existing systems
- Cost
- Maintenance

### Build Versus Buy Decision

Technical factors to consider in a build-or-buy decision<sup>1</sup> follow.

- Review the current in-house technical infrastructure.
- Do any of the in-house systems have a component that could support some of the functionality you are looking for?
- Does your existing infrastructure allow you to add new functionality to it that would be compatible with your ELS requirements?
- If you chose to build on an existing application, will it integrate with other applications? For example, an organization may chose to build an ELS system on its existing portal application, but it may not integrate with its human resources application, which creates duplicative employee records.
- What is the cost to develop the in-house application? Remember cost includes time, money, and people.

Change management factors to consider follow.

- How long have existing systems been in place? It is always difficult to get employees to use a new system when existing systems are ingrained in an employee's work flow.
- Can you manage scope creep? Building a software application is like building a house. The general feeling is to add new features as they come about. The attitude is: "we are building this from scratch, and we might as well get it in there." The hidden danger there is the system will take longer to build, will be more costly, and in the end may lack technical integrity if functionality is built in pieces.

### KEY POINTS

## Build Versus Buy Decision

### Guidelines to help make the decision

- Define high-level user requirements.
- Break into long-term, medium-term, and immediate needs.
- Classify needs by priority: high, medium, and low.
- Get stakeholder agreement.
- Estimate time, effort, and resources required for the different options.
- List all options, and rank according to priority and needs.
- Create a flow-chart to help make a decision.

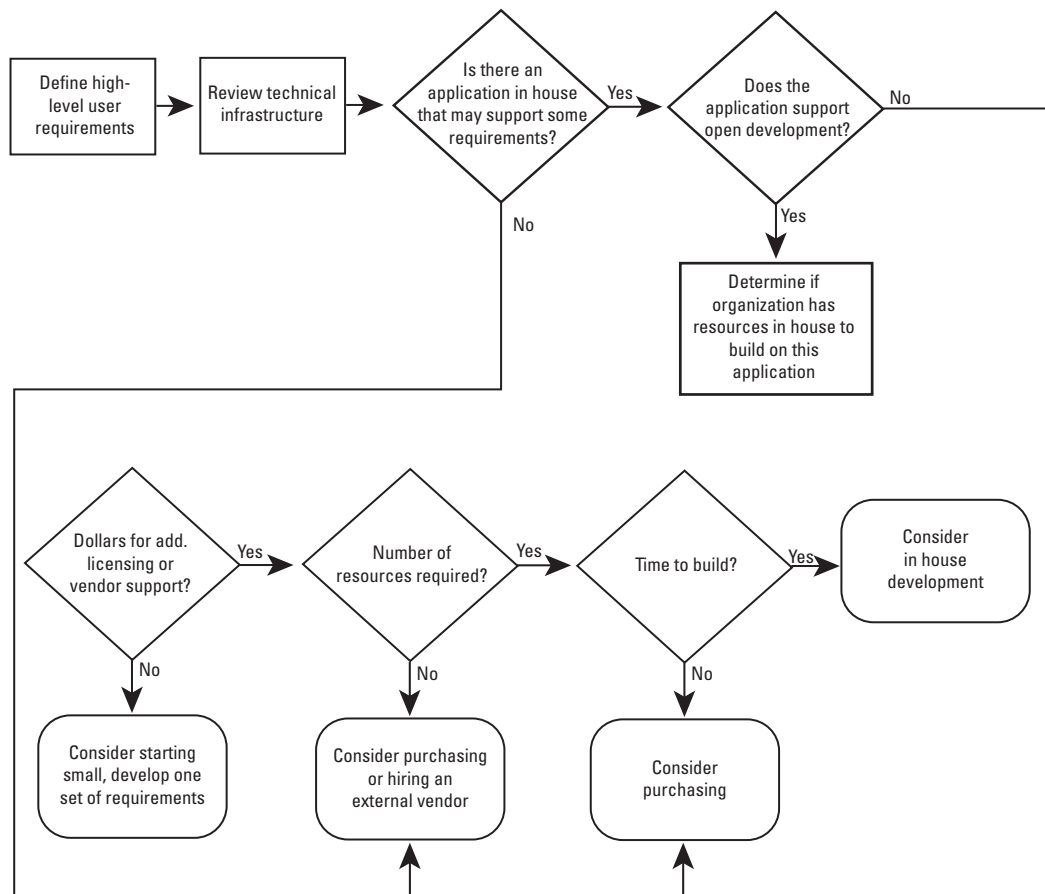
<sup>1</sup> *Build Versus Buy—Making the Right Decision*, Sanjay Murthi ([www.developer.com/mgmt/print.php/148331](http://www.developer.com/mgmt/print.php/148331)).

### Sample Build Versus Buy Flow Chart

The example below is a very simple sample of a flowchart to help an organization start thinking through the factors involved in making a build versus buy decision for an expertise locator system.

#### KEY POINTS

### Sample Build Versus Buy Flow Chart



### Types of Solutions

There are three types of ELS solutions: packaged, custom, and hybrid.

Potential benefits of the three types of solutions follow.

- Package solutions—software may be of better quality of and higher integrity if it has all been thought out well and built on a solid foundation.
- Custom solution—the major benefit is customization. The software can do exactly what you want it to do. There are no licensing costs on an annual basis. However, those are typically a wash with costs incurred for upgrading the application for new functionality.
- Hybrid solution—this approach can provide a little bit of both benefits: the structure of an existing system and the customization benefits of extending the application.

Potential pitfalls of the three types of solutions follow.

- Across the board, the potential pitfall is the quality and relationship with the vendor. Regardless of whether the application is purchased, built, or integrated, an unqualified vendor will signify trouble later.
- Off-the-shelf software applications typically carry an 18 percent to 20 percent annual licensing cost.
- Specifically for the custom solution, hidden costs are a major pitfall. Many little customizations add up to a large effect on time to deploy and total development costs.
- Because a hybrid solution involves some customization, it is prone to suffer from the symptoms of scope creep and excessive costs. A hybrid solution also consists of off-the-shelf software, so it will carry the same 18 percent to 20 percent annual licensing costs per application.

### KEY POINTS

#### Types of Solutions

- **Packaged solution**—refers to a complete or nearly complete solution proposed by a vendor for ELS functionality.
- **Custom solution**—refers to a customized solution built from scratch based on the organization's needs.
- **Intermediate/Hybrid solution**—refers to a solution that consists of a combination of various packages integrated with custom code to enable them to work together. An intermediate solution may also consist of a custom solution built on an organization's existing software application.

**Bets-practice Partner Examples**

The slide below details the decisions of Honeywell to buy and Air Products to build. The decisions of the other three best-practice partners are described below.

- **Intel**—the Intel team selected AskMe™ based on user requirements. The decision was primarily based on the fact that Intel could not cost-effectively build all the functionality for the price that it could buy the software.
- **Northrop Grumman**—a combination of several solutions support expertise location. Xref, Tacit, and Engineum are primary components. Xref is an in-house, custom-built application that started small and has grown because of demand and use across the organization. Tacit and Engineum were purchased to add more value to expertise location by providing profiles of employee knowledge and skills gleaned from e-mail communication, as well as powerful search capabilities to help locate documents and their subsequent owners.
- **Schlumberger**—Schlumberger is a technology-intensive organization, so the tendency has always been to build applications in-house. Schlumberger's ELS is built on LDAP technology. However, Schlumberger is looking for packaged solutions for the future because it is anticipating increased usage and global demands on the system.

**KEY POINTS****Best-practice Partner Examples**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Honeywell</li> <li>• Decision—BUY               <ul style="list-style-type: none"> <li>– Cheaper (long term and short term)</li> <li>– Better support</li> <li>– Requirements fit (leave the development to the experts)</li> <li>– Benefits of others who had implemented it in the past (Intel, Ford, Boeing, Proctor &amp; Gamble, others)</li> </ul> </li> <li>• Thoughts on BUILD               <ul style="list-style-type: none"> <li>– Almost always slower to deliver</li> <li>– Almost always cost more (true costs)</li> <li>– Almost always does less</li> <li>– Almost always becomes out-of-date quicker</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Air Products</li> <li>• Decision—BUILD               <ul style="list-style-type: none"> <li>– Nothing suitable available in 1998</li> <li>– Designed based on existing processes</li> <li>– Have in-house development expertise</li> <li>– Do not have to pay for upgrades and licensing</li> <li>– Internal upgrade costs far below licensing costs</li> <li>– Easy to add features and metrics</li> <li>– Easy to migrate data</li> <li>– Complete control</li> </ul> </li> </ul> |
|---|--|



## LESSONS LEARNED—BUILD VERSUS BUY DECISION

## KEY POINTS

**Build Versus Buy Decision**

- Factors will change during the decision-making process.
- Make a good decision based on what you know. It will not always be the best decision.
- Taking too much time to decide will have long-term repercussions on your project and the organization.
- With custom, purchase, or hybrid projects, use an iterative process. Build a little, review, match against requirements and outcomes, and make changes if necessary.

**SELECTING A VENDOR**

What capabilities do most of these vendors offer?

**Platform or Functionality that Supports Collaboration**

- Vendor facilitates informal flow of information.
- Vendor provides a workspace for interaction so that it can monitor activity and look for experts in topic areas.
- Typically, collaborative spaces do not allow for distinction between levels of expertise unless specifically customized to do so.

**Directory or Profile Listing**

- Vendor provides the ability to create a profile of an employee.
- Typically, demographic information is automatically drawn from an HR or ERP system. This system allows more “descriptive” information to be gathered on the employee such as past experience, past projects worked on, skills, areas of expertise, interests, and availability to work abroad.

**Database or Repository of Content**

- An ELS provides the capability to store content. This is critical when systems are set up to first look at existing information to find answers to questions posed by employees before finding a person to answer it.
- The repository will typically come with an OEM search engine that will enable full-text searches.

### Scanning information

- Different from searching in a repository, scanning information to find expertise includes scanning content as well as e-mail. These systems automatically build expertise profiles based on the information an individual writes or shares on a daily basis.

### Reporting modules

- Vendors provide the ability to print activity reports, or profiles, skill lists, etc.

### Open platform to build on

- It has almost become expected that all software today provide platforms that organizations can build on, independent of the software organization itself. If the software is written in proprietary language and the vendor does not allow open API standards or provide software developer kits, then the purchaser is severely restricted to using only the original vendor for further development. Such requirements have become unacceptable in the software industry.

### KEY POINTS

- Some vendors in the ELS space
  - AskMe
  - Tacit
  - Kamoon
  - Knowledga Lead
  - Raven
  - Server platforms:
    - Hummingbird
    - Lotus
- ASP Model—used to buy experts, typically consultants, online
  - Intellect Exchange ([www.intellectexchange.com](http://www.intellectexchange.com))
  - Intota ([www.intota.com](http://www.intota.com))
- Others
  - Kanisa (call center technology—positioned as finding expertise) ([www.kanisa.com](http://www.kanisa.com))
  - Intraspect (portal collaboration—provides workspaces for collaboration, querying databases, may lead to location) ([www.intraspect.com](http://www.intraspect.com))

### Vendor Selection Process

When selecting a vendor, take the following factors into consideration:

- **Payback for your organization**—the application addresses enough capabilities to allow you to show a changed or a new process and maybe even some payback as outlined in your business case.
- **Current functionality offered by vendor**—do not get caught in the “coming soon” trap that some vendors will subject you to once they know your requirements.
- **Extendibility of application**—do not pay heed to what the vendor says it will offer in the future but to whether the platform will allow you to extend the application if you chose to.
- **Consulting support**—most vendors should provide expert support. Their consultants are more expensive than an integrator, but they typically require less time to address an issue and know the application better than some integrators.
- **Other factors**—these are factors that you may have outlined in your build-or-buy flowchart, such as the ability to integrate the application with existing resources, or vendor-specific factors such as 24/7 global support for your employees.

### KEY POINTS

#### Vendor Selection Process

- Determine the overall outcome of the expertise locator system.
- Conduct a needs assessment, and create a list of needs.
- Develop a list of potential vendors based on needs expressed by users and some initial marketplace research.
- Develop a vendor assessment questionnaire and request that the vendors fill it out.
- Assess the risks associated with each vendor.
- Assess the vendor based on the user’s needs and the vendor’s capabilities to deliver those needs, and create a summary document.
- Make a decision.

**Integration Points for ELS**

Integration with existing systems is a critical success factor for expertise locator systems for two reasons. First, if the expertise locator system is implemented as a stand-alone system and is not designed to be part of an individual's work process, then employees' participation will likely be low. Secondly, the basic information for an expertise locator system almost always exists in a human resources database or employee directory of some kind, and it is important to leverage or reuse the data that already exists.

Because expertise implies skills and experience in a particular area, integration with performance management systems and project staffing systems seems to be a natural extension and exists at four of the seven partner systems studied.

Integration with e-mail systems and document repositories exists in organizations where the ELS is designed to crawl or search those systems to automatically generate an expertise profile for an individual based on either the e-mail that he/she is sending out or the documents that an individual may have authored.

Instant messaging/chat is primarily used as a vehicle to provide a response to a query. Instant messaging carries some expectations with it. The requestor will expect an almost immediate reply. For the experts involved it means a different level of commitment than answering an e-mail within 24 to 48 hours. Norms such as setting a user name to show "out-to-lunch" or "be back in a few" are very important. Another issue that should be considered is that of finding someone else to answer the question if the original knowledge provider is not available.

**KEY POINTS****Integration Points for ELS**

- Human resources directory
- Performance management system
- Project management system
- Project staffing system
- Succession management system
- Customer relationship management system
- E-mail systems
- Document repositories
- Instant messaging/Chat

### Linking ELS with Other Systems

All partners link their ELS with other in-house systems. Here are some examples.

- **Northrop Grumman**—ELS is linked to human resources, performance management, and active directory.
- **Schlumberger**—LDAP, SAP, and human resources are all linked together. There is a separate human resources profile for official use, and there is a career networking profile for communication and knowledge-sharing purposes.
- **Rockwell Collins**—ELS is linked to performance review systems, learning and development systems, and engineering and resource planning systems.

### KEY POINTS

#### Linking ELS with Other Systems

All partners link their ELS with other in-house systems.

- **Air Products**—the ELS is linked to central employee directory (“Workforce”).
- **Eli Lilly**—the ELS is linked to communities of practice, succession management, and performance management.
- **Honeywell**—has a planned (not implemented) link to in-house project tracking application and Siebel customer relationship management system.
- **Intel**—individual records are extracted from the human resources database. The ELS is also linked to MS Outlook, MS Share Point Server, and instant messaging.

## Search Capabilities

## KEY POINTS

**Search Capabilities**

- Whether you are looking for people or content, it is essential that employees be able to locate them.
- If an employee cannot identify an expert or knowledge provider, then they can not contact one.
- If an employee can not locate the appropriate documents, then more of the provider's time is spent attempting to answer questions.
- In a best-case scenario, one search function scans all applicable repositories or listings.
- In a best-practice partner example, Schlumberger has an integrated search capability that looks across a variety of databases in response to a query.

**ELS FTE Maintenance Requirements are Modest**

Maintenance requirements for Air Products follow.

- KM group staffing: eight employees are assigned to the KM Center of Excellence, and about 40 others are part-time contributors and facilitators throughout the world.
- The ELS is maintained by a 0.1 FTE administrator and 0.25 IT support staff.
- A clerical staff sends alerts: 1.2 FTE.
- Technical scouts conducting secondary research: 1.2 FTE.
- The reporting function is responsible for technical data systems: 0.6 FTE.

Maintenance requirements for Intel follow.

- Pilot solution with 1,200 users to understand cultural and behavior impacts
- Ramping up (implementation, marketing and communication, rewards and recognition, etc.): 1 FTE
- New development (new capability, content audit, and usage performance analysis): 0.5 FTE
- Sustaining ELS: 0.5 FTE for infrastructure and 0.5 FTE for application maintenance

Maintenance requirements for Honeywell follow.

- Technology (user support, upgrades, and help desk): 0.02 FTE
- Administration (license tracking, user add/delete, etc.): 0.01 FTE
- SBU Focal Point (training, communications, etc.): 0.01 x 4 FTE

Maintenance requirements for Northrop Grumman follow.

- IT personnel (ActiveNet, PeopleNet, XRef, and Talent Pool deployment): ~1.5 FTE
- KM team (ActiveNet, PeopleNet, XRef, and Talent Pool development): ~0.9 FTE
- IT personnel (ActiveNet, PeopleNet, XRef, and Talent Pool development): ~2 FTE
- IT personnel (network support): ~1 FTE
- KM developer (XRef development and administration): ~1 FTE
- KM team (CoPs and lessons learned): ~0.3 FTE

Maintenance requirements for Schlumberger follow.

- Now that the systems are enterprise wide, they are supported and developed by the corporate information systems. No small skunkworks exist.
- The directory and Eureka CNPs are operating at a basic level. The directory has one thought leader and a small support team for the five LDAP servers. Three people manage Eureka and have a small support staff.
- InTouch System
  - Experts named “InTouch engineers” (“ITEs”) staff a service desk that employees contact through telephone or e-mail.
  - There are 1,600 officially designated support experts who fall into one of four groups: subject matter experts, segment knowledge champions, geomarkets knowledge champions, and applied community experts. Eighty-six service desks are manned by 200 ITEs

## KEY POINTS

### ELS FTE Maintenance Requirements are Modest

- The full-time equivalent (FTE) time requirements to support an expertise locator system are modest by software standards.
- Now that the Honeywell ELS is up and running, the combined total for all activities equals one-tenth of a person (4 hours per week or 208 hours per year)

**Characteristics of Affordable and Flexible Maintenance and Expansion****KEY POINTS****Characteristics of Affordable and Flexible Maintenance and Expansion**

- Limited customization of technology wherever possible.
- Choose a vendor who is a good fit for your needs.
- Keep it simple.
- Aim for enterprise-level support.
- Continue emphasis on marketing and communication.
- Enhance by cross-functional and silo involvement in the design process.

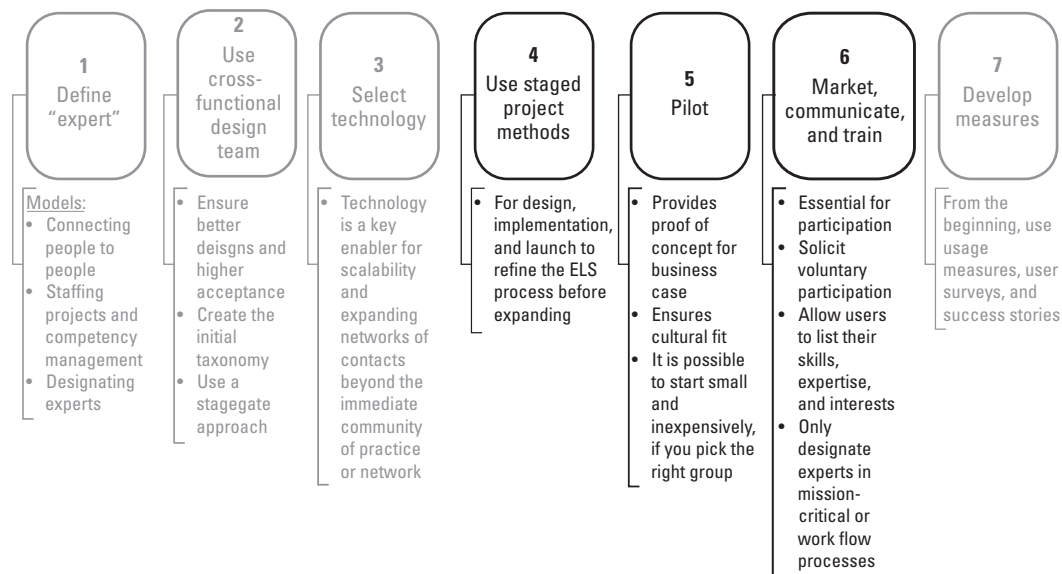


# Implementation and Launch

## KEY POINTS

### Implementation and Launch

<b>ELS DESIGN AND DETAILS</b> Analyzing needs, the design process, profiles and profile management, taxonomy development, privacy policies, and roles	<b>TECHNOLOGY AND MAINTENANCE</b> Support, application, integration, build vs. buy, owners, and FTE requirement	<b>IMPLEMENTATION AND LAUNCH</b> Implementation and launch approaches, communications, training, and rewards and recognition	<b>MEASURES</b> Design, use, selection, and reporting (lessons learned)
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## CHARACTERISTICS OF A SUCCESSFUL ELS LAUNCH

## KEY POINTS

**Characteristics of a Successful ELS Launch**

- Begin the launch with a pilot whenever possible.
  - All of the partners began in units where the sponsorship and desire to have the solution were present.
  - Expansion also reflected a “pull” approach, which is encouraged by marketing the system to potential user groups.
- A formal marketing and communications plan leads to greater participation and usage.
- Don’t lose the human touch.
  - Honeywell’s team sent hand-written thank-you notes to advocates.
  - Northrop Grumman asked early adopters to identify success stories and encourage others to add their profiles.
  - Intel recognizes people for participation and for advocacy.
  - Air Products started with a person interviewing 100 technical people to identify the type of alerts they would personally find useful.

## VALUE OF PILOTS

Honeywell selected a pilot group that shared a business goal, was oriented toward sharing, and wanted the ELS. Additional criteria for the pilot group included a driven, knowledgeable group that was cross-company, cross-area, cross-functional, had the right mindset, and was enthusiastic. The Six Sigma pilot group was focused on delivering productivity results to Honeywell.

### KEY POINTS

#### Value of Pilots

- Use pilots to understand the local culture and work flow of the potential users in order to intimately embed the solution into their process.
  - Intel piloted with 1,200 people over a 10-month period.
  - Honeywell piloted with the Six Sigma and customer service groups over a four-month period.
- Pilots provide the proof of concept to build the business case for moving forward.
- Selection of a pilot that is already cross-functional, such as Six Sigma champions, gave Honeywell a “touch point” across many functional areas.

