



Boise, Idaho

## **National Interagency Fire Center**

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# **Addressing Knowledge Loss and Workforce Attrition Issues in the Fire Management Workforce**

**August 7, 2002**

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# Addressing Knowledge Loss and Workforce Attrition Issues in the Fire Management Workforce

## Understanding the Issue

Recently, National Public Radio (NPR) highlighted the critical issue of knowledge loss and attrition in key fire management positions in the Northwest United States. According to the National Interagency Fire Center (NIFC), between 1995 and 2000, 20 percent to 50 percent of these critical and qualified fire management personnel left the workforce.

This translates into potentially greater damage due to fire and increased risk to personnel, resources, and property because there are not enough qualified and experienced fire managers to safely lead teams of firefighters to battle blazes. While federal agencies are speeding up the training process and sending more trainees to fight fires alongside experienced managers, this is at best an inadequate, long term solution.

Fire management is an experienced based profession where the skills and insight necessary for success are acquired primarily through time. No amount of technology or education can provide the requisite “know how” and “know why” that comprise the experiential side of the multi-dimensional profession and skill set that is fire management.

## The Critical Question(s)

*What can be done to ensure that the critical knowledge possessed by a skilled and experienced senior workforce can be transferred to the next generation of senior managers that require this knowledge and expertise?*

- *What is being done to capture critical experiential knowledge from leaders before they depart?*
- *What is critical knowledge and where does it reside within the organization?*
- *What are the critical domains, and what information in those domains should be retained?*
- *How do you engage the workforce to ensure that the workers share the critical information that should be harvested?*
- *How do you minimize the risk of placing inexperienced new leaders in very senior positions without the traditional maturing of time and experience?*

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## Observations

- Large numbers of senior fire management leaders will continue to leave due to retirement and other attrition in the next few years. The issue facing fire management professionals is consistent with issues facing other government agencies (fig 1).

### Projected Government Workforce Loss – Federal Emergency Response Organizations

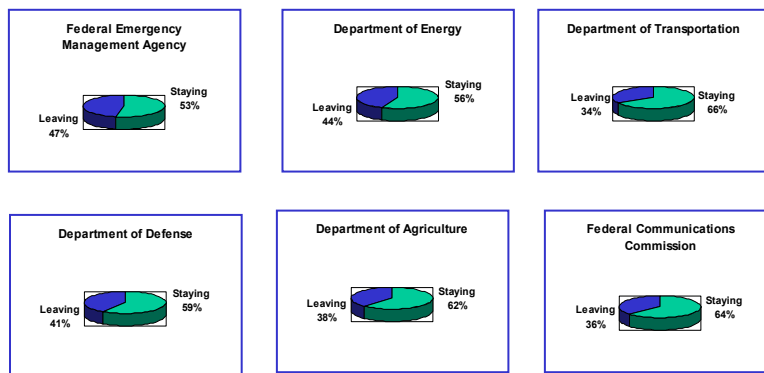


Fig 1

- Critical “know-how” and experience developed over many decades and through many fire scenarios will continue to leave with the retiring workforce.
- There are inadequate numbers of junior and mid-level fire management professionals currently “in the system” to fill the positions that will be vacated. Much of this is due to hiring freezes during the previous decade (fig 2).
- A “formal” mentoring process, if it exists, may not be adequate to help deal with this.
- Any “informal” mentoring process will be short-circuited with the large loss of senior personnel in such a short period of time.

### Results of Hiring Freezes of 1990s