**Intel's Pilots**

The Intel team kicked off marketing campaigns and rewards and recognition programs in conjunction with the launch of the pilot. The team gauged the success of the campaigns and programs over the course of the effort.

Intel successfully completed the pilot phase in 10 months. The team evaluated the success of the project by measuring it against the requirements (schedule, budget, usage, performance indicators, and ROI) and customers' feedback. The team saw a 13-week upward rolling trend for the number of log-ins and the number of knowledge exchanges. Had these requirements not been met, the pilot may not have been judged a success and the project could have been halted.

Intel's pilot also revealed an important design tip: every additional click required will reduce 10 percent to 20 percent of the users who will actually use the system.

**KEY POINTS****Intel's Pilots**

- Intel piloted the ELS solution (AskMe) to understand cultural and behavior impacts.
- During the pilot, the following tasks were completed:
  - users surveyed to determine value and behavior baseline;
  - taxonomy standards and a change management process defined and in place;
  - customer business analysis completed;
  - knowledge category created with pre-populated content; and
  - marketing campaign and reward and recognition program kicked off.
- The Intel pilot successfully concluded after 10 months.

## Encourage Participation

### KEY POINTS

#### Encouraging Participation

- Having a well-thought-out communication and launch plan leads to faster adoption and participation.
- In addition to a formal set of communications, Intel used a calculated “infection model” by encouraging word-of-mouth promotion, company-wide advertising, and Web site referral.
- Several partners offered training programs:
  - Certification of moderators, online training, and train the trainer

#### Encouraging Participation: Incentives and Rewards

What motivates partner employees to complete their profiles is different for each partner, but all rely on the personal benefit to the employee. If Air Products’ employees wish to receive targeted technology alerts, then they have to complete and update their profiles. Eli Lilly, Rockwell Collins, Schlumberger, and Northrop Grumman all include a profile review in the performance review. At Northrop Grumman, profile creation is part of the employee annual review process, and a measure in the semiannual performance review process. The ELS required the employee to enter a minimum amount of data, and other data are voluntarily entered.

In Honeywell and Intel, the chance to give advice and be seen as knowledgeable and helpful by peers and management is a key motivator. The Intel ELS recognition program has four levels and is designed to motivate participation through recognition. The reward is largely to provide recognition, but in some cases, a community or functional group may decide to provide small rewards such as \$25 to \$50, American Express gift certificates, or Intel logo merchandise. Intel, as a rule, does not encourage cash gifts for KM recognition because Intel’s culture does not find that, in the long term, these ad hoc financial rewards promote the desired behavior.

## KEY POINTS

**Encouraging Participation: Incentives and Rewards**

- The personal reward inherent in having a profile was the most common incentive used.
  - Profiles were required to be staffed on projects at Northrop Grumman.
  - Profiles were required to be alerted to technology updates (e.g., professional development) at Air Products.
  - Career Network and Profile (CNP) helps one get new postings at Schlumberger
  - All partners found that employees wanted to get questions answered and provide advice.
- Formal recognition
  - Intel recognition program selected frequent “winners” in four categories: knowledge sharer, champion of champions, navigator, and study in success.
- Profiles were a required component of the performance appraisal
  - Northrop Grumman

Partners were asked what they considered to be the top three factors contributing to a successful ELS launch and adoption. Their responses are below.

#### **Air Products**

- Compelling content (i.e., the technology alerts)
- Geographically-dispersed teams have no other efficient way to find experts
- Increasing numbers of communities of interest and communities of practice

#### **Eli Lilly**

- Link to its performance management system
- Support (in dollars and resources) from its global human resources group
- ELS is a key part of HR transformation deliverables and is tracked monthly

#### **Honeywell**

- Stage-gate implementation
- Choosing the right pilot group
- Understanding the culture prior to deployment

#### **Intel**

- The recognition program
- Senior management role modeling
- Internal communication and training through road shows, newsletters, seminars, online courses, and “training-the-trainer” models

#### **Northrop Grumman**

- Tenacity
- The practical application
- Correlation to success

#### **Rockwell Collins**

- Leadership support
- Mandatory input profile
- Success stories

#### **Schlumberger**

- Change management
- Ease of use
- Contains personally appealing “informal content”

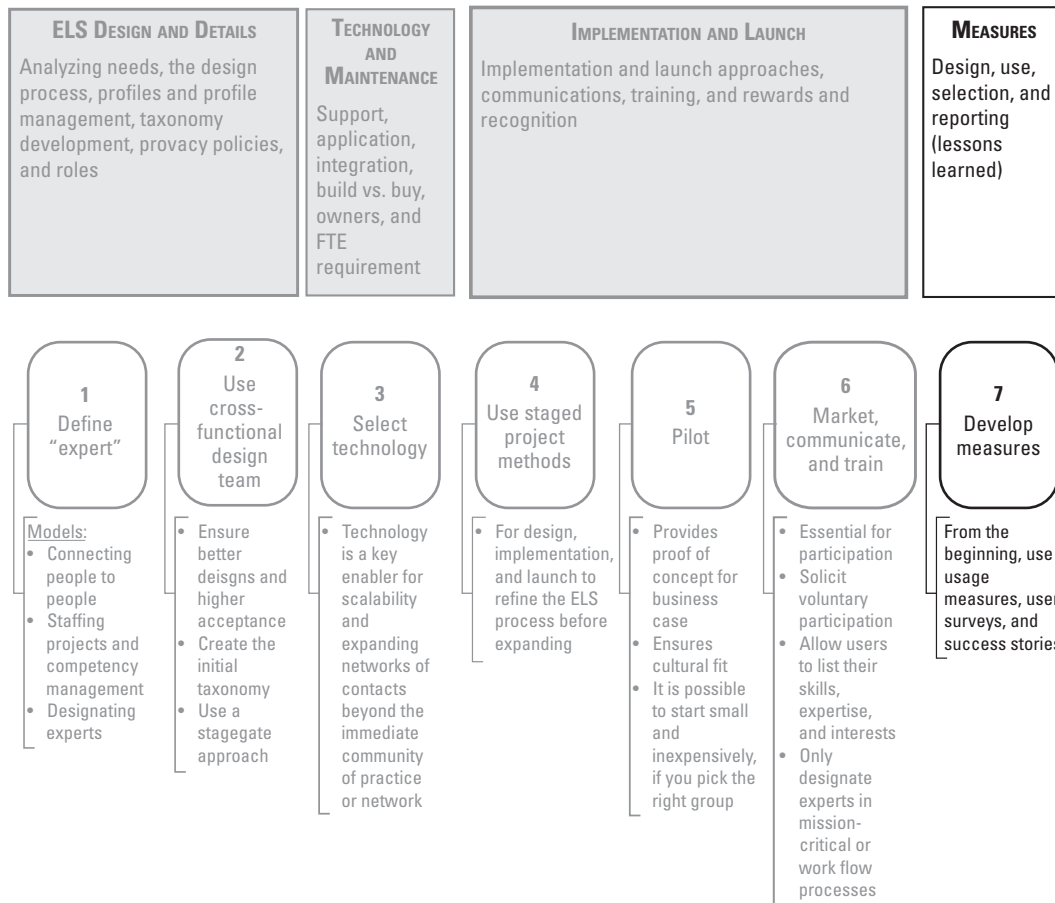




# Measures and Results

## KEY POINTS

### Measures and Results



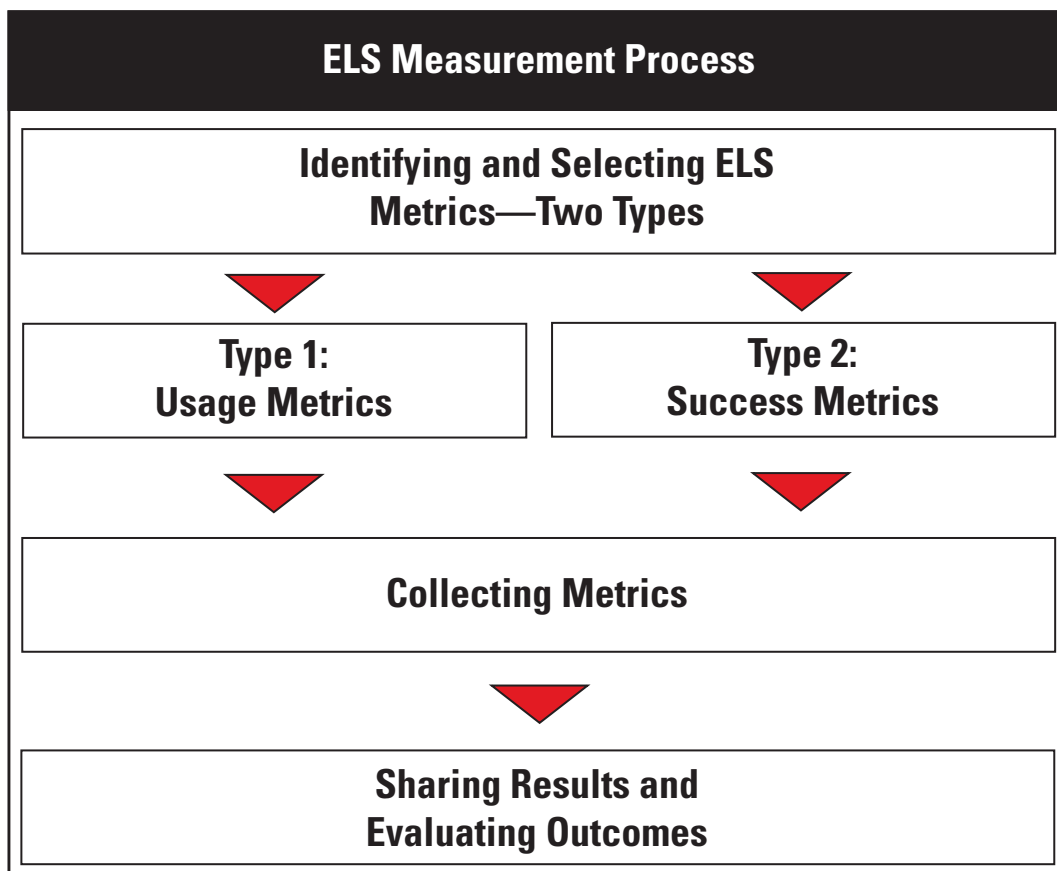
**Best Practices in ELS Measures and Metrics****KEY POINTS****Best Practices in ELS Measures and Metrics**

- If purchasing a tool, ask the vendor for measures that others have used and then select and adapt for your situation.
- Several partners make a distinction between usage and success metrics.
- Establish a process for finding and reporting success stories.
- Conduct preliminary and post-implementation surveys of user satisfaction.
  - It is equally important to track the number of questions answered as it is to track the quality ratings of content in specific areas.

## From Measures to Results

## KEY POINTS

## From Measures to Results



## From Measures to Results

## KEY POINTS

## From Measures to Results

## Identifying and Selecting ELS Metrics—Two Types

- Use Six Sigma methodology
- Request that vendor provides
- Create based on quality, function, and deployment in relation to customer expectations
- Base on ELS implementation or baseline targets
- Use a balanced scorecard approach

Type 1: Usage Metrics

- Number of unique application users
- Number of profiles in system and currency of profiles
- Number of alerts or bits of information “pushed” to users
- Identified leading performance indicators

Type 2: Success Metrics

- Number of unique application users
- Number of profiles in system and currency of profiles
- Number of alerts or bits of information “pushed” to users
- Identified leading performance indicators

## Collecting Metrics

- Methods: embedded system auto feedback feature, surveys, and conducting user interviews
- Frequency: partners report updating usage metrics daily and weekly, while success metrics are collected as needed

## Sharing Results and Evaluating Outcomes

- Identify opportunities for improvement
- Communicate to stakeholders to build support and encourage participation
- Use success stories
- Evaluate ELS value using comparative pre- and post- launch metrics

### Identifying and Selecting ELS Measures

Identifying appropriate measures early in the ELS implementation cycle was identified as a critical success factor for partner organizations. The approaches adopted by partner organizations to select measures ranged from highly sophisticated Six Sigma procedures to measuring ELS usage and acceptance among subscribers. Honeywell, for instance, gathered all the measures ever used in an ELS technical implementation before selecting their own. The measures were internal Honeywell measures as well as measures supplied by the vendor. The pool of measures was subjected to a rigorous analysis using Six Sigma tools such as Quality Functional Deployment, PMAP, and FMEA to determine the which measures to pick. The effort resulted in 10 success metrics and seven usage metrics, which are described later in this section.

Air Products and Chemicals, on the other hand, decided to select measures based on the core functionality of their ELS, which was the dissemination of news alerts to employees. Their measures include how many employees are signed up for alerts and whether or not they find them useful (as judged by a survey).

Schlumberger's expertise location functionality is dispersed over several systems such as the Hub (knowledge repository), InTouch (engineering help desk), Eureka (community of scientists and engineers), and its Career Networking Profiles (CNP). Measures for the Hub and the InTouch communities are very rigorous. The usage metrics are used to assess future training needs for employees. The measures on the CNPs, however, are not as rigorous. Activity measures, such as number of profiles created and updated, are available for members to view online.

#### KEY POINTS

### Identifying and Selecting ELS Measures

- Partner organizations use a variety of approaches to identify ELS measures.
  - Six Sigma methodology
  - Request from vendor
  - Base on quality, function, and deployment factors in relation to customer expectations
  - Base on ELS implementation or baseline targets
  - Balanced scorecard approach
- Selected measures serve to evaluate knowledge location before, during, and after ELS implementation.

### Two Types of Measures

APQC's KM Measurement Framework (introduced in the 2003 Best-practice Report *Measuring the Impact of Knowledge Management from APQC*) recommends tracing KM investments (inputs), activities (process and behaviors) to impacts (outputs), and related bottom-line measures (outcomes). Successful KM initiatives show a linkage between inputs, activities, and outcomes. The partners in this study focused on inputs and activity measures, and gauged usage and satisfaction as output measures.

Value and ROI measures refer to the calculation of input (typically dollars spent), minus outcome (typically dollars saved) to provide the hard numbers to support the success of the program. ROI is often calculated based on the total cost of ownership of the system and includes the costs associated with initial setup and ongoing analysis of the system. For the ELS support team, it includes ongoing support and technology costs.

The Intel team conducts quantitative analysis on a variety of fronts and frequently communicates results to key stakeholders to build support and engage potential user groups. A weekly report termed the "usage summary" presents the number of knowledge categories and subcategories, number of unique users and profiles, questions and answers provided that week with the percentage rated, and the number of search and browsing activities. The team tracks key user/usage indicators and includes the average "per production per user per month" and the "return user" rate. Success stories and anecdotes captured online through feedback mechanisms or champions are gathered as qualitative indicators of success.

#### KEY POINTS

### Two Types of Measures

- Usage metrics serve as leading indicators of performance for the ELS. Commonly tracked usage measures are:
  - Number of users (most common)
  - Frequency of use
  - Time savings or cost avoidance
  - Number of system hits
- Success metrics address the final outcomes of the ELS. Success metrics track:
  - Usability
  - Acceptance
  - Meeting user requirements
  - ROI

**Examples of Usage Measures**

- Average number of log ins per month
- Knowledge provider registration rate
- Monthly knowledge transaction per user
- Monthly visits per user
- Number of answers viewed
- Number of current profiles
- Number of expert profiles
- Number of questions posted to bulletin board
- Number of registered experts
- Number of search and browsing activities
- Number of sites accessed
- Number of system hits
- Number of technology alerts pushed to users
- Number of topics in the system
- Profile update rate

**Examples of Success Measures**

- Number of active categories in the system
- Number of best practices created
- Number of best practices submitted for review
- Number of categories displaying best practices
- Number of content updates
- Number of documents populated or exchanged
- Number of documents uploaded
- Number of FAQs
- Number of knowledge categories
- Number of questions posted
- Number of unique open questions
- Average rating of answer
- Average response time to posted request
- Degree to which content meets user needs
- Number of calls to call center
- Number of customer service escalations
- Number of improvements in operation
- Number of problems solved
- Accessibility 24/7
- Percentage reduction in project completion time
- Resources saved by system use
- ROI
- Time savings to locate a knowledge provider
- User satisfaction

**Measures That Help Indicate Problem Areas****KEY POINTS****Measures That Help Indicate Problem Areas**

- Number of active categories with zero experts
- Number of deleted categories in the system
- Number of empty categories
- Number of knowledge gaps identified (expertise that is needed but that does not exist)



**Qualitative Indicators of Success**

- **Air Products and Chemicals**—The team surveyed its customers regarding the technology alerts sent out by its ELS, and the results were insightful. The survey consisted of approximately 12 questions and addressed users' perceptions of the technology alerts, including the degree to which the alerts contribute to decision making and actions taken by the reader as a result.
- **Northrop Grumman**—The team aggressively collects stories from its power users and requests them that they be advocates to others. A member of the KM group is in charge of soliciting success stories.
- **Intel**—Intel gathers success stories online through its ELS. The effort is coordinated through champions. Quarterly and annual recognition is given to participants. Intel also gathers qualitative data using surveys. The survey covers questions that address customer satisfaction with the ELS tool as well, as the usability and value of knowledge gathered or learned as a result of finding an expert using the ELS.

**KEY POINTS****Qualitative Indicators of Success**

- Partners use surveys to assess ELS.
  - Honeywell, Air Products, and Intel
- Partners aggressively collect success stories to supplement usage data.
  - Northrop Grumman, Schlumberger, and Intel

### Intel: Pilot Measures and Results

One of the critical success factors of ELS implementation, especially a large-scale implementation, has been to identify the appropriate measures during the pilot phase and show some results. Two partners, Honeywell and Intel, did just that. The pilots were a complete prototype of the solution including usage and success measures. The only limitation was the degree to which the system had been rolled out in the organization.

During the pilot phase, the Intel implementation team established success indicators to monitor the pilot. An interesting observation for Intel was not the response time or the quality of the answers. It was the low number of questions being asked. The team had to consequently work on encouraging employees to ask questions so that experts could answer them.

#### KEY POINTS

### Intel: Pilot Measures and Results

Indicators	Industry Benchmark	Intel Goal (POR)	Intel Actual
Expert sign-up rate	15% - 20%	30%	59%
Answer rate	80% of unique questions answered	90%	93%
Response time	80% of questions answered in 3 days	80%	91%
Number of total questions	2/user/month	1/user/month	1.38/user/month
Rating of answer	4 - 4.5 stars (aggressive)	4	4.38 (94% answers rated)
Empty category	0 category that has 0 expert and 0 activities	<1% category that has 0 expert and 0 activities	4 categories ~ 0.98%
Monthly visit per user	2	1	2.6
Monthly knowledge transaction per user	2	1	4.6
Calls to call center	NA	0.5% x 1000 = 50 calls per month	25 calls for the entire pilot
Percentage of accessibility 24/7	NA	95%	99%

### Honeywell: Pilot Measures and Results

Honeywell's pilot measures were picked based on extensive Six Sigma analysis and include some outcome as well as activity measures. These were the success metrics required for the pilot to pass the final stage gate. The return on investment (ROI) numbers were based on soft money and savings (that is, amount of work and number of hours avoided).

#### KEY POINTS

### Honeywell: Pilot Measures and Results

Measurement	Initial Targets	
Exceed ROI hurdle	ROI $\geq$ 12%	✓
Time savings in locating help	.5 hours/person/week	✓
Average response time	36 hours	✓
Increased number of cross "group" connections	Map trend	✓
Participation	$\geq$ 70%	✓
Number of answers viewed	10% growth/week	✓
Number of documents	10% growth/month	✓
Number of frequently asked questions (FAQs)	10% growth/month	✓
Average rating of answers (scale of 1 - 5)	$\geq$ 3 stars	✓
User satisfaction (scale of 1 - 5)	$\geq$ 3.5 rating	✓

**Honeywell: Measures and Results**

Measures and results are important in Honeywell's culture and played a key role in the stage-gate process employed by the ELS team. One of two sub-teams focused on measures and results. The team used the Six Sigma DMAIC process and tools to identify and select its measures. The team adjusted and fine-tuned communications and strategies based on emerging data patterns.

The team identified 10 success metrics and seven usage metrics that could be used to manage the project. Although many other metrics were and are tracked, these were identified as the "critical few." Usage metrics served as leading indicators of performance and were updated on a more frequent basis (daily, multiple times per day) as compared to the success metrics. Metrics are tracked using a weekly scorecard for both "success metric" tracking and "usage metric" tracking.

Honeywell categorizes its business drivers and results by responsiveness, agility, effectiveness, and productivity.

- **Responsiveness**—Answers to questions must be in minutes and hours, not days. Twenty-four hours is the average.
- **Agility**—More than 90 percent of the connections or answers come from across boundaries (organizational, geographical, and divisional).
- **Effectiveness**—The system currently includes 1,700 profiles and is growing. The answers, with embedded links to other documents, are captured and saved for future reuse.
- **Productivity**—ELS users at Honeywell are saving an average of 40 hours per user per year, or for every fifty people that the ELS is deployed to, Honeywell gains an extra headcount

## KEY POINTS

## Honeywell: Measures and Results

Microsoft Excel - askmereport\_Master.xls

File Edit View Insert Format Tools Data Window Help Acrobat

100% ? B I

A2 = Metric

	A	P	Q	R	S	T
2	Metric	Current Weekly Total	Total	Weekly Target	Trend	Status
3	Visits	432	5987	400		
4	Unique Visitors	169	722	700 (PTD Target)		
5	Expert Profiles Viewed	375	7227	500		
6	Unique Questions	38	472	50		
7	Total Answers	59	848	75		
8	Total Searches Conducted	175	2704	150		
9	User Visible System Downtime (hrs)	0	N/A	<10 MINS/WK		

Early Use Metrics Success Metrics

Draw AutoShapes

**Other Less Quantifiable Benefits of ELS**

- Honeywell, Air Products, and Intel were especially pleased that the systems enabled expertise sharing across normal organizational boundaries.
- At Northrop Grumman, the ELS enables the retention of valuable knowledge and project staffing options by including an extended network of contractors and retirees—whoever is in the firewall.
- Legitimize participation and success stories as evidence of value.

**Just Because Knowledge Is Intangible Does Not Mean That Its Impact Is**

*The overarching lesson learned is this: if one can't figure out how to measure the impact of KM on the business, it is a clue that one doesn't understand how the KM approach actually is going to work. And that is a clue that it probably won't (unless you get lucky). It is time to go back and get it right.*

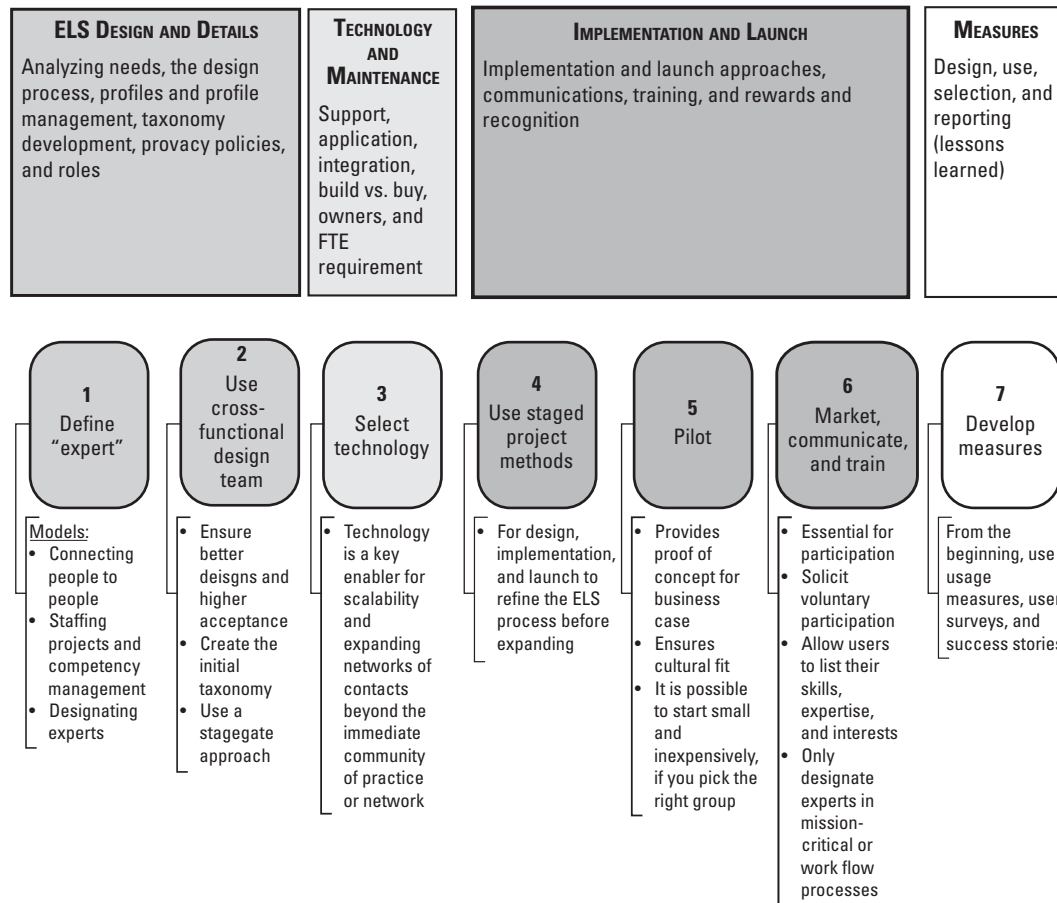
APQC's 2003 Best-practice Report  
Measuring the Impact of Knowledge Management

For more information on the above benchmarking report, visit [www.apqc.org/pubs](http://www.apqc.org/pubs).

# Lessons Learned

## KEY POINTS

### Lessons Learned



**LESSONS LEARNED**

All the partners cited change management issues as both the reasons for their success and where they learned the most lessons. Behavior change was difficult for all partners. Many reported that people forget that the ELS is available or do not attend to its introduction. At Honeywell, even people who wanted to use the system accidentally deleted their launch instructions, thinking it was SPAM. Implementers should carefully choose the wording in the subject line of the message that introduces the system so that the recipient knows it contains instructions. Intel's ELS team believes that its marketing plan and ongoing communications and recognition were key promotional tools to remind people to use the system.

For Honeywell, critical success factors in the ELS included the culture study, the paradigm shift to “knowledge provider” rather than “expert,” excellent communications, the selection of the right pilot group (Six Sigma), and the selection of the right metrics and vendor. Conversely, Honeywell reported that the ELS team would have liked to have been more pervasive in communication, effectively embedding the ELS in the work process, and having more patience because behavior change takes time in a large company.

During the deployment of its ELS, Air Products identified four critical success factors based on its lessons learned. First of all, tie the ELS to an existing business process. In the company, new initiatives and processes are often perceived negatively. By tying it into an existing process (technology alerts) that is seen as valuable by employees, the team immediately generated a supportive following for the ELS. Second, give people a vested interest in posting and maintaining profiles. Collaboration and the opportunity to receive new information on topics of interest is a motivator, and the price of admission is completing and updating a profile. Third, the ELS needs both bottom-up and top-down support to expand to the enterprise. The organic growth of the system in its early years built a very strong foundation in a pivotal user group. However, in order to gain the credibility and acceptance of the enterprise, more executive support (the KM group) was needed. Finally, keep the system low maintenance. The more maintenance costs required for systems, the higher the likelihood it will be a target for budget cuts. Keeping the system simple and easy to use not only increases the user experience, but also allows it to “fly under the (budget-cutting) radar.”

Senior executive sponsorship was cited by several partners as a key need for expansion. Most employ a marketing approach to spreading the use of an ELS (rather than by mandate); and unless the executives in a potential unit endorse the system and role model its use, it is hard to propagate.

Schlumberger and others cited “ease of use” as a major lesson learned as they developed their ELS applications over a period of years. The profiles need to be easy to maintain—a change in one application should automatically propagate to others—and competing systems need to be removed to reduce confusion. As an organization that built its original systems, Schlumberger stresses that IT standards are needed to promote compatibility of the systems. If the company were starting today, then it would purchase commercial components that were well integrated.



## KEY POINTS

**Common Themes in the Lessons Learned**

- Effective change management methods are the key to success.
  - Devote resources to understanding the culture and communicating repeatedly and personally.
- Do not worry about validating skills and expertise listed in profiles unless it is mission-critical.
- Select the right pilot group.
- Select technology that is simple to use so that people can update their information once, and have it propagate to other systems. Design for low maintenance costs.
- Give people a vested interest in posting and maintaining profiles, rather than trying to sell them on the value to the company.



## Partner Organization Case Studies

<b>91</b>	<b>Air Products and Chemicals Inc.</b>
<b>99</b>	<b>Honeywell Inc.</b>
<b>111</b>	<b>Intel Corp.</b>
<b>125</b>	<b>Northrop Grumman</b>
<b>131</b>	<b>Schlumberger Ltd.</b>



## Air Products and Chemicals Inc.

Air Products and Chemicals Inc. serves customers worldwide in technology, energy, health care, and industrial markets with a unique portfolio of products, services, and solutions by providing atmospheric gases, process and specialty gases, performance materials, and chemical intermediates. The company is a leading global supplier of electronic materials, hydrogen, helium, and select performance chemicals. Founded in 1940, Air Products has annual revenues of \$5.4 billion, operations in more than 30 countries, and 17,200 employees.

Air Products and Chemicals provides gases such as argon, hydrogen, nitrogen, and oxygen to manufacturers, health care facilities, petroleum refiners, semiconductor producers, and other industries. It also produces chemicals including catalysts, surfactants, and intermediates used to make polyurethane, amines, and emulsions derived from vinyl acetate monomer (VAM). Air Products also makes gas containers and equipment that separates air, purifies hydrogen, and liquefies gas.

Air Products and Chemicals distributes industrial gases by building on-site plants (a strategy nearly as old as the company itself) or by truck for companies with less extensive needs. Customers include AK Steel Holding Corp., Samsung Corp., the Sherwin-Williams Co., and many major petroleum refiners and chemical companies.

The company broadened its health care operations in late 2002 by acquiring American Homecare Supply Co., which serves the home health care industry. It also moved to strengthen its electronics business by acquiring the electronic chemicals division of Ashland Specialty Chemical in June 2003 for \$300 million. The unit provides chemicals to the semiconductor industry. Air Products and Chemicals spends approximately 2 percent of sales on research and development.

### OVERVIEW OF ELS

Establishing a need for an ELS was a grassroots effort. An employee from the technology group championed its first deployment in the early 1990s as a solution to link external technology development to internal needs. The technology group explored all of its options before implementing ELS. The champion interviewed more than 100 potential users to develop preliminary profiles and kept the profiles in a spreadsheet. He then collected and disseminated unpublished external technology research and shared it with interested parties in hard copy by matching the news items to the profiles. Thirteen years later, information delivery methods have matured significantly, but the basic sharing processes are still in place.

Although ELS predates Air Products and Chemical's knowledge management (KM) initiative, it has recently been incorporated under the KM umbrella. KM had existed as an informal organization since 1999 and became the basis for the Center of Excellence, the formal KM group established in 2001. The KM group is a virtual organization staffed by eight to 10 full-time equivalents (FTEs). An additional

50+ people are affiliated with KM by virtue of the work that they do, and they commit varying levels of effort to the Center of Excellence. In 2002 the ELS was adopted as an enterprise KM offering and brought under management of the Center of Excellence.

Today, Air Products and Chemicals has a Web-based ELS housed on the corporate intranet. The current version was commissioned in 1998 and built in-house because no off-the-shelf products met the users' needs at the time. The organization upgrades the system annually and has considered migrating to an off-the-shelf application but has not found one that cost effectively meets the organization's needs.

Members of an ELS-focused group that scan for information are called "technology scouts." They are part of the corporate technology evaluation and planning group, which reports to the chief technology officer. The information technology personnel who support the system are members of technical data systems, an R&D computing group that reports through the corporate research services department to the chief technology officer. Because KM is a cross-functional organization, it adds significant credibility and visibility to ELS efforts and provides a network of people to promote ELS benefits throughout the enterprise.

Virtually everyone in Air Products and Chemicals has access to ELS, but the KM group targets approximately 12,000 potential users. ELS currently has almost 2,400 active users, of which about 800 are in the R&D organization. Retirees and joint venture partners are the only groups specifically excluded from system use. ELS is used mostly for technology alerts, but the user base is increasing and is starting to use ELS in other areas such as communities of practice, sales, marketing, information technology, engineering, one-on-one collaboration, and mentoring.

Technology scouts generate technology alerts and use the ELS to identify the right people and to disseminate the alert. Technology scouting forms the basis of the first ELS champion's role and has evolved today to approximately two FTEs under the R&D umbrella, with virtual membership in the KM chief operating executive. Scouts scour the "gray" literature for important advances and information that can be applied to in-house research efforts. Gray literature includes the Web sites of universities, research laboratories, and government agencies, as well as online news sites and trade organizations. Published literature is under the ownership of the corporate library, and unpublished work is under the umbrella of the corporate technology evaluation and planning (CTEP) group that manages the ELS. Currently, the team accesses more than 900 different sources of information as a part of its scouting activities.

When a technology scout finds a relevant piece of information, he or she creates an alert in the ELS that contains a synopsis of the information, the source of the information, and a link to the complete source. He or she then searches the ELS profiles to identify people interested in the topic and may select appropriate distribution lists to which users subscribe. After she identifies the interested parties, she sends an e-mail through the ELS with a summary of the alert and a link to the full information. Technology scouts are careful to obey copyright laws and store only synopses of articles rather than extensive coverage.

Searching Air Product and Chemicals' ELS for an expert or alert is similar to searching the Internet. The searcher enters one or more search terms with optional Boolean commands. Search results may contain names of experts and profile excerpts or short pieces of an alert. Clicking on the appropriate search result will link the user to either the profile screen or the full alert. Links are available from the profiles to the corporate directory.

Because the ELS was created as a support function for the technology scouting process, a business case was not required to obtain initial funding. In addition, the low-cost, skunkworks foundation drew

little financial management attention because it required minimal funding to start and maintain (a few hundred dollars annually). As the project grew and moved to the current Web-based model, funding requirements grew but were still relatively small (\$20,000 investment and 0.35 FTEs to maintain and upgrade the ELS). Budget negotiations were painless given the inherent value of the system in the research and development function.

The use of anecdotes, feedback on individual technology alerts, and testimonials from users generate support for ELS at the executive level. The chief technology officer is a user of the system and receives alerts. As a result, he has first-hand experience with ELS and is able to champion its value to his peers and direct reports.

## DESIGN AND FEATURES

The most important design feature of the ELS is that it was based on existing processes and only served to enhance the effectiveness and efficiency of those processes rather than adding new processes to the organization or create additional complexity. The company's corporate culture may question the introduction of new processes, including those caused by the implementation of SAP and the process changes that accompany it, because they are perceived as adding new work to a heavy workload. Therefore, ELS was distinctly positioned as a user-driven enhancement to an existing manual process, not as a new initiative or process.

The technology scouting organization, which reports through a corporate technology function, adapted the existing processes to the Web-based interface. An in-house information technology team, which is part of the research and development management information systems group, designed the new system. The key system requirements were:

- an open system, available globally;
- Web-based technologies;
- the ability to integrate with the corporate e-mail system and network security architecture;
- the capability to combine employee profiles with alert storage and processing; and
- user-initiated updates and queries.

Although the designers initially focused on providing the system primarily for a single global function (research and development), they ensured that the system was designed and built with scalability up to the enterprise level.

Before developing its ELS, Air Products and Chemicals conducted an external benchmarking study and found that technology scouting at other large industrial companies relied heavily on personal networks and did not involve formal information technology systems. The finding supported the decision to build its own system and increase its competitive advantage by incorporating the organization's unique capability into a custom system.

The company avoids many privacy issues by making participation in the ELS voluntary. Employees supply profile information and may change it at any time. Through a corporate directory, the ELS provides basic, non-confidential information including e-mail addresses, group names, and office phone numbers. Private information such as HR-related data is not accessible through the ELS and is closely guarded by Air Products and Chemicals. When employees leave the company, administrators remove or archive their profiles. An automated script that compares employees in the corporate database to the

profiles within the system runs every week. The administrator routes exceptions to a member of the ELS team, who investigates and adjusts the profiles appropriately.

Policies integral to the ELS include copyright and intellectual property protection. With respect to copyrights, alerts include links to news rather than the full text in order to respect the copyrights of the authors and publishers. Safeguards and checks are built into the system to ensure that the company complies with the law. Intellectual property protection is an important internal policy concern. Air Products and Chemicals' legal department mandates that expert profiles not provide too many details regarding ideas that may be patented or tagged as trade secrets. If this is the case and details are widely disseminated, then Air Products and Chemicals jeopardizes its ability to secure legal protection. Hidden fields are available within the system to maintain relevant information but to prevent it from being widely disseminated and thus risking loss of intellectual property protection.

Information management is largely a manual process within the ELS. Employees key in their own profiles, although in some instances, technology scouts may interview employees and create profiles for them. Employees are responsible for the accuracy of their profiles and are motivated to be accurate so that they receive the appropriate alerts. If a profile is out of date, employees may receive information they no longer value. If an employee is working on a new topic, he or she may not receive information critical to his development process and thus be at a disadvantage. The ELS team does not validate, nor does it require managers to validate, any of the information on the expert profiles.

The technology scouts also update profiles with information gleaned from monitoring literature searches, research reports, corporate and departmental newsletters and research summaries, idea submissions, seminars, and other existing internal sources. These sources are also used to identify potential new experts within the organization to interview and solicit participation from.

In general, experts designate themselves in the ELS. The terminology the company uses is described in

Figure 1. For example, a director-level team identified experts in "safety" because safety is critical due to the nature of the company's business. These individuals have demonstrated expertise and knowledge and are specifically singled out as experts in the area.

**Figure 1: Expertise Technology**

Category	Description
• Safety expert	• Designated by management on a topic-by-topic basis
• Expertise	• Areas in which an employee will consult
• Experience	• Areas in which an employee has worked
• Interests	• Specific and detailed areas of interest



## IMPLEMENTATION AND LAUNCH

Implementation of the ELS happened gradually over a period of 15 years. In its early days, implementation was a grassroots effort that grew organically based on word-of-mouth and personal recruiting. With the advent of the company intranet, the ELS was migrated to a database with a Web-based interface to greatly improve the dissemination of alerts and to open up access to this valuable resource to others in the company. At this point, a large user base already existed, and the primary product (technology alerts) had recognized value. No new processes were created. Instead, the Web-based application merely built increased capability in existing processes. Consequently, the existing user base moved to a more formal system without too much pain. When the KM group adopted the ELS in 2002, the ELS opened up new opportunities because of the increased enterprise-wide exposure and credibility it lent.

Participation in the ELS is rewarded intrinsically rather than with prizes or awards. The team determined that the “carrot” of technology alerts was much more powerful than a “stick.” To receive focused technology alerts, an employee must have a detailed and accurate profile. Automatic e-mail messages are sent on a semiannual basis to remind employees to update their profiles. If employees have updated their profiles within the last six months, then they do not receive a reminder e-mail.

Statistics show a 200 percent increase in use as people update their profiles following the reminder. This rewards system is supported by the talking points that technology scouts use when promoting the tool to groups and in one-on-one interviews. Scouts focus on the benefits that employees can reap through technology alerts and indicate that the only way to receive these benefits is by having a profile. If scouts emphasized having a profile over having the alerts, then the response might not be as favorable.

The company has not deployed a formal marketing plan but intends to do so with the upcoming release of the latest upgrade. Because of the historic organic growth and the scope limited to the research and development group, the team did not see a marketing plan as critical to the development and success of the system. Also, HR has considered deploying SAP’s skill mapping module and has asked the KM organization not to undertake a large-scale marketing plan as part of an enterprise rollout to avoid possible confusion between the initiatives. To prepare for the enterprise-wide deployment, the team has published a series of articles in the corporate newsletter to build awareness and support.

## TECHNOLOGY AND MAINTENANCE

The current ELS model is built with standard Web technologies including active server pages, Microsoft search capabilities, a Windows 2000 Server, and a SQL Server 2000 database. The upgrade, released in fall 2003, is written in Microsoft’s .Net framework, which provides a richer user interface and will greatly enhance the overall user experience. Process support is provided by the CTEP, and IT support is provided by the technical data systems team.

Integration of the system is occurring with several corporate functions, including the corporate directory, active directory network security, and Microsoft Exchange (e-mail). No significant integration issues have arisen; however, specific systems are not to be integrated with the ELS because of security concerns. For example, the company has a policy that HR systems are closed and cannot be linked to any other system. The company stores research reports on a separate database and does not integrate them with the ELS because of their confidential information. Technology scouts review the research reports and may update or create profiles based on authorship of a report.

The ELS has been upgraded on an annual basis since its major transformation to the Web-based model. Despite these annual upgrades, it is still more cost effective to use the built model rather than convert to an off-the-shelf solution. Factors in this decision include avoiding cost for upgrades and seat licenses and having the flexibility to add features ad hoc. As upgrades have taken place, maintaining the consistency of the end user experience, increasing the flexibility of the system, and improving internal metrics have been the primary focus. The team built into the latest upgrade the dynamic building of profiles so that the team can readily add fields without modifying the program code. As an example, adding languages provides significant benefit to the system and to users and can be readily added to the profiles at no additional expense and with minimal effort.

Accountability for the ELS is held by the CTEP group, the manager of which reports to the chief technology officer. Technical data systems is responsible for the IT aspects of the system. IT funding comes from an executive committee and is justified during the budget cycle. To support the system, CTEP allocated approximately 1.2 FTEs as technology scouts, 1.2 FTE for clerical support, and 0.1 FTE for ELS administration. IT support and upgrades require only 0.25 FTE from the IT organization.

## **MEASURES AND RESULTS**

The team uses a variety of measures to analyze and gauge the success of the ELS. Success is not measured for the tool, but for the process it seeks to automate (i.e., technology alerting). In other words, users are asked to provide feedback not only on the system or its interfaces, but also principally on the content of the alerts and the degree to which they meet users' needs. Besides the measures of alert content, "unique application users per month" (and per quarter) and the number of profiles in the system and in targeted segments (such as research and development, as well as marketing) are measured. The team tracks the currency of profiles and the number of technology alerts pushed to users. Feedback forms are an important loop in the ELS system, and qualitative and quantitative feedback mechanisms are tracked.

Air Products and Chemicals uses measures and other tools to identify and understand areas for improvement within the system. Specifically, metrics indicated that a significant percentage of the profiles were outdated. To remedy this, the team created the semiannual e-mail reminder system and has seen marked improvement in the currency of profiles.

For the first time, the team surveyed its customers regarding the technology alerts, and the results were insightful. The survey consisted of approximately 12 questions and addressed users' perceptions of the technology alerts. The ELS team hopes to continue to survey regularly. Sample areas of investigation included user perceptions of the following topics:

- how users decided which alerts to read,
- the percentage of alerts containing new information for the reader,
- the percentage of alerts useful for reference only,
- the percentage of alerts sufficiently relevant that users forwarded or discussed them with someone else,
- the degree to which alerts contributed to decision making or action by the reader,
- the percentage of alerts that users plan to take action on, and
- the actions taken by readers as a result of alerts.

Survey results indicated that nearly 70 percent of users said that alerts caused them to talk with someone else or show the information to someone else. Eighteen percent of users reported that at least 50 percent of the alerts they received prompted conversations with others. The actions taken by readers as a result of alerts included addressing competitive threats (30 percent), calling inventors (10 percent), and initiating the technology transfer process (a small number of responses).

The team recognized three primary opportunities for improvement in the survey results. First, survey results indicated that individuals receiving alerts were generally satisfied with them; however, better targeting was a concern for many, and some people wanted more rather than fewer alerts. The team is broadening the terms to identify interested users for specific distribution lists by comparing profiles to distribution lists and considering other actions to improve targeting. Secondly, the team is trying to find new ways of summarizing the information. Popular areas generate dozens of alerts per month, and users requested that the technology scouts prepare summaries of related alerts so that the users can better digest the information. Summarizing is a large task for the limited support staff, and the team has yet to identify a method to address this request. Finally, users noted some preferences for giving feedback that differed from the current methods. The latest upgrade will include more unobtrusive feedback mechanisms targeted specifically at the action users took based on the alert.

## LESSONS LEARNED

During the deployment of its ELS, Air Products and Chemicals has learned many lessons and seeks to leverage them as it continues to upgrade and gather feedback. The team identified four critical success factors.

1. Tie the ELS to an existing business process. In the company, new process initiatives are sometimes perceived negatively. By tying it into an existing process that is seen as valuable by employees, the team immediately generated a supportive following for the ELS.
2. Give people a vested interest in posting and maintaining profiles. Collaboration and the opportunity to receive new information on topics of interest is a motivator, and the price of admission is completing and updating a profile.
3. The ELS needs both bottom-up and top-down support to expand throughout the enterprise. The organic growth of the system in its early years built a very strong foundation in a pivotal user group. However, in order to gain the credibility and acceptance of the enterprise, more executive support (the KM group) was needed.
4. Keep the system low maintenance. The more maintenance costs required for systems, the higher the likelihood it will be a target for budget cuts. Keeping the system simple and easy-to-use not only improves the user experience, but also allows it to “fly under the (budget-cutting) radar.”

In the larger upgrades, the team hit barriers or unexpected obstacles. Three obstacles were a lack of financial flexibility, a lack of visibility to senior management, and a lack of processes to update and integrate information. Because members of upper management were not users or clients of the system and therefore not well versed in the benefits it generated, some were hesitant to increase the funding for needed upgrades. The team invited these leaders to create profiles and receive alerts themselves. Once they were a part of the system, they better understood and supported requests for funding. As a corollary, because the system was operated as a skunkworks for so long on a shoestring budget, the increase in funding to move it to the Web-based system drew attention that the team had not anticipated.

The ELS team did not foresee the HR-related issues. It did not plan for the number of profiles that were out of date because of employees who had left the organization. To handle these profiles, the team developed a weekly process for matching the profile database against the corporate database and identifying and addressing exceptions on the report.

HR security barriers prevented the ELS from integrating with the HR database and thus providing potentially robust information to users. Access to critical HR systems is well guarded by the company, and pressure from recent legislation, including the Patriot Act, has only increased this security. As a result, the two systems will not be integrated in the near future, and the team must seek more creative ways to add depth to the profiles in an efficient manner.

Figure 2 details at a high level what worked particularly well in the ELS system and what that the team saw as areas for improvement. The list will help the team focus on closing the gaps in the current system as they work toward the ideal state.

**Figure 2: High Level ELS Implementation Results**

What Worked	What Did Not Work
<ul style="list-style-type: none"> <li>• The alerting system was a great incentive for employees to create profiles.</li> <li>• People's preferences drove changes in the system, such as the addition of distribution lists for key alert topics.</li> <li>• Focusing on business results (e.g., technology scouting results) was superior to building an ELS for its own sake.</li> <li>• The system is simple and low maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>• The team should have broadened the user base more systematically when the system was opened to the enterprise.</li> <li>• Although the system is global, it does not have local contacts to provide direct support.</li> <li>• The system does not have local language support.</li> </ul>

Three items cited as not having worked well to date are linked to the enterprise-wide expansion. To have been more successful with the enterprise launch, the ELS team should have developed and deployed a structured marketing and launch plan to systematically educate and bring users into the system. Instead, the initial influx of users was uneven and caused a few bumps in the road. The second and third points are related to the global limitations of the system. Although there are KM contacts globally, they have not been engaged to provide front-line support for the system and thus users outside the United States may experience time delays or cultural or language barriers when interacting with the system. Finally, whereas English is the primary language at Air Products and Chemicals, the lack of local language support may limit the applicability of some alerts to users not in English-speaking areas. To curb the potential language issues, ELS profiles will now include a language competency field and some experts may be tapped to translate relevant materials into other languages for dissemination.

# Honeywell

Honeywell is a diversified technology manufacturer of aerospace products and services; control technologies for buildings, homes, and industry; automotive products; power generation systems; specialty chemicals; fibers; plastics; and advanced materials.

The company employs approximately 100,000 people in 95 countries and operates hundreds of facilities throughout the world.

Honeywell agreed to be acquired by General Electric in 2001, but EU regulators vetoed the deal on antitrust concerns. In the aftermath, former AlliedSignal CEO Lawrence A. Bossidy replaced Michael Bonsignore at Honeywell's helm. When Bossidy retired in 2002, David Cote became CEO.

Facing the economic slowdown and the fallout from the aborted GE deal, Honeywell closed 50 plants and set about driving productivity in the company through an aggressive digitization program it calls "DigitalWorks." Today the company retains its emphasis on productivity but has increased its focus on growth.

## OVERVIEW OF ELS

The development of the expert locator tool can be traced to a 2001 corporate strategic planning session in which the CEO singled out knowledge management as an area to be explored as a means to enable strategic growth. By focusing on solutions with the potential to impact Honeywell's key business drivers (responsiveness, agility, effectiveness, and productivity), senior leaders believed the organization could achieve its goal to grow by focusing on the customer.

A team sponsored by the chief information officer identified two primary categories of KM to focus on at Honeywell: information depots and sharing networks. Information depots are the myriad of databases, Excel spreadsheets, and Web servers that exist at most large organizations. These house the information or data used by employees and can be categorized as "explicit data." The second category, sharing networks, involves tacit information and is the means by which individuals look for people or information.

The team conducted a survey as a part of the preliminary research that demonstrated that company employees spend approximately 10 hours per week searching for information or people who have that information. As a result of this research and with the support of the CEO and CIO, the KM core group developed and deployed an expertise locator system designed to enable the sharing of expertise and best practices across departmental and geographic boundaries. The system, called AskMe, is housed under the company's collaboration umbrella. (KM is a subset of collaboration at Honeywell and is often not called out explicitly as its own discipline.)

The company could manage the system in a centralized fashion with deployment based on the pull of users and user groups. The term “expert” was not culturally acceptable because employees were reluctant to identify themselves as experts, but they were very willing to participate in the system as “knowledge providers.” One of the fundamental choices made by the design team was to identify users as knowledge providers rather than experts.

Figure 3 contrasts the two terms.

**Figure 3: Experts Compared to Knowledge Providers**

What Worked	What Did Not Work
• Exclusive	• Inclusive
• Presented as accurate	• Presented as a point of view
• Requires verification	• Adopted as the reader’s discretion
• Requires certification	• Does not require certification
• Monitored by an authority figure	• Monitored by peers
• “THE” answer is...	• “AN” answer is...

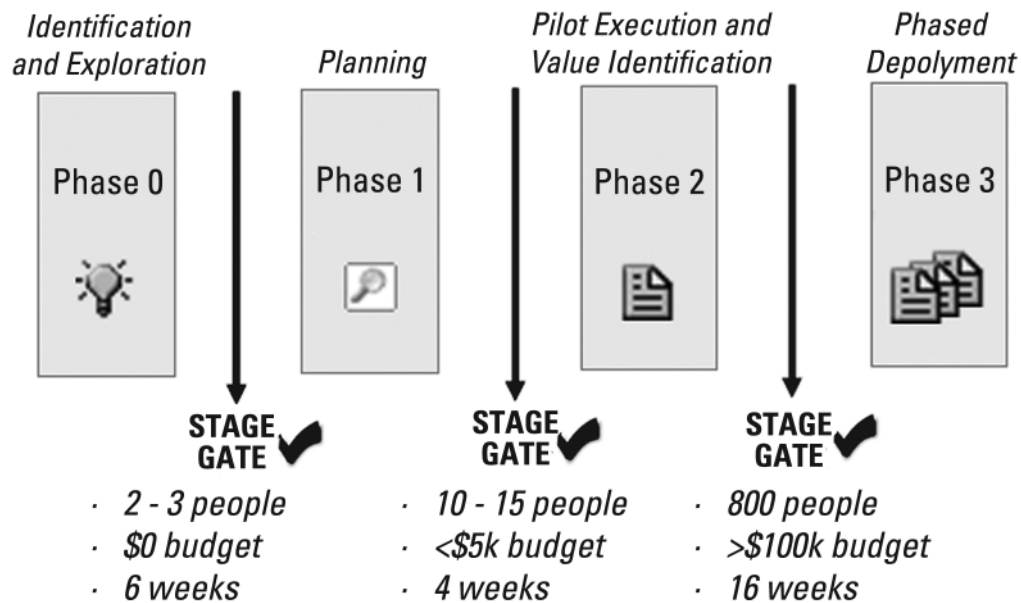
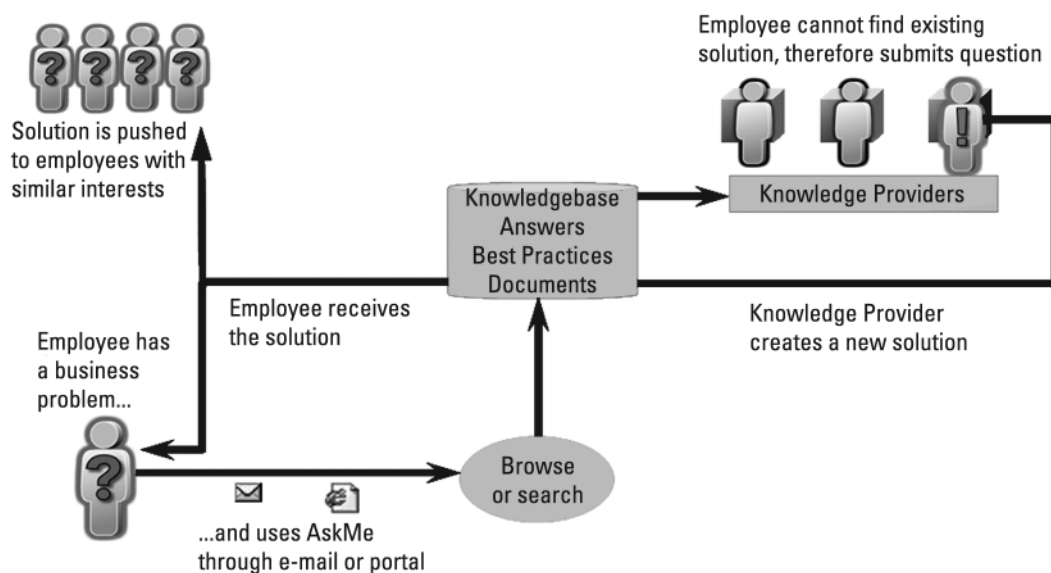
The methodology used to deploy the ELS parallels Honeywell’s other projects by using a stage-gate process. The implementation team places special emphasis on the process and asserts that the organization is willing to stop projects at various gates if they are not successful. The team worked to meet goals and objectives at each gate rather than count on executive-level support or initial funding to carry the project to launch.

The stage-gate process and resources characterizing each phase are detailed in

Figure 4. The entire project, from identification and exploration to phased deployment, required 26 weeks and a budget of slightly more than \$100,000. The team employed an off-the-shelf solution and did very little customization. The majority of the implementation cost was incurred by a culture study conducted by IDEO, an outside consultant. A core team was used to plan and launch the system.

The basic process employed by users of AskMe is detailed in Figure 5. Beginning at the bottom left, an employee has a business problem and searches the database to see if he or she can leverage an existing entry. Answers come back as “previously asked questions,” FAQs, or best practices. If these responses are not enough, then he or she uses AskMe to pose a question either through the portal or an e-mail. The question is distributed to potential knowledge providers identified within the network. A knowledge provider answers the question and creates a new solution, which is captured into the database and distributed to the knowledge-seeker and any other employees with similar interests who have subscribed to the distribution list.



**Figure 4: Stage-gate Process****Figure 5: AskMe Process**

As a pilot, the tool was deployed to two groups: Six Sigma and aerospace customer service. Pilot results indicated that the use of the system saved 40 hours per user annually by reducing the time to find answers. The pilot sites encompass hundreds of global sites and have nearly 2,000 registered users or knowledge providers. The results of the pilot were extrapolated to Honeywell's approximately 30,000 professionals that were potential users of AskMe. Approximately 12 other corporate organizations are currently in various stages of pulling the application into their groups.

## DESIGN AND FEATURES

The team tasked with completing phases one and two (planning and pilot execution, and value identification) was designed to be inclusive and relied on project-critical groups to provide employees to support the project. The core team was divided into two groups: culture, measures, and results.

Figure 6 lists the core team members, as well as auxiliary members.

Figure 6: Core Team Members and Extended Team	
Core Team Members	Core Team Members
<ul style="list-style-type: none"> <li>• User champion and driver</li> <li>• Six Sigma drivers</li> <li>• Program lead*</li> <li>• Technical Implementation</li> <li>• Technical driver*</li> <li>• Technical manager (vendor)</li> <li>• Customer service implementation</li> <li>• Program lead (vendor)</li> <li>• Design and administration*</li> </ul>	<ul style="list-style-type: none"> <li>• Communication advisor</li> <li>• Organizational development, change management, and culture</li> <li>• Culture and humanfactors (IDEO)</li> <li>• Consulting manager (vendor)</li> <li>• Program whip (vendor)</li> <li>• Executive program</li> <li>• Executive advocate and sponsor</li> </ul> <p>* <i>Vendor/Technology selection team</i></p>
Extended Team	Extended Team
<ul style="list-style-type: none"> <li>• Supply management</li> <li>• Business unit liaisons</li> <li>• Corporate Six Sigma</li> </ul>	<ul style="list-style-type: none"> <li>• Tools sub-team representative</li> <li>• Corporate communications</li> </ul>

Two new key team roles—program whip (a vendor, recognized in a role similar to a senate majority leader whip) and executive program whip (Honeywell)—enabled the team to execute successfully. The CIO and CEO were the named sponsors, and the project had whips at lower levels in the organization and the vendor (director-level) charged with removing implementation barriers and identifying solutions as necessary. Honeywell considers the whip roles a best practice in its organization.

The core team included a communication adviser to prevent “obsessive messaging.” This individual was dedicated to the project and ensured that solid messages were consistently communicated throughout the life of the project. Company representatives believe that communication is an area in which it has room for improvement.



## Vendor Selection

Members of the vendor/technology selection team included the program lead, technical driver, and design and administration. This team was charged with identifying potential vendors and managing the decision-making process through selection and implementation. The ultimate decision makers served on this team.

Because Six Sigma is embedded in Honeywell's culture, the management approach provided the toolset by which the technology selection decision was made. The vendor/technology selection sub-team identified specific technical requirements, user-based requirements, and possible failure modes. Each requirement was weighted, and the team rated each of the potential vendors against all of them. The team started with seven potential vendors and narrowed the pool to three vendors: AskMe, Tacit, and Sopheon (formerly Orbital). The team distributed a request for quote and then narrowed the field to AskMe and Tacit. After careful analysis, the team chose AskMe because of the fit with Honeywell's culture, the structure of the tool, and its overall score based on the requirements detailed in the matrix.

One of the reasons the team eliminated Tacit was the vendor's heavy reliance on e-mail profiling. AskMe's primary reference is questions and answers, and Tacit relies on keywords embedded in outgoing e-mails. Although Honeywell employees recognize that the corporation owns the e-mail content, the culture study identified Tacit's approach as a barrier to success because of a low acceptance by employees. As the team compared and contrasted the vendors, it noted that AskMe was further along in its way to rounding out its technology portfolio.

The ELS team shared information with Intel to learn from its pilot and deployment efforts. (Intel also uses AskMe.) The Honeywell team traveled from its Scottsdale, Ariz. location to Chandler, Ariz. to visit Intel and learn first-hand from its experience. After talking with the Intel team, Honeywell decided to limit its focus on technology assessment because of detailed analysis already conducted by Intel. Instead, the Honeywell team focused much of its planning efforts on analyzing its culture to identify critical success factors and potential barriers for success.

## Policies and Privacy

The team was concerned with policies and privacy as it developed the tool. Participation in AskMe is entirely voluntary, which addresses European concerns regarding privacy and information sharing. Participants are instructed that they should not participate if they have any reservations concerning privacy. All foreign nationals are tagged in the system to allow their activity to be audited by the legal department if necessary. Security and access is managed via the corporate LDAP by using employee identification numbers. Any question can be marked "private" at any time, and marking an item as such takes it out of public view.

## Profiles and Expertise Identification

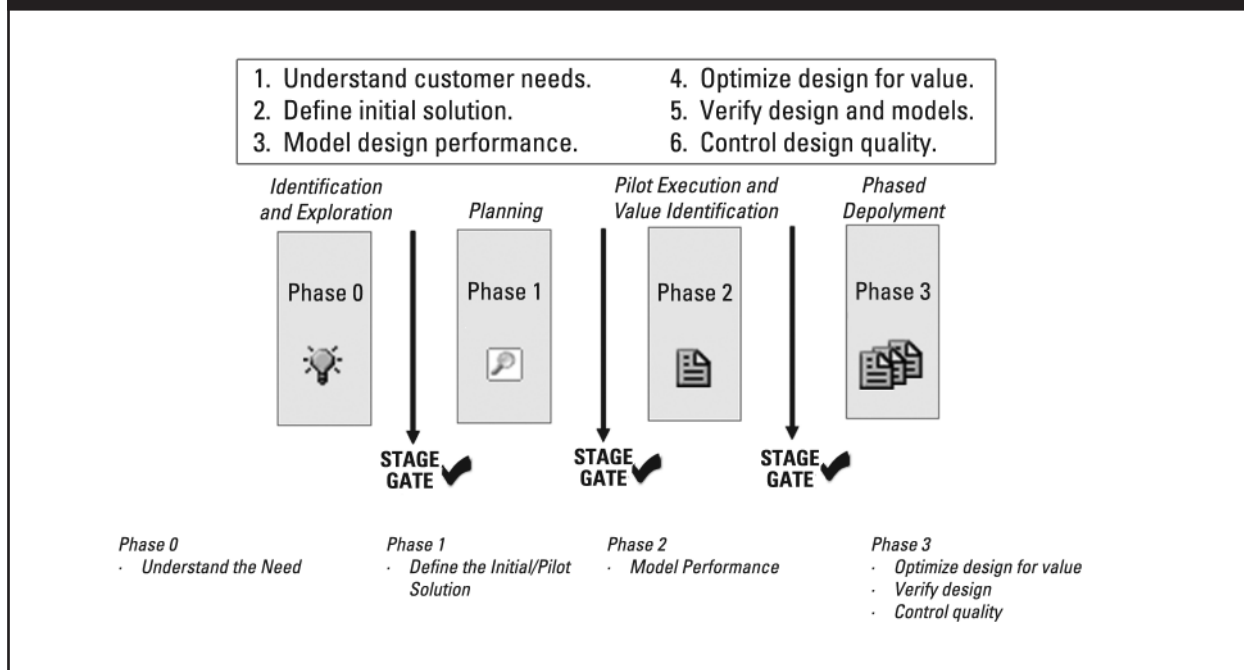
AskMe is structured so that knowledge providers complete and maintain their own profiles the first time they log in to the system. Users complete a Web-based form and profile white papers and Word documents in the system. (The system has the capability to profile e-mail, but this is not currently enabled.) Maintaining up-to-the-minute profiles was identified as a potential opportunity for failure during the planning phase, but during the course of the pilot and large-scale launch it has not emerged as an issue. One does not have to be a registered knowledge provider to use the system to seek information.

## IMPLEMENTATION AND LAUNCH

The approach for designing and implementing the ELS solution followed a design for Six Sigma methodology, as detailed in Figure 7. Design for Six Sigma relies on six steps:

1. understand the customer needs,
2. define initial solution,
3. model the design performance,
4. optimize the design for value,
5. verify the design and models, and
6. control the design quality.

**Figure 7: Stage-gate Process and Design for Six Sigma**



One of the foundational elements of the project was the culture study. A group lead by corporate organizational development partnered with IDEO, an outside consultant. This team employed a three-pronged approach to gathering the voice of the customers (users). The team observed seven users in Phoenix and Minneapolis and identified unarticulated needs that might be resolved through the ELS. The team distributed a survey to the pilot community, and responses from 465 members were analyzed. Finally, the team interviewed previous application and solution owners to gather lessons learned. According to the AskMe program lead, the study drew 40 percent of its input from observation, 40 percent from the survey, and 20 percent from the lessons learned exercise.

A finding from the culture study included a baseline for an ROI estimate; specifically, people spend approximately 10 hours per week searching for information or people who have the right knowledge. Other important findings follow.

- Focus should be on connecting people, not just making information available.
- The success of the system depends on constant, visible executive and organizational support.
- Information providers should be rewarded, and the most effective rewards are reciprocity, repute, and altruism.
- Groups have diverse work styles and needs.
- The system should fit with the employee's current work flow and tools.
- Some employees are concerned about the repercussions of sharing what they know.
- Some employees have preconceived perceptions based on previous application rollouts.

The team translated the findings into a nine-item, recommendation-based checklist and the assessed feasibility.

1. Pre-populate the system to provide value at the time of launch.
2. Enable pilot participants to provide feedback, and be willing to redesign the system to reflect their needs and desires.
3. Drive the system with dedicated staff.
4. Search results should present people first.
5. Do not impose rules. Do provide guidance for contacts that claim expertise in a subject.
6. Be clear about the benefits of using the system at each stage of the problem-solving process (gather, research, synthesize, solve, and publish).
7. The system should address employees' concerns about privacy and publishing information.
8. Be clear in communication and training concerning what this system is used for and when other tools are better.
9. Make it clear that the system is not a replacement for anything; it is a new functionality. Communicate the "big picture."

Items 2 and 3 are driven by the company's desire for ELS to be a low-cost solution. If the associated costs were minimal, then the team redesigned the system based on pilot participants' feedback. The team did not accept "driving the system with a dedicated staff," but rather recruited volunteer proponents or advocates to drive its success.

AskMe connects people and makes information available. The tool publishes people's names both in response to questions and in answers to FAQs. Each profile can include a picture of the user in any environment. Some users have baby pictures and others have more formal studio portraits. Knowledge seekers' and providers' profiles may include "non-private personal information." When creating a profile, the user may elect to answer any or all of 14 questions ranging from "my favorite game is" to "one of the goals for my future is." Figure 8 lists the questions posed by Honeywell. This helps to break the ice and builds relationships rather than just providing information.

**Figure 8: Personal Information for the Public**

• My favorite game is...	• My favorite web site is...
• Music I most like to listen to...	• When I'm not at Honeywell, I'm probably...
• Something nobody would suspect of me...	• One of the goals for my future is...
• My favorite vacation spot is...	• My hero as a child was...
• A vehicle that moves me is...	• The designers/artists that inspire me...
• My idea of vacation involves...	• My favorite magazine is...
• Some of my hobbies include...	• My favorite quote is...

Communications was another critical element to the success of Honeywell's system. The team developed a full, detailed communication plan with dedicated resources to support it. The culture study fed the communication plan, and messages were tailored to Honeywell's unique needs and, more specifically, the needs of the pilot groups (Six Sigma and customer service). The top-level communication planks are detailed in Figure 9.

**Figure 9: Honeywell Senior-level Communication Messages**

1. The company is not optimizing its potential if it fails to facilitate and encourage the company-wide sharing of information, knowledge, and expertise; opening cross-company lines of communications will make us more successful.
2. Knowledge networking is about creating employee-to-employee information sharing in order to drive productivity, improve customer service, create business opportunities, and enhance employee development. It is not document management.
3. Technology (e.g., the Internet and e-mail) and AskMe create a powerful and easy way to share information throughout the company. There are great benefits for the "seeker" and no significant incremental workload for the "knower."

The team used three methods of communicating to potential users within the pilot community: consistent e-mail communication, face-to-face communication by the executive sponsors and team members, and invitations to participate. The invitations were hand-signed by the member of the core team who had a relationship with the potential user or user group. The invitations were mailed so that the communication did not feel like "spamming" to the potential user. A follow-up reminder postcard was also delivered in hard copy to encourage participation.

## Technology and Maintenance

Honeywell deployed AskMe technology to enable its expertise locator system. AskMe was deployed using a single instance model and was a part of the organization's central IT infrastructure. Honeywell's IT group prefers the single instance model because it enables scalability, wide-scale deployment, and centralization.

AskMe was deployed as an integrated tool and linked with Microsoft Outlook (e-mail), Honeywell's portal tools, and IBM's LDAP in use at Honeywell. The system met all security requirements and firewalls. In the near future, the team would like to integrate the project tracking database and instant messaging with AskMe. Other systems that are on the Honeywell considers integrating with ELS include:

- CRM (Siebel Systems Inc.),
- project management (eProject™),
- HR (PeopleSoft Inc.),
- federated search (Google Inc.), and
- LMS (Saba Software Inc.).

When tasked with a "build versus buy" decision, Honeywell identified critical success factors and lessons learned from earlier IT-related deployments and determined that buying an off-the-shelf solution was the most appropriate for the organization and the intended use of the ELS. One key factor is the ability to leverage other customers' experiences with a vendor, and using an external vendor enabled this in a way impossible for an internally built system.

Figure 10 details advantages and disadvantages for the build versus buy decision at Honeywell.

**Figure 10: Honeywell Build Versus Buy Comparison**

Buy	Build
<ul style="list-style-type: none"> <li>• Cheaper (short term and long term)</li> <li>• Better support</li> <li>• Fit for purpose (making collaboration products is not Honeywell's corebusiness)</li> <li>• Benefit of other customer input (Intel Corp., Ford Motor Co., The Boeing Company, The Procter &amp; Gamble Co., and others)</li> </ul>	<ul style="list-style-type: none"> <li>• Almost always slower to deliver</li> <li>• Almost always costs more (true costs)</li> <li>• Almost always does less</li> <li>• Almost always is out-of-date quicker</li> </ul>

Honeywell launched the AskMe by pre-populating employee profiles and without populating the content database. During the course of the Six Sigma and customer service pilot projects, the content rose. In addition, the team set and managed other metrics regarding the content to gauge the depth and breadth of the system. Because the system can integrate with existing databases, it could have been populated before the pilot study.

The system enables users to set data to automatically expire on specified dates when the information is submitted or at some point in its life cycle. In this case, data is not deleted from the system but hidden from the view of everyone but the owner.

Maintenance of AskMe is the responsibility of the IT group for infrastructure-related issues and of business units for expansion-related decisions. Honeywell estimated that the launch of the system required two or three FTEs from the core team. Figure 11 details the FTE requirements to support the system on an ongoing basis. This is not the investment required to launch the system or to deploy it to new areas.

**Figure 11: FTE Allocation for AskMe Maintenance**

Support Area	FTEs
Technology (user support, upgrades, and help desk)	0.02
Administration (license tracking, user add/delete, etc.)	0.01
Business unit focal point (training, communications, etc.)	0.04
Total	.07 FTE

## MEASURES AND RESULTS

Measures and results are important in Honeywell's culture and played a key role in the stage-gate process employed by the ELS team. One of two sub-teams focused on measures and results. The team used the Six Sigma DMAIC process and tools to identify and select its measures. The team adjusted and fine-tuned communications and strategies based on emerging measurement patterns.

The team identified 10 metrics of success and seven usage metrics that could be used to manage the project. Although many other metrics were and are tracked, 10 were identified as the "critical few." Usage metrics served as leading indicators of performance and were updated on a more frequent basis (daily or multiple times per day) as compared to the metrics of success.

In order to identify the 17 metrics noted above, the team asked the AskMe vendor to provide every metric that any customer had ever used related to the tool. The vendor identified 57 unique metrics, and the team created a quality, function, deploy (QFD) matrix to measure and track meeting of customer requirements. The 10 metrics of success and their targets are detailed in Figure 12. The team records these measures and usage metrics on a weekly scorecard for communication and dissemination to key stakeholders.

Honeywell's ROI exceeded the initial goal of 12 percent and can be estimated using both hard or soft costs elimination and avoidance. AskMe's ROI was created purely of soft money; in other words, no people were eliminated as a byproduct of the system's success. The savings was calculated from the baseline of 10 hours per week that employees use to search for information or people who have the knowledge they seek. Pilot results indicated that users could save 40 hours per year searching for information and people. The team calculated the ROI by multiplying by the number of users and the average cost per user. Hard numbers were captured in the system through feedback mechanisms, but these numbers were harder to validate and attribute correctly. They were valuable as anecdotal support for the system.

**Figure 12: Success Measures and Targets**

Measurement	Initial Targets
• Exceed ROI hurdle	• ROI > 12%
• Time savings in locating help	• .5hrs/person/week
• Average response time	• 36 hrs
• Increased number of cross “group” connections	• Map trend
• Participation	• > 70%
• Number of answers viewed	• 10 percent growth/week
• Number of documents	• 10 percent growth/month
• Number of FAQs	• 10 percent growth/month
• Average rating of answers (scale of 1-5)	• > 3 rating
• User satisfaction (scale of 1-5)	• > 3.5 rating

## LESSONS LEARNED

Honeywell identified high-impact lessons learned.

1. Have a charter. Honeywell advises that teams take time to create a charter but the team should not worry about wasting time by writing a “perfect” charter. Manage time and effort wisely so that the charter is solid and provides direction but is flexible as the project evolves.
2. Set program boundaries. By scoping the project and clearly communicating the boundaries, the core team ensured that everyone was on the same page and moving along the same path.
3. Use stage gates. Having stage gates was a cultural norm, and the team’s success depended on employing this methodology and navigating it well. Honeywell advises that a key success factor is having the right people controlling the gate with the understanding that if the project did not meet its requirements, it would not proceed.
4. Choose your team and initial deployment groups wisely.
5. Critical success factors included executive ownership, inclusion of similar projects and activities, and finding zealots to support the system.
6. Select a pilot group that is eager to “pull the technology” instead of one for which the solution is a “push.” Honeywell identified the following characteristics as important to its pilot participants:
  - driven;
  - knowledgeable;
  - cross-company, cross-area, and cross-functional;
  - right mindset;
  - enthusiastic; and
  - all focused on delivering productivity numbers.
7. Pick the right metrics, clearly define success, and measure the right things at the right time.

8. Culture and communication are everything. Nothing else matters if the culture is not receptive. Honeywell advocates having a plan and communicating something every 10 to 14 days as the program pilots and launches. The communication plan should be detailed and well supported.
9. Process change. Process change takes time because it requires convincing people to change their habits. The team used training to teach people to do things the “new” way.
10. Obstacles to process change are detailed in the list below. Each was uncovered in the process or planned for, and a mitigation strategy was developed and deployed.
  - Users “forget” to use it.
  - “What? Another tool” Potential users are weary of additional tools.
  - Understand organization and user security concerns and requirements
  - “I’m not going to invest my time if this is just a pilot.”
  - “Why isn’t it integrated with xyz?” Potential users wanted integration with other applications, even during the pilot.
  - Some users mistakenly deleted launch communications. (Users thought it was SPAM.)



# Intel

Intel Corp., the world's largest chipmaker, is also a leading manufacturer of computer, networking, and communications products. Founded in 1968 to build semiconductor memory products, Intel introduced the world's first microprocessor in 1971.

Today, Intel supplies the computing and communications industries with chips, boards, systems, and software building blocks that are the "ingredients" of computers, servers, and networking and communications products. These products are used by industry members to create advanced computing and communications systems. Intel's mission is to be the preeminent building block supplier to the Internet economy.

Intel is a leader in semiconductor manufacturing and technology and has established a competitive advantage through its scale of operations, agility of its factory network, and consistent execution worldwide. Intel has 11 fabrication facilities and six assembly and test facilities worldwide. In 2002 Intel had a net revenue of \$26.76 billion and net income of \$3.1 billion. In the same year, Intel spent \$4.7 billion on capital investments to help build manufacturing capacity and increase manufacturing efficiency. Additionally, Intel spent \$4 billion on R&D in 2002.

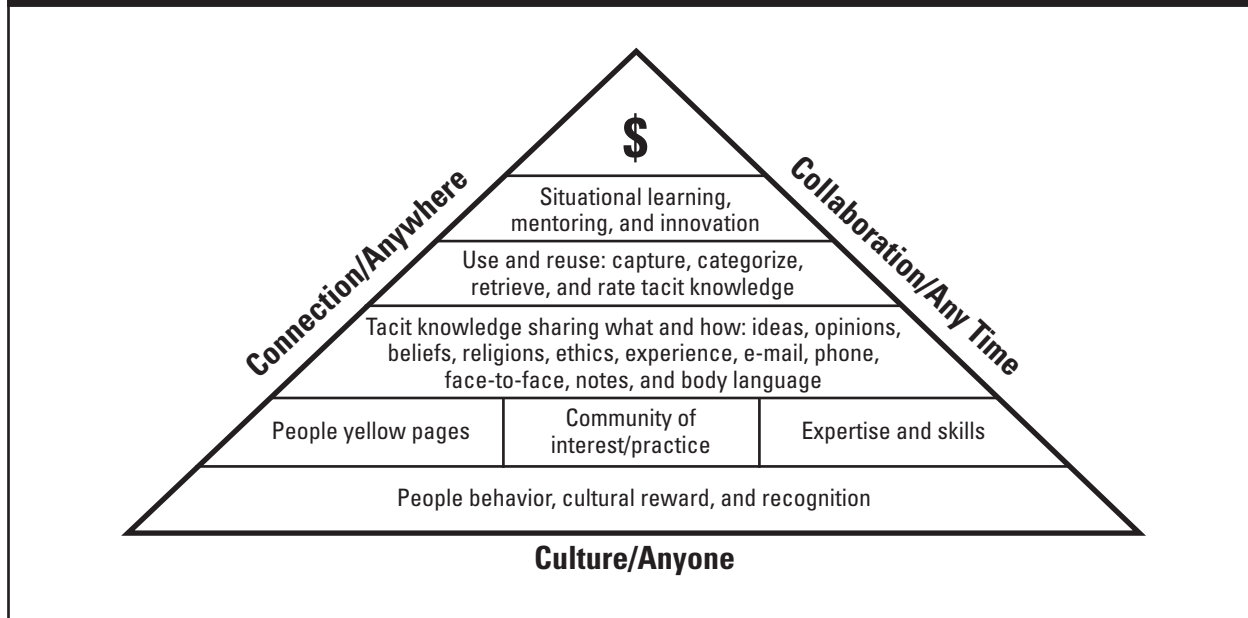
The company's technology investments differentiate Intel from competitors and provide the foundation for future growth. Intel Labs, the R&D arm of Intel, is comprised of more than 6,000 researchers and scientists in laboratories around the world.

## OVERVIEW OF ELS

"Value is in the knowledge flow, not in the knowledge store," noted E. Sandvik and B. Lie-Nielsen, leaders of the Norwegian Consortium of Intellectual Capital. In designing and launching its ELS program, Intel used this axiom as its focal point to ensure that the solution it developed was applicable to the knowledge flow required by users across the organization.

The mission of KM at Intel is to increase the rate of learning and innovation through connecting knowledge workers and enabling the capture and reuse of their actionable knowledge.

Figure 13 (page 112) illustrates the pyramid of capabilities that the KM team details to achieve this mission. If successful, KM will provide connectivity anywhere, collaboration anytime, and culturally acceptable information to anyone. The foundation of the pyramid forms the base and must be solid in order to support the higher-level activities above it. As one moves up the pyramid, the capabilities and solutions become more complex and require stronger understanding and integration.

**Figure 13: Pyramid of Capabilities**

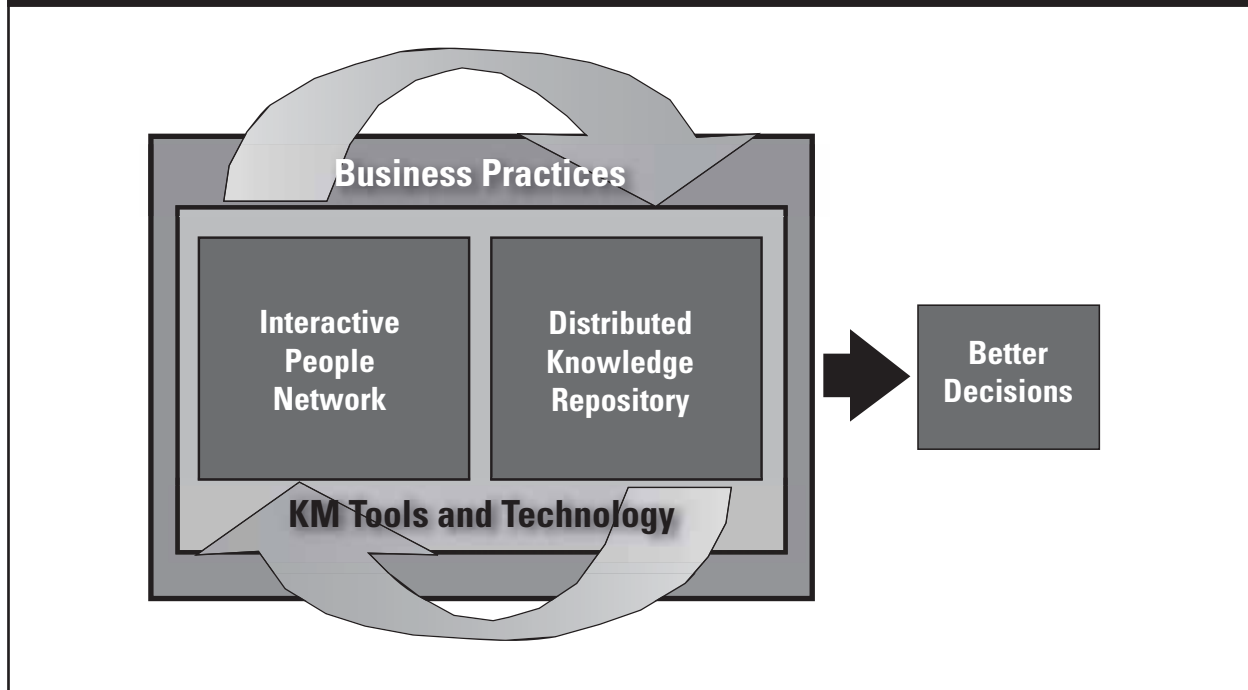
The IT function sponsors KM, which leverages cross-functional teams through a grassroots approach. The Intel culture supports this approach, and a recent IDC study showed that 52 percent of its members' KM initiatives are driven by this approach.

Figure 14 depicts the high-level KM leverage model. By using KM tools and technology to integrate business practices to an interactive people network (tacit knowledge) and a distributed knowledge repository (explicit knowledge), the organization is able to make better decisions.

Strategic initiatives in the KM function are divided into people, process, and technology categories. After conducting an internal assessment of business needs from the users' perspectives, Intel identified the need for an ELS to serve the people category and prioritized it as the most-needed capability. Specifically, an internal survey conducted throughout Intel showed a high demand for the ELS and a low level of competition or competing initiatives for the project. The business drivers for ELS articulated by potential users included:

- globally dispersed information, knowledge, and expertise;
- shrinking time-to-results requirements; and
- employee productivity demands.

In short, as the demand on Intel to compete in the global marketplace grew, so did the need to collaborate and connect across the organization to efficiently leverage existing resources. Shrinking time-to-results requires that employees not only locate the data and information rapidly, but also translate them into knowledge and wisdom to make better decisions across all boundaries including geography and culture.

**Figure 14: High-level KM Leverage Model**

To develop the ELS, the KM team identified six distinct value propositions or business cases for deployment of a system across Intel. The team identified the need for multiple business cases because of its certainty that there were a significant number of cultures within the overall Intel culture. To be successful, the team believed it needed to present the ELS concept and capabilities differently to various groups to gain their buy-in and support as well as to ultimately meet users' needs.

The KM team presented these business cases, as well as pilot opportunities, to a select group of business managers for resources (human and financial) as well as pilot opportunities. The business cases are detailed in Figure 15 (page 114) and work to describe different aspects or functionality within the ELS that can be leveraged by groups or individuals to meet their cultural and business-defined needs. The target audience for deployment is detailed in the second column. For example, the “people yellow pages” business case is designed for enterprise-wide or group-wide deployment. Its primary value proposition is to connect knowledge seekers with self-identified experts. In contrast, the value proposition for best-known method is different because it relies on expert valuation of ideas and solutions for publication as best practices.

Whereas Intel detailed a number of different value propositions, the overall purpose and design of the ELS is static at the highest level. The system serves to link employees with business problems to the ELS database via e-mail, intranet, shared servers, or instant messenger. Once connected to the system, the user can perform a natural language search for existing people or solutions. If the search does not provide the sought-after information, then the user can query the system (an expert or a group of experts). Once

**Figure 12: Success Measures and Targets**

Business Case	Target	Key Elements
People directory	Enterprise, group	Find out the knowledge, responsibility, and ownership that the individual possesses: <ul style="list-style-type: none"> <li>• Who is “John Smith?” What is his background? What does he know? What may he be looking for and/or offering?</li> <li>• How can I find people with factory construction skills?</li> <li>• What are the skill sets in my group? What should be my training strategy?</li> </ul>
Community	Individual, virtual team	Share practices and knowledge and solicit ideas in specific areas: <ul style="list-style-type: none"> <li>• Self-organized or have organization sponsorship; size varies and fluctuates</li> <li>• Ability to share, create content, and brainstorm ideas around the clock by anyone from anywhere</li> <li>• Situational mentoring and learning</li> </ul>
Escalation	Group	Locate experts/expertise in specific area (process, tool, and technology) <ul style="list-style-type: none"> <li>• Knowledge flow and source of knowledge for complex and agile virtual functional group (i.e., supply chain, field service, and product design/manufacturing)</li> <li>• Organization made up of a series of mergers and acquisitions or globally disbursed</li> </ul>
Consultation	Group	Capture and use/reuse the solutions among customers, call center, and engineers <ul style="list-style-type: none"> <li>• Q&amp;A, comments, follow-ups, and insights 24/7</li> <li>• Supplement details included in attachment and/or links</li> <li>• Delete non-value added questions/answers</li> </ul>
Best-known method	Group	A BKM identification process initiated by those who use it and know it best <ul style="list-style-type: none"> <li>• Employee’s choice of solutions—best practices nomination</li> <li>• Rating of solutions and practices</li> <li>• Business rules for follow-up actions</li> </ul>
Knowledge category and flow	Enterprise, group	Comprehensive knowledge category and flow <ul style="list-style-type: none"> <li>• What knowledge is needed to manage organization business?</li> <li>• What knowledge is needed to manage employee work activity?</li> </ul>

an expert answers the question, the system automatically captures and stores the solution. In some instances, the system may share the solution with a subscriber-base that is interested in the particular area of discussion.

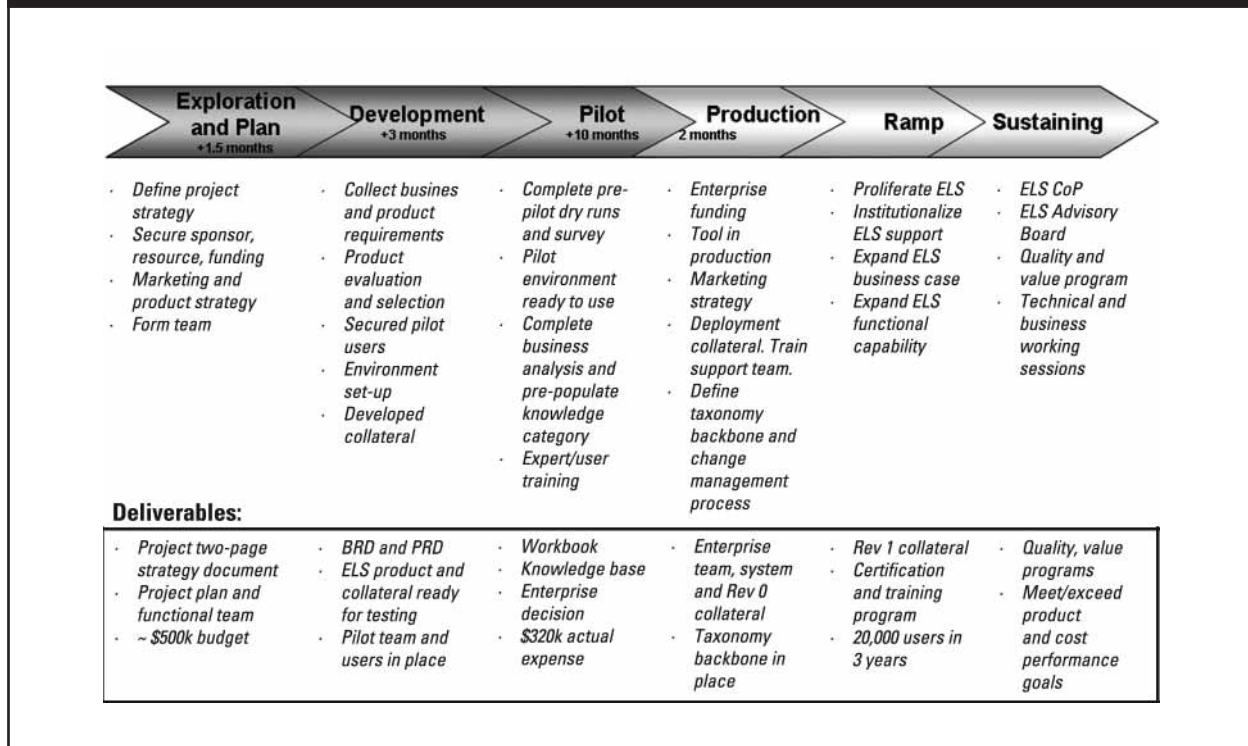
Three key enablers for the ELS are rewards and recognition, usage/value analysis, and training and learning. Each of these enablers is supported on an ongoing basis and reviewed for effectiveness and efficiency. Intel notes specifically that the quality of transactions is critical to the success of a KM system and thus the usage/value analysis provides depth to the system. In other words, it is equally important to track the number of questions answered as it is to track the quality ratings of content in specific areas.

Intel describes deployment of its ELS as a “teach to fish” model and, as a result, carefully emphasizes the need for ongoing training and learning. Training must reflect the needs of the business and the quality of the solution set to be successful.

Intel’s deployment methodology is the project life cycle process (PLC process). The process has six distinct phases (Figure 16). Funding was secured for the system during the exploration and planning phase. During the development phase, the team recognized and clearly articulated the need to focus on the inherent behaviors and cultures embedded within the organization. The final product (AskMe) was selected during this phase. Using the foundation laid out in the development phase, the pilot phase engaged 1,200 users and populated the knowledge base. An important deliverable of the pilot phase was the workbook, which contained more than 500 pages of documentation to support the decisions made throughout the phases to date, lessons learned, and collateral for future decisions.

Following the pilot phase, the team entered the production phase, secured funding for an enterprise-wide deployment, and developed and deployed the taxonomy to support the content. It developed change management processes during this phase and played a critical part in managing the complexity of the overall system. The ramp and sustaining phases built upon the foundation outlined in the earlier phases and increased the user base and the quality and value of the tool and available content.

**Figure 16: Product Life Cycle Process**



## DESIGN AND FEATURES

The Intel ELS team received approval from four business managers with cross-functional responsibilities to launch the pilot project. These business managers approved funding of approximately \$500,000, which came largely from the IT budget, and were willing to allocate human resources to support the planning and launch of the pilot and offer their own associates to serve as constituents for the pilot project.

The project team, consisting of seven people, dedicated on an average of 30 percent of their work time to developing and launching the ELS. Team members represented cross-functional units and had diverse backgrounds. Two team members had previous ELS experience; one with another company and one with an earlier, unsuccessful ELS effort at Intel. The team was divided into three teams: the core team, the business team, and the technology team. And each had specific responsibilities and deliverables. The efforts of each subteam were carefully orchestrated to manage the critical paths of the overall project. Team members detailed the touch point and operational flow and communicated across all teams. When the team was convened, Intel had already made the decision to roll out the ELS throughout the enterprise, but the team focused on the group and/or community level for the pilot phase.

The business team completed the functional requirements and process documentation. Specifically, it detailed usage scenarios including the “as is” and “to be” usage maps and identified potential gaps to be filled by the ELS. The functional requirements were detailed and covered a wide variety of topics from ease of access to scalability and reliability requirements to spell check and reporting capabilities. In addition, the team developed marketing and training collateral to support the various roles within the ELS.

The ELS follows all the security and privacy rules mandated by Intel. Because participation is voluntary, Intel has not encountered any issues or constraints. The system uses many of the security features built into the AskMe product including encryption and privacy locks. The support team and/or moderator audits the content periodically to ensure that security rules are obeyed and that content is appropriately protected. When the audit uncovers potential issues or violations, the support team or moderator contacts the user directly and ask him or her to resolve the problem. In all cases, the user has resolved the problem quickly and without issue. In a severe instance, the security team would be contacted to resolve the issue.

The business team clearly defined roles and responsibilities, and Figure 17 lists them as outlined by the team. The team defined the roles and responsibilities carefully because it knew they would be applicable enterprise wide. Moderators dedicate approximately 20 percent of their time to the ELS.

Identification of knowledge providers can occur in one of four ways:

1. employees designate themselves as experts in ELS profiles,
2. self-assigned experts in a knowledge category,
3. employees are assigned or nominated by a community in a knowledge category, or
4. employees are assigned by the organization in a knowledge category.

The means by which an expert is identified often reflects the degree of complexity of the knowledge to be shared. As one moves down the list above, the number of experts decreases significantly. Organization-assigned experts are the most stringently evaluated and may own their process or have functional responsibility. The designation may also be based on competency evaluation or subject matter expertise that results from years of service, industry recognition, or academic credentials.

**Figure 17: Business Team Roles and Responsibilities**

Role	Responsibility
User/Knowledge seeker	Access ELS to ask question or retrieve knowledge
Experts/Knowledge providers	Knowledge providers have expertise in one or several knowledge categories defined by the moderator and champions. These persons are responsible for answering users' questions and posting useful documents on the Web site of the category where they act as experts.
Moderators	These individuals have a broad base of business and/or technical knowledge and operational skills. They work with the implementation manager/champion to define, set up, and maintain knowledge categories for the business group. These people "own" the knowledge category where they act as moderator.
Champion	The business program manager is responsible for working with implementation manager and moderators to explore, implement, and sustain ELS use. The champion represents the business group.
Implementation manager	This role markets, explores, and implements the ELS for business groups and is also taxonomy design consultant and trainer.
Ramp leader	This individual is involved in marketing, training strategy and collateral, and overall ramp progress.
Quality/Value leader	This individual is responsible for value measurement methodology, the quality assurance program, and execution.
Support agents	First-level call support, Second-level application and infrastructure support, Third-level vendor support

### Technology Team

The technology team selected a vendor and ensured that the product met the business requirements and standards outlined by Intel in its office system architecture. The team quickly made the decision to buy the technology rather than to build it because of the resource requirements to build and support the degree of flexibility the Intel system would require.

After identifying all the potential vendors in the market place (12), the team scored each against its perceived ability to meet the business requirements identified by the business team. This process narrowed the field to four final candidates: AskMe, Tacit Knowledge Mill, Orbital, and Tikal. Each of the final candidates was provided the list of business requirements and invited to present its case to the team. After careful analysis, the team selected AskMe as the vendor.

A critical piece of the development process was building the knowledge content through the taxonomy backbone and knowledge category systems. The taxonomy backbone was based on the taxonomy employed by the Intel library. This backbone was tested in interviews with 30 experts across 16 divisions. The team solidified the backbone, and the knowledge category development process began.



Countless knowledge categories exist under the backbone. The moderator develops specific categories during and following the training sessions. The moderator is responsible for category maintenance and can change subcategory words up to (but not including) the highest level backbone. The highest level can only be changed with the approval of an oversight committee.

Figure 18 details the capabilities of the ELS, as well as the features that enable them. These were identified and transferred from the initial survey findings and research by the project team.

**Figure 18: ELS Capabilities and Features**

ELS Capability	Features
The technology to identify and capture expertise and to connect knowledge seekers with knowledge providers	<ul style="list-style-type: none"> <li>• People profile</li> <li>• Tacit knowledge base</li> <li>• Repository index</li> <li>• Integrated search</li> </ul>
The methods and processes for situational knowledge exchange and collaboration within the context of job function and work process	<ul style="list-style-type: none"> <li>• Knowledge taxonomy</li> <li>• Content pre-population</li> <li>• Business cases study</li> </ul>
The cultural expectations, incentives, and support system necessary to make this capability viable and grow in value over time	<ul style="list-style-type: none"> <li>• Training/Certification</li> <li>• Sharing cultural/behavior</li> <li>• Rewards based on a rating/point</li> <li>• Job code</li> </ul>
The mechanisms to learn from and leverage previous solutions and dialogues around specific questions and topics	<ul style="list-style-type: none"> <li>• Use/Reuse of conversation</li> <li>• Situational mentoring</li> <li>• Just-in-time learning</li> </ul>
A forum for experts from varied disciplines to engage in dialogue and problem solving, resulting in more innovative solutions.	<ul style="list-style-type: none"> <li>• Online community</li> <li>• Community of practice</li> <li>• Best practices nomination</li> <li>• Business rules</li> </ul>

One area that can have a significant impact on the effectiveness and efficiency of the system is the succinctness knowledge seekers should employ when posing questions. Intel's culture is polite, and employees often pose questions with a greeting and salutation ("Hello, I'm John Doe"), insert unnecessary words in the question ("I am working on a project to"), and close with signatures ("Thanks, John Doe"). When the additional words are added to the system, search time increases and errors are more frequent. For example, in the parenthetical references above, John Doe's name would be returned as a potential expert on a question in the same area because his name is embedded in the text string from the dialogue.



## IMPLEMENTATION AND LAUNCH

The team piloted the ELS to understand its cultural and behavioral impacts before launching the system throughout the enterprise. As a part of the pilot, value and behavior baseline surveys were deployed before and after the launch. The surveys provided the team with insight about how specific job codes would react to knowledge sharing and the value that the ELS might bring. Survey results showed dramatic differences in the behavior of engineers compared to that of marketing personnel. Consequently, the team built flexibility into the system so that it could be modified and adapted to make each group feel comfortable and demonstrate the value of sharing knowledge. The team kicked off marketing campaigns, as well as rewards and recognition programs, in conjunction with the launch of the pilot. The team gauged the success of the campaigns and programs over the course of the effort.

Intel successfully completed the pilot phase in 10 months. The team evaluated the success of the project by measuring it against the requirements (schedule, budget, usage, performance indicators, and ROI), as well as customers' feedback. The team saw a 13-week upward rolling trend for the number of logins and the number of knowledge exchanges. The total pilot indicator measurement set is detailed in Figure 19. The vendor provided benchmarking data. Had these requirements not been met, the pilot may not have been judged a success and the project could have been halted.

**Figure 19: Pilot Indicators and Measures**

Indicators	Industry Benchmark	Intel Goal	Intel Actual
Expert sign-up rate	15% to 20%	30%	59%
Answer rate	80% of unique questions answered	90%	93%
Response time	80% of unique questions answered in three days	80%	91%
Number of total questions	Two questions per user per month	One question per user per month	1.38 questions per user per month
Rating of answer	4 - 4.5 stars (aggressive)	4 stars	4.38 (94% answers rated)
Empty category	0 Category that has 0 expert and 0 activities	< 1% Category that has 0 expert and 0 activities	
Monthly visits per user	2	1	2.6
Monthly knowledge transactions per user	2	1	4.6
Calls to call center	NA	0.5% X 1000= 50 calls per month	25 calls for the entire pilot
Percentage of accessibility, or 24/7	NA	95%	99%

The one measure of concern for Intel following the pilot was “total number of questions per month.” Specifically, the industry average for “questions per month” was two per user per month. Intel’s average was 1.38. The team is conducting additional analysis to better understand the trend and to try to reverse it if possible.

In contrast, the number of knowledge providers is high as noted by the answer rate (93 percent for Intel as compared to the industry benchmark of 80 percent) and response time (91 percent answered within three days at Intel compared to 80 percent for the industry benchmark). In fact, some knowledge providers even complain that they are at a disadvantage, being non-U.S. based, because of the time delay for them to provide an answer. They say they are being “beaten out” and are disappointed not to be the first to provide a solution to the knowledge seeker.

Intel is proud of its metric on the number of calls to the help desk it created to assist users. It set a target of 50 calls per month and has received only 25 calls over the life of the pilot. This indicates that Intel deployed a strong training program and selected a tool that was easy to use and intuitive to most users. The total cost of ownership should decrease because of cost avoidance to support the system through the help desk.

### **Production Setup**

Following the pilot phase, the team moved into production. Intel approved the enterprise license based on a ROI to recoup all costs in three years. Intel has a goal of 20,000 users (or half the estimated base) within three years. The ROI calculation was made by assuming to save 10 hours per year per user multiplied by an average run rate of \$25 per hour. The finance team conducted a more sophisticated analysis and completed computation to move the ROI through the approval phase by taking into account tax rates for savings and other details.

The headcount to support the system during production is fewer than three people. These individuals are tasked with product management, implementation, marketing, and value calculation. Intel uses the “teach to fish” model and has many more resources in the field that dedicate time to maintaining and managing the product (moderators, experts, and champions).

The ELS marketing strategy is depicted in Figure 20. Marketing will be customized for groups depending on their culture and business needs. Ideally, the rollout is coordinated and integrated with existing business tools so that it is as seamless to the end user as possible. The areas that have caused the most difficulty are in the top-right quadrant of the diagram: functional areas with enterprise and customized solutions. Because these constituencies are so broad and divided by multiple functional silos, obstacles have proven difficult to overcome.

Marketing and training programs are based on an infection model, which relies on word-of-mouth, door-to-door sales, company-side “ads,” and aggressive marketing techniques. Three key success factors include (1) the reward program; (2) senior management role modeling; and (3) internal communication through road shows, newsletters, and seminars. The team offers training in a variety of formats including certification, online courses, and “train-the-trainer” models.

The rewards program has four levels and is designed to encourage participation through recognition.

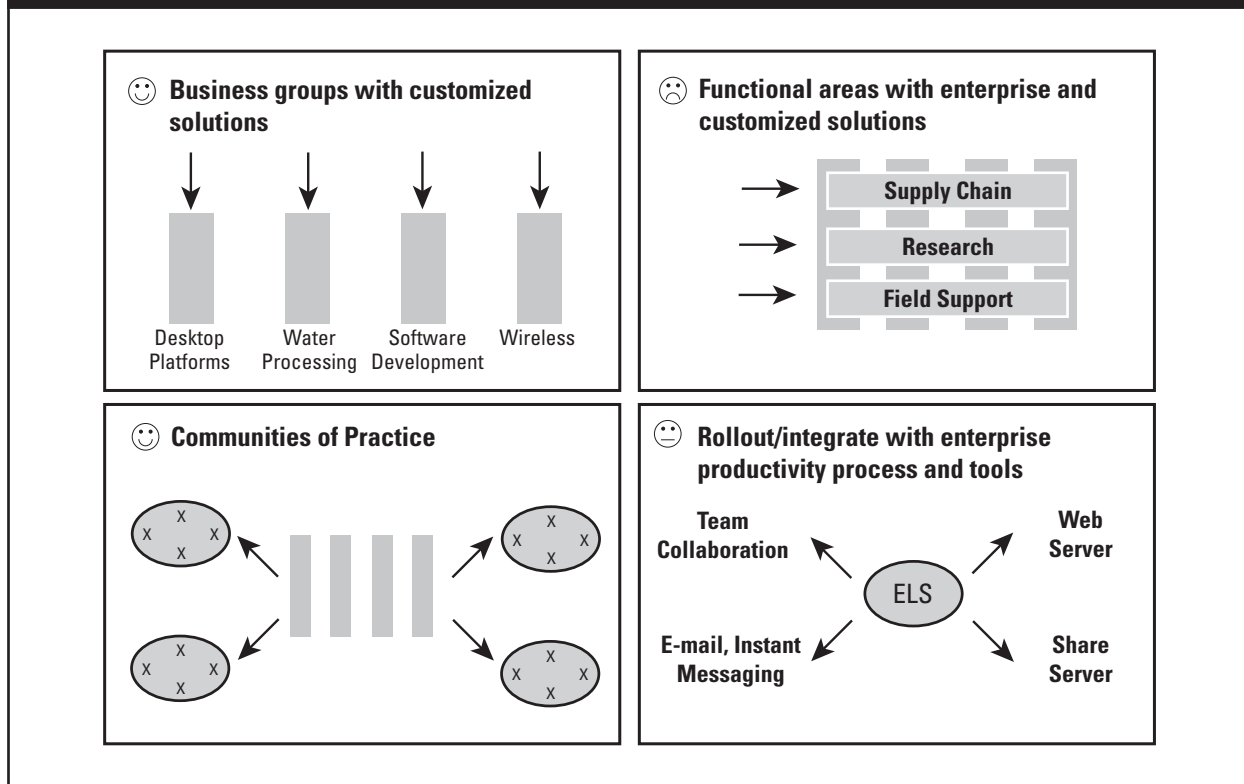
**Figure 20: ELS Marketing Strategy Model**

Figure 21 lists the program levels and goals. The reward is largely recognition-based, but in some cases an individual group may decide to provide small rewards such as \$25 to \$50, American Express gift certificates, or Intel logo merchandise. Intel, as a rule, does not encourage cash gifts for KM recognition because it does not believe that in the long term it promotes the desired behavior.

**Figure 21: Encouraging Participation Via Rewards and Recognition**

Reward	Audience	Criteria
Knowledge sharer	Knowledge providers and knowledge seekers	Quantitative number of answers given and number of questions asked (two to four individuals recognized per quarter)
Champion of champions	Champions and moderators	Individuals who supported proliferation of the ELS and serve as role models for the quality of information submitted and used
Navigator	Champions and moderators	Individuals who referred or drew in partners to the ELS to expand the user base
Study in success	Knowledge providers and knowledge seekers	Individuals who receive or provide star ratings on a consistent basis

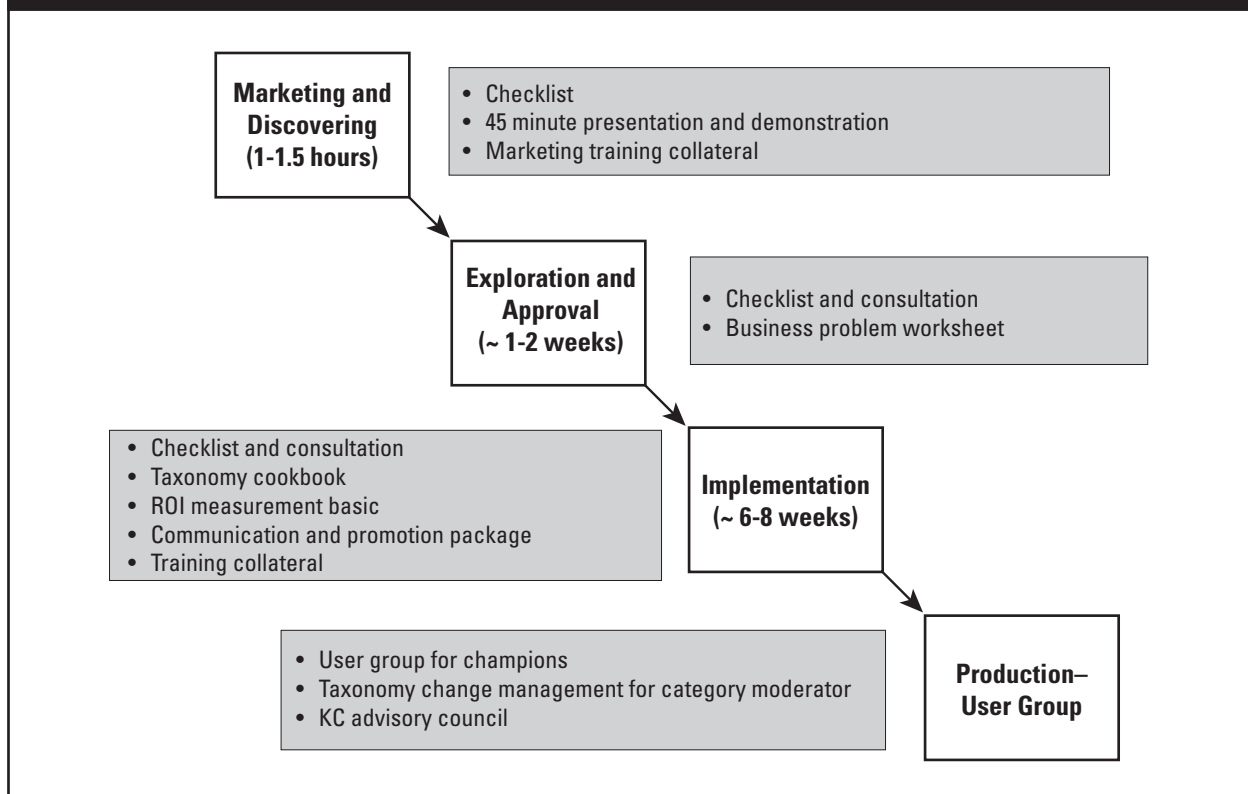
## Launch

The ELS set-up and launch is customized based on the user's or user group's articulated business needs and culture. The support team allows a significant amount of time to understand these factors and to apply the appropriate customized ELS solution set. The following approach is used for deployment and collateral because it enables a repeatable process that speeds up the ELS implementation for groups with similar goals and processes.

Figure 22 details this approach and the timeline associated with each step of the process. As the user base grows, the cycle time for launch will decrease based on the foundation built by earlier groups.

Currently, the user base is 3,500 with an additional 2,000 in implementation. Additional users are being brought into the system as a result of peer influence, self-motivation, awareness of the system, and the push of business drivers (e.g., speed to results, and productivity demands).

**Figure 22: ELS Set-up and Launch Approach**



## TECHNOLOGY AND MAINTENANCE

Because of the buy decision and the design of the product, the vendor product requires that Intel allocate only 0.5 FTE for infrastructure and 0.5 FTE for product engineering to support the backup and integrity of data. Another significant benefit, in Intel's opinion, to the vendor product is that it is Web-based and, therefore, does not require client install or upgrade pushes, which may become costly and time consuming, to individual desktops.

As the system matures, Intel adds additional capabilities. In the near term, Intel would like to add a skill management capability and the Yellow Pages feature. Automating the retention process (including reminders for users to update their profiles or to remove content) is also an important capability to be added. Finally, product integration is considered critical to success and is on the agenda for near-term improvement, if possible. The ELS team would like the system to integrate with company-wide applications, such as e-mail, scheduling tools, shared drivers, and instant messaging.

Maintaining the ELS from a non-technology standpoint requires 1.5 FTEs to address product, implementation consultation, and marketing and training collateral development and execution. The maintenance model is owned primarily by IT. It controls the infrastructure, the ELS road map, and budget, as well as new capability design, implementation, and expansion with business groups' support.

The audit and retention process is critical as the system matures and will gain more attention and focus over time. Currently, moderators and the support team conduct audits. E-mail is sent to remind users to update profiles. The reminders continue on a weekly basis until the profile is updated or deleted. Users have the opportunity to report obsolete or inappropriate content to their moderator or to the system administrator.

## MEASURES AND RESULTS

Measuring the results of the ELS pilot and enterprise-wide deployment is critical to Intel's success. The highest-level goal for the ELS is to ramp up to 20,000 users by the end of 2004 (three years from start). As of August 2003, the system hosted 3,200 users, and Intel is on-target to hit its next major milestone of 5,000 users by the end of 2003. To track its progress, the team reviews both conservative and aggressive models. Intel notes that heavy marketing and communication efforts are needed because qualitative studies indicate that less than half of the potential user population has heard of the tool.

The quality of the tool is viewed equally to, if not more importantly then, the number of users. Intel captures success stories and anecdotes online through feedback mechanisms or the champions. It gives quarterly and annual awards to individuals that demonstrate high-quality use of the tool.

The team conducts quantitative analysis on a variety of fronts and frequently communicates results to key stakeholders in order to build support and engage potential user groups. A weekly people-based report termed the "usage summary" presents the number of knowledge categories and subcategories, number of unique users and profiles, number of questions and answers provided that week with the percentage rated, and the number of search and browsing activities. The team tracks key user/usage indicators and includes the average "per production per user per month" and the "return user" rates.

Value and ROI measures provide the hard numbers to support the success of the program. ROI is calculated based on the total cost of ownership of the system and includes for the business group the costs associated with initial set-up and ongoing analysis of the system. For the support team, it

includes ongoing support and technology costs. The team tracks ROI and communicates it frequently to stakeholders using a variety of methods.

Intel uses a balanced scorecard framework to focus and calculate the return on value of the ELS. Champions are tasked with identifying the specific quadrant for which the ELS is intended to provide value (financial, customer, internal process, or learning). After the objectives are identified, the team can track specific metrics and review the ELS-Value Measurement survey that was deployed before and after the launch.

## LESSONS LEARNED

Intel divides its lessons learned into two categories: success factors and obstacles. Core success factors for the ELS deployment included consistent, well-thought-out marketing plans and activities. The plan was more detailed than a standard communication plan and focused messages to specific groups based on business case results and cultures. The marketing and communication plan answered the employees' question, "What is in it for me?"

Detailing and communicating the individual benefits was important. The team used the "train-the-trainer" and the "teach-to-fish" models successfully. Upkeep procedures minimized the investment required by the core team and improved the commitment of the end users. The cross-functional skills and background of the ELS team served as a broad foundation upon which to build the system and leverage experience.

Technology-related success factors for Intel included the decision to build instead of buy the software. Embedding the tool in existing business processes and tools played (and continues to play) a pivotal role in generating use and commitment across the business. Ensuring that the process is repeatable and scalable was a critical success factor and will enable the team to rapidly move from the pilot and preliminary deployments to the enterprise-wide deployment.

Obstacles for the team include the ability to engage the active support of an executive. Although the team had the approval of four business managers and fell under the mandate of the KM and IT teams, additional executive leverage would have alleviated some of the pressure points and potentially increased the speed at which the system passed particular milestones.

IT factors presented another obstacle and will likely continue to be in most deployments of this kind. Specifically, the ELS competes for priority with popular "office tools" in terms of funding, bandwidth, and attention. The perception of IT being solely technology and not business savvy was an obstacle to be overcome in order to gain the buy-in and support of operations partners.

The most important factor was that behavioral and cultural influences had more of an effect than anticipated. These influences are hard to understand, capture, and address. Lastly, the ELS is a dynamic area with a wide variety of variables and few constants.

# Northrop Grumman

Northrop Grumman Corp. is the world's No. 1 ship builder and the No. 2 U.S. defense contractor. Northrop Grumman is a \$25 billion global defense enterprise with approximately 120,000 employees and operations in 50 states and 25 countries. Headquartered in Los Angeles, the company serves U.S. and international military, government, and commercial customers. Northrop Grumman provides technologically advanced, innovative products, services, and solutions in systems integration, defense electronics, information technology, advanced aircraft, shipbuilding, and space technology.

Northrop Grumman is organized into seven operating sectors: electronic systems, based in Baltimore; information technology, based in Herndon, Va.; mission systems, based in Reston, Va.; integrated systems, based in El Segundo, Calif.; ship systems, based in Pascagoula, Miss.; Newport News, based in Newport News, Va.; and space technology, based in Redondo Beach, Calif.

Northrop Aircraft Co. was incorporated in 1939. Northrop Grumman was formed in 1994 from the acquisition of a number of companies. The major acquisitions comprising the current capabilities of Northrop Grumman are: Grumman Aircraft Engineering Corp., Westinghouse Radio Division, Logicon Inc., Litton Industries Inc., Newport News, and most recently, Thompson Products (TRW).

Included in its portfolio are high-profile products including the B-2 stealth bomber, amphibious assault ships, communication satellites, airborne radar, and wide area information systems.

Northrop Grumman has a vision that its global work force of 120,000 employees should think and act as a centralized organization. For the KM team, the vision means supporting "One Northrop Grumman" and delivering integrated solutions. This unified Northrop Grumman is a system that connects people and makes knowledge assets visible and accessible for people, data, and applications. Through the delivery of integrated solutions, the KM team enables:

- the reuse of "what we know," regardless of location;
- learning, deciding, and adapting faster than the competition;
- immediate response to the needs of customers;
- collaboration across boundaries.

The KM team collaborates across the sectors and product lines to bring additional value to its customers and to integrate the various systems that it builds. Northrop Grumman will leverage the power and resource of its large organization, whereas KM allows it to respond with the agility of a small company.



**OVERVIEW OF ELS**

The KM strategy is to generate capabilities by enabling knowledge access and exchange. The strategy is not a supplemental “thing to do;” it is fully integrated into employees’ daily work and adds effectiveness as it is realized. The two KM strategic components are knowledge access and knowledge exchange.

Knowledge objects are readily accessible and are centrally codified and stored. Knowledge access is more static than knowledge exchange is and driven by accessibility and retrieval. Knowledge exchange generates knowledge through dynamic interactions that are part of getting work done. One outlet to knowledge exchange is communities of practice.

Soft (exchange) tools promote collaboration and how that knowledge capital is managed. Soft tools include discipline management, communities of practice, mentoring, succession planning, lessons learned, and knowledge capture practices.

Hard (access) tools provide the access to knowledge resources and facilitate collaboration and knowledge capture and retrieval. Hard tools include expertise locator systems, document management, collaboration and learning technology, portals, and collaborative office environments. Hard tools allow Northrop Grumman to address questions such as how to change the environment, how to provide information, how to build virtual environments, and how to make technology a sharing and collaborative tool and not the driver.

The company contracted with the Delphi Group to perform a knowledge audit at the air combat systems business area of integrated systems. More than 3,600 surveys were completed, and many interviews were conducted in order to understand the number of hours spent searching for information. The audit revealed that, on average, people spend at least eight hours per week searching for knowledge and that the company has a knowledge-sharing culture and valuable peer networks. The audit also reconfirmed that people are the primary source of knowledge and the first stop in the search for knowledge.

Given the estimate that 80 percent of what people know is tacit knowledge, individuals contact peers for answers more often than they search for documents. The amount of time spent by 120,000 employees searching for information translates to millions of dollars per year. Before implementing an ELS, customers waited too long for their questions to be answered and were not confident about the information they received.

All company employees have expertise. Therefore, expertise location is a key enabler for leveraging the collective tacit knowledge of Northrop Grumman. ELS enables the organization to overcome the natural impediments of finding and gathering people and allows the KM team to view itself as the premiere organizational problem solver.

**DESIGN AND FEATURES**

Northrop Grumman integrated systems (NGIS) connects people and existing databases and taps into resources. Parts of the current system include e-mail, training, HR systems, an internally developed cross-reference system, and the accompanying interfaces. All expertise locator activities are designed for peer-to-peer interaction via a cross-reference tool named the XRef (as in “cross reference”) system.

Locating peers was the original purpose of the XRef system. The tool was created in 1995 specifically for the B-2 bomber development program that was coming to a close. Its purpose was to keep track of the personnel with the program’s engineering expertise and experience as they moved both in and out of the program. Of the more than 17,000 program personnel, approximately 1,700 people remain



with the support and follow programs for that aircraft. The B-2 customer requires that the same skills and capabilities be available to support the aircraft. Lead engineers on the B-2 were able to search for individuals who previously worked on the project who could provide solutions to current or reoccurring problems.

The ability to track former team members and access their expertise was important to the decision to award Northrop Grumman the aircraft's maintenance contract. In addition, the ability to save time searching for answers and to increase the response rate to customers is a cost savings.

In 1997 a KM team was established on the B-2 bomber program, and it began to manage the program's KM activities, including people, process, and document-related projects. Because of the B-2 bomber program success, the KM team transformed from a program focus to a business area focus in 1999. In addition, the XRef migrated across multiple programs, and the KM team began to evaluate complementary tools to enhance ELS capabilities. In 2000 KM reached an agreement with Tacit, a software company, and conducted a pilot. Starting in 2002 a PeopleNet portal was developed, and in 2003 a Northrop Grumman knowledge strategy was established. Plans for 2004 include a cross-sector application for ELS.

Profile creation is part of the employee annual review process, and a measure in the semiannual performance review process is an 80 percent response rate. Employees are required to enter a minimum amount of data into the ELS and other data are voluntarily entered.

Part of the employee profile is a self-assessment that uses a scale from one to five (beginner to expert). The discipline manager (in collaboration with the employee and management) makes the discipline management portion of the system assessment.

Expertise is the combination of learning, skill, and life experience. The KM team uses experience scales and years of experience categories to identify the level of skill gained. The job of the discipline manager is to identify and manage those personnel resources with expertise to support current work and respond to future statements of work.

## TECHNOLOGY

The XRef system, Northrop Grumman's peer-to-peer network resource, is user maintained and directed. All employees have the ability to access the open system, which is available on a global network, and maintain a business profile. In addition, vendors, contractors, and customers who have access to the system for programmatic reasons can gain admission to XRef.

The ownership of the core database is KM. Human resources, business management, engineering, and production functions built the interfaces. Those with the need to know own the use of the information.

The components are simple; it is a system designed in-house using products the company already owned and interface compatible with both clients and Microsoft Internet Explorer. Numerous applications (such as client/server, a resource center, portal search engine, and Talent Pool) interface with the XRef database.

XRef became a resource for many other processes and interfaces, took advantage of legacy systems, and emerged as a database. System growth came from other business groups realizing benefits of the system, which currently has more than 15,000 active profiles for personnel from 37 different sites. Approximately 3,000 users per month log on to XRef. The number of active profiles, the number of

sites accessing it, and log-on trends are indicators that XRef and expertise location are becoming part of employees' normal work activities.

The XRef client main screen is simple to use and similar to Microsoft File Manager™. Users can search the database by category and keyword, maintain a personal profile, and track skills and capabilities for staffing. An example of data in a business profile include: contact information, responsibilities, interests, experiences, skills subjects, computing tools, publications, education and training, and language experience.

Personnel may be located by indices of data items such as business skills subjects or programs experience. Other fields are free text, and the KM team urges the user to check spelling because free form text becomes search criteria for the search tools.

Currently, the ELS is not capable of refining a search, but XRef allows a "sort and exclusion" of a search site. It can drill down to the lowest level on a site, skill, language, or category. Upcoming search tools will allow the user to refine the search.

### **IMPLEMENTATION AND LAUNCH**

In 2003 Northrop Grumman deployed its Web talent pool site across the integrated systems sector. The talent pool is a browser-based interface to the XRef database that does not require a local client. Anyone from any sector can tap into the system and utilize the search capabilities. The talent pool also allows a user to update the XRef business profile and search for others across the organization. In fall 2003 it connected and integrated with the PeopleNet search portal.

Soon after XRef deployed to the engineering, logistics, and technology organizations across the integrated systems, sector and the discipline management process was developed. Tools to support this process were added to the XRef system. Discipline management consists of skills proficiency assessment, career development planning, and personnel resource management across organizational, program, and location boundaries. Discipline management applies KM methodologies in three areas: staffing new programs faster, improving career planning, and enabling the location of expertise. XRef allows Northrop Grumman leaders to reach their vision that when customers engage any entity of Northrop Grumman, they have engaged the ability of the entire enterprise.

E-mail exchange is the most popular communication tool at Northrop Grumman. Other sharing and collaboration tools, such as instant messaging, chat rooms, and bulletin boards have been unsuccessful. Because e-mail is used so extensively, NGIS decided to leverage the tremendous knowledge resource that e-mail represents. Keeping with the general KM philosophy at Northrop Grumman, the adopted system is peer-to-peer. There has been no negative user feedback regarding the use of e-mail traffic to develop user profiles, because user security and privacy features are a critical element to the solution adopted.

NGIS selected ActiveNet, a network solution by Tacit Knowledge Systems, to create profiles based on e-mail traffic product. ActiveNet is a real-time, passive profiling tool that provides persistent search and alert features depending on the user e-mail exchange. Integrated systems conducted two pilots of the product. The first occurred in 2000 with 250 users and resulted in sector purchases of user licenses. In 2002 a second pilot included an expert locator portal and 450 users. Primary pilot objectives were to test small- and large-scale ELS deployment (process, training, software, and hardware), test the expertise locator portal, and gain target sector user perspectives. The result of both pilots was the deployment of ActiveNet to 10,000 employees in 2003. Presently, every integrated systems sector personnel with a network e-mail account will be part of the ActiveNet system.

During the pilot phase, NGIS promoted ActiveNet as a search tool. Within the first three months, the implementation team received several success stories that supported cost savings and efficiency gains. Initial users also report finding experts, others working on the same topics, and responses to technical questions. Users can continually share success stories and give suggestions via an embedded program feedback mechanism. Integrated systems expects the value of ActiveNet to significantly increase with deployment across internal boundaries.

Every e-mail user has a profile that represents that person's knowledge, skills, and interests. The user profile consists of two areas: a public area that is viewable only by other Tacit users, and a private area that only the profile creator can access. Because ActiveNet is a real-time system and allows users to continually update their profiles, users can locate others working on the same issues.

Regarding security, the ELS required no additional security beyond what is already in place, as appropriate for a defense contractor. The company distinguishes between employees' unfounded and legitimate concerns. The operational model and features explicit to ActiveNet comply with e-mail privacy requirements for deployment to those personnel at European sites. That is, legal and HR departments have approved ELS privacy and voluntary sharing practices.

## MEASURES AND RESULTS

Integrated systems use several measures to track system use. Collected statistics include the number of current profiles, number of sites across the organization, average number of logins per month, and growth history. Plans include measuring browser interface use.

Integrated systems uses success stories to share measures and results of its ELS. For example, the baseline time for staffing new program contracts ranged from six to 12 weeks. The ELS contributed to a staffing time reduction to less than four weeks. This time saving positively impacted the organization's ability to respond faster to customer staffing requirements and realize scheduling cost savings.

A reduction in time to identify internal resources and to identify requested resources are two success stories. In less than four hours, the Northrop Grumman team was able to locate an employee who could translate Japanese. This represented a cost avoidance of \$5,000 dollars in translator fees for this client engagement. More importantly, this success left a positive lasting impression on the Japanese customer. The second success story involves locating an experienced resource from another organizational sector and deploying him to a project within one day. The resource was able to apply his knowledge to save an estimated \$50,000 in rework.

Another success story is the ability to locate expertise quickly, which aids in the optimization and retention of skilled staff. The baseline metric for finding an expert ranged from two to five days. With the ELS, an expert is located in less than four hours. The ability to locate experts (such as structural engineers) and transfer them from one program to another eliminated potential layoffs and reduced cycle time to staff projects. This is an example of exceeding employee expectations, because project members staffing levels are optimized and staff reductions are avoided.

**LESSONS LEARNED**

Northrop Grumman shared some lessons learned regarding expertise locator systems.

- Have an executive champion and user support; both are necessary for acceptance.
- Do not battle existing processes. The systems are business resources, not business tool replacements.
- Leverage existing information bases, and tailor deployment to the organization.
- Peer pressure is a powerful tool that promotes users populating and updating their profile, providing accurate information, and responding to requests for assistance.
- Communicate often.
- Be patient and persistent. Change occurs in increments.
- Just start, because implementing the ELS takes time. The Northrop Grumman effort has been years and continues.

## Schlumberger Ltd.

Schlumberger Ltd. is an independent global technology services company, headquartered in New York City, with 78,000 employees of 140 nationalities. It provides a unique combination of IT and energy expertise. It strives to be a committed and trusted partner and is a recognized IT practitioner with a proven track record. In 2002 its revenue was \$13.6 billion.

Schlumberger's oilfield services include surface seismic, wireline logging, drilling and measurements, well services, well completions and productivity, geoscience, engineering and economic evaluation software, information management, data and consulting services, and Web-enabled solutions. It is involved in field operations and integrated project management.

Although most people are familiar with the oilfield division of Schlumberger, they are not so familiar with SchlumbergerSema, which is the IT services, consulting, and systems integration arm of the company. SchlumbergerSema provides IT services such as network and infrastructure solutions, consulting and systems integration, SmartCards, parking meters, point-of-sale terminals, electricity meters, payphones, ticket vending machines, and telecommunications billing and messaging software.

Through all market cycles, the company invests in technology and research engineering. In 2002 it invested \$6.5 million in oil field services and in IT. It focuses on speeding up the development process and engineering lower cost service delivery.

Schlumberger is located worldwide with laboratories in Ridgefield, Conn.; Cambridge, U.K.; Stavanger, Norway; Moscow; and Dhahran, Saudi Arabia. Its technology centers are across Texas in Houston, Sugarland, and Rosharon; in Princeton, N.J.; across the United Kingdom in Abingdon, Gatwick, and Stonehouse; Fuchinobe, Japan; Clamart, France; and Stavanger, Norway. These research laboratories and technology centers in combination with the universities and technology companies Schlumberger works with produce a "knowledge factory." Knowledge generated by these laboratories and technology centers must be delivered to the oil companies, which are Schlumberger's clients, and to the GeoMarkets (the geographical areas in which Schlumberger operates). Likewise mechanisms are in place to transfer knowledge generated in the GeoMarkets to other GeoMarkets and back to the technology centers.

Schlumberger is the official Information Technology Partner for the Olympic Games and is currently working on the IT and KM requirements for 2004 Athens Olympics.

### OVERVIEW OF THE ELS

A corporate directory implemented in 1993 demonstrated the company's commitment to knowledge management. In 1997 Euan Baird, then chairman and CEO of Schlumberger, set the stage for current-day developments when he said, "To succeed, an organization must create a new work environment

where knowledge and experience can easily be shared. In such an environment, individuals are able to apply their collective knowledge to make optimal decisions—in real time.”

Schlumberger’s goal is to provide the knowledge of the entire organization for all of the decisions the organization makes. Employees have real information in real time. “Real time” is defined as enough time to affect the decision. For example, if a team is working on a presentation that is due in two weeks, real time may be one week from now. For employees working on a drilling rig, real time to reach a decision might be minutes.

A pivotal year for knowledge management and expertise location was 1997. A group of employees met to envision Schlumberger’s future and made decisions that transformed the organization. The group decided that Schlumberger should:

- **split itself into GeoMarkets and segments**—the company was a combination of many divisions operating separately with limited communication among the divisions;
- **apply knowledge in service delivery**—the idea was the seed of a system called InTouch;
- **develop communities of practice**—the idea was catalyst for implementing bulletin boards and a system called Eureka;
- **control the organic growth of its intranet**—a decision that led to the creation of “the Hub;” and
- focus on career management.

In answer to the vision, the employees can now manage careers through technical career ladders, a “career network and profile” process, a career center, and e-learning.

In 1998 Schlumberger set three goals and three strategies. The goals are to:

1. implement world-class technologies,
2. offer complete solutions, and
3. be the leader or exit.

Two of the three strategies are important to the ELS, and they are to deliver integrated solutions locally and concentrate on knowledge management.

### GeoMarkets

Knowledge management is a challenge in an organization as large as Schlumberger that is divided into many different segments. For the company, the solution lies in creating GeoMarkets so that it can concentrate locally with global services and use knowledge management to ensure that the knowledge in one area is shared with other areas. The company has split the globe into three areas, and each of the three areas has a number of GeoMarkets. Can knowledge that is applied in one GeoMarket be transferred to another? If an expert resides in one GeoMarket, can his or her expertise flow to the other GeoMarket? Because of the four systems that comprise the ELS, the answers are “yes.”

### The Four Systems of the ELS

Schlumberger does not have one ELS; it has four: the corporate directory, the knowledge Hub, Eureka, and InTouch support. Knowledge management grew from the bottom using a Darwinian approach—certain ideas survived and others did not. Some of the more successful ideas began as little skunkworks projects—small developments in localized areas. When the projects received the recognition of management, they gained credibility.

Figure 23 shows the evolution of the ideas that did succeed.

**Figure 23: Evolution of ELS**

Good Ideas	"Little KM"	"Big KM"
PH (University of Michigan)	LDAP (Lightweight directory Assistance Profile)	Corporate directory with career network and profiles
Hundreds of web sites	Proto-portals	The Knowledge Hub
1,200 bulletin boards and archives	Managed communities	Eureka
Service-oriented web sites + bulletin boards	District 2000	InTouchSupport.com

In 1993 technically savvy employees from the Austin office came across the PH technology from the University of Michigan and decided that it would make a good internal directory for the Austin office which was deployed throughout the corporation. The directory took shape further in 1997 when the company deployed LDAP system across the organization so that a single "Directory" included both employees and expertise. The directory was coupled with the career network and profile profiles.

In the mid to late 1990s, many small Web sites cropped up, each with a different structure, design, and search mechanism. The knowledge Hub brought all the Web sites together with a common classification and common search mechanism and also offered an easy-to-use content management tool that sites could be migrated to.

Eureka began as more than 1,000 bulletin boards that evolved into managed technical communities. Schlumberger's public Web site was based on the same technology as the Hub and became a site devoted to the news of the day. The InTouch system rose up from the 1998 District 2000 project.

Today, portfolio management is important to the company. Managers are ensuring that IT projects are managed from "Project Office," a central place, so that groups are not duplicating systems.

The KM strategy has been to connect people to people through the directory, connect people to communities of practice through Eureka, connect people to information through The Hub, and connect people to best practices through InTouch. All of the four systems have an element in them that relates to expertise location.

### **Schlumberger's Approach to the ELS**

Schlumberger's current approach to the ELS is primarily corporate, but the systems began locally. When grassroots efforts reach management's radar, management determines if they are suitable for the entire organization. InTouch began in drilling and measurements and then expanded to oilfield services, but it is now migrating to SchlumbergerSema. The directory existed at the corporate level in 1993, and all employees developed profiles in 1998. The ELS is part of the knowledge management strategy, and it is integrated with the communities of practice.



### Retirees Access the ELS

For some time, Schlumberger has been considering the use of retirees as experts in response to the brain drain that has been occurring in its industry.

To present an effective business cases for knowledge management, leaders of initiatives:

- solicit management sponsors;
- set realistic expectations;
- present believable measurements; and
- start small, but think big.

To receive executive buy-in, find the right executive. The KM leaders see no benefit in taking an initiative to an executive who does not believe in knowledge management. When the leader does find the right executive, he or she nurtures the relationship by communicating frequently regarding the progress of the projects.

Schlumberger's story of how it invested in the 1990s is probably not relevant in 2003. Because the company was learning as it was going, progress was slow. People beginning now have the luxury of faster execution. However, no matter when the knowledge management initiative begins, it still requires an initial investment in technology and culture.

The primary users of the ELS are "worker bees." They are in the GeoMarket staff and may be located in swamps, deserts, or on offshore platforms. The four systems of the ELS provide the knowledge they need to do their jobs. The technology centers and human resources are also users of the ELS.

All applications are Web-enabled and can be searched or browsed. One system has a service desk. People can contact experts through a Web application, the telephone, or e-mail, and entire communities of experts can be contacted simultaneously. The ELS does not require that questions be framed in a certain way, and experts can be located in just a few moments.

Both push and pull strategies are used to attract users to the ELS. Because the experts directory records for themselves, they pull people toward them; the experts are advertising themselves as publishers of content. The system also sends e-mail to groups created by the directory or bulletin boards.

## DESIGN AND FEATURES

### The Directory

When a new employee enters the company, he or she receives a SAP HR record, which stays with the employee until termination. When the employee leaves the company, the record disappears immediately, and all access to the networks and the facilities stops.

The SAP HR record automatically generates the directory record, which includes a name, phone numbers, an e-mail address, time zone (important in a global community), and other basic information, which the user adds to in order to enrich the content. The record contains the organizational unit the employee works in, his or her manager, a job title, and a list of expertise. The expertise is not located in the directory system but is populated through the Eureka system. The directory has room for the individual's schedule; and people customize the area with the dates they will be out of the office or with a URL that links to the personal calendar. The directory contains a list of subscriptions to bulletin boards and career information, including what courses the employee has taken.



Employees have the option to publish basic contact information on the public Web site. (Many people do not want any details published.) It has room for optional information such as personal contact and family details. The directory record and career network and profile Web page is linked.

### **The Eureka System**

The Eureka system is the home for technical and business communities of practice. Twenty-five major communities (with 142 special interest communities embedded in them) share more than 14,000 members. A community of practice can vary in size from 4,500 members to 50 members.

The Eureka system links to knowledge repositories, news, and events that a particular community is interested in. Communities create surveys to canvas their members, and each community has elected leaders who serve for a year. Smaller communities may have only two leaders, but larger ones have five or six. The role of the leaders is to welcome new members and generate activity and make sure that people who are sending messages to the bulletin board receive a response. The Eureka site is used not only by practitioners, but also by top executives who see the community as a source of expertise and advice.

Although Schlumberger does not yet mine the bulletin boards, it searches them for information. It is implementing new technology that will allow it to find “nuggets” through the mining process for information sharing.

Career network and profiles are part of Eureka, and they act as online resumes. Anyone can have a career network and profile; membership in a community is not a prerequisite. career network and profiles contain:

- some directory information;
- a personal statement (optional);
- current projects including URLs to the Web pages of projects that the employee is involved in;
- areas of free-form text for the employee to describe his or her expertise;
- education (names of universities and references to theses, dissertations, and publications);
- patent work and professional achievements;
- a history of work at Schlumberger (and at other companies); and
- job skills and classification.

Skills are classified manually using the Schlumberger master classification system. Employees built the classification of skills by examining published classification schemes and brainstorming how the classification looks at Schlumberger. The oil field division of the business is rolling out an extremely detailed classification of skills.

The classification system is multifaceted with categories of skills, subject matters, organizational structure, geographical structures, and languages; and it standardizes terms of speech. For example, an employee may want to know something about a cell phone, but the answer to her question is under “mobile phone.” The organization creates a common language for publications. According to a KM champion, “It is a challenge to put things in one place and find them in the same place.”

Eureka leaders encourage employees to post happy pictures and personal interests because these break down barriers. Using just one search screen, employees can search Eureka by memberships, profiles, or the directory. The search can be further limited to “part of the organization” or “geographical location.”

### The InTouch System

The InTouch system is a combination of knowledge base (which includes best practices, lessons learned, solutions, and reference manuals) and service desks that are manned by experienced oilfield engineers. Field engineers with problems search the InTouch knowledge base, and if it does not provide a solution, they contact (via the Internet or telephone) the InTouch engineers who man the service desks. If the InTouch engineers do not know the answers, they have a network of people to contact. There are 1,600 officially designated support experts: subject matter experts, Segment knowledge champions, GeoMarket knowledge champions, and applied community experts. The support experts spend a portion of their time providing expertise, which is a component of their job description and objectives.

The company has 86 service desks manned by 200 InTouch engineers, and each service desk is assigned a particular product or service. The InTouch engineers work full time on the service desks for two to three years and then cycle back into the field, possibly as an applied community expert.

People are encouraged to search for the answers to their questions in the database before moving on to the service desk. The answer to every question that is answered by the service desk is published so that it does not have to be answered again. The InTouch system shares some content with the Hub, but the InTouch system is geared to field operations in the GeoMarkets.

### The Hub

The Hub has a Yahoo-type navigation system. It lets the employee choose products, services, divisions, locations, etc. Schlumberger has a common classification nomenclature between the Hub and the InTouch system so that classification is consistent.

The Hub identifies authors of the publications posted on it so that employees can contact the authors. The Hub acts as a signpost that invites the reader to “contact this person for that information” or “click here to join this bulletin board.” Employees gain access to e-learning and training through the Hub.

The Hub provides a consolidated search and allows employees to use it to access material in the career network and profiles, the directory, and on other Web sites that are not as yet part of the Hub.

### General Comments

All four of the ELS components are owned by corporate IT, and they are funded centrally. No one department is paying for them; they are part of corporate overhead. Schlumberger did try to benchmark knowledge management in the early 1990s, but without much information available, most of their progress was through “trial and error.”

The information in the profiles and in the directory is published voluntarily. Employees themselves are responsible for the personal information content, but Schlumberger has a culture of feedback. Therefore, if a person recognizes an error in another employee’s information, he or she is empowered to politely point it out to either the employee or the system administrator.

A KM champion distinguishes between questions that are “critical” and “not critical.” Both types of questions are equally important. An example of a critical question is a field engineer asking a technical question with the possibility of interrupting the drilling of a well. A bulletin board would not be the proper forum to discuss the question because the engineer needs an expert (InTouch) opinion. A software developer working through some bugs also has an important question, but the answer is not critical. He or she could pose the question to a bulletin board and receive various opinions about how to work through the software problems.

Schlumberger does not have the ability to mine information communicated from one e-mail box to another. It is aware of the technology, but is not comfortable with it yet.

## LAUNCH

Implementing the usage of the system required organizational change. Employees had to change their behaviors for each of the four initiatives:

1. **The directory**—to update the directory, the company held PHdays twice a year. Directory managers sent employees e-mail messages and hung posters to encourage the employees to update their records. During the event, those who updated their records were entered for prize drawings. (Except in a small part of the organization, the company no longer needs PHdays, because employees routinely keep their records up-to-date.)
2. **Career network and profiles**—employees are responsible for maintaining the profiles, though a manager might have as an objective that 80 percent of the employees in the department have a career network and profile. The managers roll the objectives down to the employee level, and employees are told in January that they are to have a profile developed by the end of the year. Many organizations have high participation: 90 percent of their employees have career network and profiles. Human resources uses the career network and profile as a starting point when it looks for people to fill internal jobs. Those without a career network and profile do not receive promotions or lateral moves—and that serves as a good way to encourage people to create a one.
3. **InTouch**—this system involves excessive training, champions worldwide in the GeoMarket locations, and objectives for each employee regarding the level of use. A tipping point has occurred in which employees think “everyone is doing it, so why don’t you.”
4. **The Hub**—provides consolidated searches to access materials in the career network and profiles, the directory, and other Web sites.

## Sema Example

Schlumberger works to transfer its culture to organizations that it acquires. When Schlumberger acquired Sema, Sema was not accustomed to the idea of a directory. In fact, the culture was anti-directories. Sema management had made an intentional decision not to have personal information available because they wanted to prevent outsiders from receiving a long list of everybody in the organization.

Schlumberger pulled information from Sema’s human resources system into the directory system and generated a record for each employee. Many Sema employees had records that were not up-to-date, and the cultural change required for employees to update their records took three or four months. (It was a busy time for the Sema employees because they were moving office locations and changing e-mail addresses and telephone numbers.) For the four months, the veteran Schlumberger employees were frustrated because they could not contact Sema employees. All at once, all of the Sema employees got onboard with the system, and their records are now consistently up-to-date. The Sema employees reached a tipping point.

### Reward and Recognition

Of the total Schlumberger employee population, 20 percent are involved in Eureka. Approximately 50 percent of all employees have a profile. Schlumberger's technical staff belong to Eureka, and of the population of Eureka, 90 percent have a profile.

Employees are not specifically rewarded for having a profile, except in increased networking opportunities. InTouch is different from career network and profile and has an extensive reward and recognition system associated with it, which takes the form of a "frequent flyer system." Employees receive points if they use information that has been published in InTouch or if the information that they publish is used. The higher the quality rating of the information, the more points they receive. Prizes for the most points are awarded at the GeoMarket and segment level, each quarter.

Schlumberger does have a culture of sharing and helping, and it is one that grows and influences other employees. A KM champion said, "If you are in an organization where you can ask a questions and receive help, you become willing to give help yourself."

Participation is always voluntary, however encouraged. According to the KM champion, "If you know your career will be enhanced by having a career network and profile, you become very willing to put one into place. And if your directory does not have a correct e-mail address or telephone number, no one will get hold of you and your career will fizzle in no time at all."

Employees engaged in conference calls have the profiles of each of the call participants open on their desktops. Employees can see pictures and personality details of the participants, so the career network and profiles provide a head start in the process of becoming acquainted. When employees realize that others are using and depending on the career network and profile information, they keep the information current.

### Barriers to the Continued Use of the ELS

Experts could become frustrated that they are answering the same question multiple times. Anyone who asks a question for which the answer is already published is notified politely that the answer already exists.

Employees do become unengaged from the bulletin boards, and some unsubscribe. Managers set protocol for board use and enforce it through polite one-to-one e-mail messages to the offenders. Points of protocol include:

- **no inappropriate traffic**—people must direct their questions to the most appropriate board, and
- **no large attachments**—large attachments waste both disk space and bandwidth. (The protocol is to publish the file and send the URL.)

Managers encourage employees to post happy, informal pictures on their profiles. These break down barriers and encourage others to call. Individuals have personal objectives tied to maintaining or using the ELS.

Incentives are less important as people begin to accept the benefits of the system. Now, if employees change e-mail addresses or cell phone numbers, they go immediately to the directory. Now, if employees have content, they publish automatically. The company stops the incentive programs when they are no longer needed.

## TECHNOLOGY AND MAINTENANCE

All four of the systems—the directory, the Hub, Eureka, and InTouch—were built in-house rather than purchased. The technology to carry out the company’s vision was not available in the late 1990s.

Schlumberger may buy rather than build its second generation of tools. It is developing return on investment cases now. The reasons for buying rather than building are to reduce the cost of maintenance; to lengthen the product life cycle, which is shorter on internally built technology; and to “use what it sells and sell what it uses,” which is important to a consulting company that requires technology be implemented in other companies.

### Technology of the Directory

Schlumberger continues to use the scripts it developed in-house to walk employees through entering information into the directory. It is considering a commercial content management tool. Directory support is a management team of one, and the company has outsourced its IT function to SchlumbergerSema. The team in SchlumbergerSema manages not only the directory but also other systems.

The use of the directory has increased because it is the tool for authentication. For instance, security uses the directory to allow employees access to buildings. In 1997 the directory had three servers: one in London, one in Houston, and a failsafe one in Houston. Because of the increased use of the system, the company added two servers: one in Brussels and one in Singapore. The management of these servers is taking more time.

### Technology of Eureka and the Career Network and Profiles

Eureka is an in-house tool consisting of a Web application and an Oracle database. A management team of three people develops the Web pages behind Eureka (and career network and profile). However, Eureka is much more than just that. The team has access to corporate libraries of periodicals, as well as a technical career ladder, which is an outreach system of relationships with universities that is run by Eureka. A three-person team manages all the systems. The actual development of the search and career network and profile is in maintenance mode and not being expanded now. Eureka costs little to maintain and is being maintained by a small contract company in Paris.

### Technology of InTouch

Schlumberger built the InTouch tool in-house, and it consists of a Web application, a service desk, and a knowledge base with an Oracle database behind it. It has a commercial search engine. SchlumbergerSema manages InTouch, and because Schlumberger is looking at third-party components and the system is expanding, a larger team is involved with it at the moment. If InTouch were in maintenance mode, two or three people could maintain it.

The company has two separate search engines: one for the Hub, and one for InTouch. The one on the Hub covers everything excluding InTouch, but the other covers only InTouch. The organization is considering consolidating and having one search engine.

### Technology of The Hub

The Hub tool was built in-house and consists of a Web application for the front end and an Oracle database. It has a commercial search engine. Schlumberger is deploying commercial components for classification and Web content management in October 2003. The Hub is supported by a team of three and maintained by SchlumbergerSema.

### The Integration of the ELS

The ELS integrates to various levels with:

- **human resources**—the directory is fully integrated with SAP HR;
- **customer relationship management**—CRM is considered a knowledge management system and is used mostly in sales. (The information in it is sensitive, so it is separate from the other systems and integrates little with the ELS.);
- **collaboration**—Schlumberger uses ProjectNet, an off-the-shelf project collaboration tool that allows the documents involved in a project to be published to the project team. (The leader of KM community believes that publishing documents in a collaboration space does not constitute “enterprise KM” and processes need to be in place to ensure best practices are transferred from project space to enterprise best practice systems.);
- **portals**—portal technology is used simply to personalize and customize content (Schlumberger uses no commercial portal products now but could for the development of the Hub II.);
- **content management tools**—are used in InTouch and the Hub. (Currently, they are in-house built, but the company will implement commercial versions.);
- **directory tool**—Schlumberger uses a commercial LDAP directory and is considering moving to a commercial directory content management tool;
- **authentication**—is used for edits and feedback (InTouch, the Hub, and Eureka use the directory to permit access.); and
- **e-mail**—is commercial and is used by the bulletin boards, the Hub, InTouch, and Eureka.

### Maintenance of the ELS

Now that the systems are throughout the enterprise, they are supported and developed by the corporate information systems. No small skunkworks exists. The directory, Eureka career network and profile, and are operating at a basic level. The directory has one thought leader and a small support team for the five LDAP servers. Three people manage Eureka and have a small support staff.

### MEASURES

The number of measures in place is dependent on the life cycle position of the initiative.

- **The directory**—except to measure system usage, Schlumberger does not spend too much time measuring the use of the directory. Because its return on investment is already proved, spending resources to measure activity is not necessary. The directory’s site (the LDAP) has approximately 11 million hits per week, so the company has no need to drive increased participation.
- **Career network and profile**—the company measures the number of updates and the ratio of the employees who have them, but it does not measure accuracy of the entries. The profiles in career network and profile have demonstrated a tremendous return on investment, so they do not require further proof of their value.



- **The Hub**—hits and another matrix, including content updates, are measured.
- **InTouch**—is measured extensively. The company analyzes calls to the service desk to determine employee learning gaps or missing pieces of information.

Most of the measures are available online, and employees can go to the Hub to see the level of new or modified content. The measures are split by GeoMarkets and segments.

## LESSONS LEARNED

If the Schlumberger team began again, it would have:

- the directory profile and career network and profile be on the same system and not require a hyperlink between the two and
- commercial content management tools for the directory and other applications.

A lesson learned is: “You can never overestimate the need for change management. Build it and they will not come unless they are encouraged.”

## Critical Success Factors

A number of factors have helped Schlumberger succeed.

- Its career network and profiles and directory are easy to maintain.
- It has developed a common language for skills (classification).
- It has comprehensively managed change.
- It has removed or combined competing systems. Employees should not need to use two or more systems, because encouraging people to change their information in one system is difficult enough. Trying to encourage them to update two systems may be impossible.
- It works from the enterprise level and identifies experts in one location to help the other locations.
- It is not hung up on the validation of skills and experts. One percent of the people in any organization may misrepresent their skills, but 99 percent of the people will be accurate. People have more of a tendency to underestimate what they do rather than overestimate. Schlumberger does not halt the good that can come from an ELS system because a couple of people’s information may be inaccurate.

## Unforeseen Obstacle

Because the four different systems—the directory, the Hub, Eureka, and InTouch—began in four different locations at four different times, the technological choices made by each group are not entirely compatible. To overcome this obstacle, a company that is beginning to implement the ELS must have IT standards and portfolio management early in its knowledge management career so it can catch the technologies early enough to make a difference.

**What Works Well and What Does Not**

1. It is difficult to predict if technology systems will last. For example, Schlumberger first used Cold Fusion rather than Java.
2. Employees never know in advance where the company itself is headed. Schlumberger has become an IT systems integration and consulting company, and could have made different decisions to position itself regarding its new core competency.
3. Schlumberger's unmanned bulletin boards could have been better managed at their inception. Bulletin boards that spring up throughout an organization are not a good way of solving the problem of the lack of expertise.
4. Self-service works well if it is encouraged.
5. If Schlumberger had to "do it over," it would have commercial components that are well-integrated with each other and a single source of information about people—a goal the company has almost reached.

**Plans for Expansion and Growth**

Schlumberger will concentrate on continuous improvement and culture change. It is still working on making business cases and calculating returns on investments for the various improvements.





# Expertise Locator Systems: Finding the Answers



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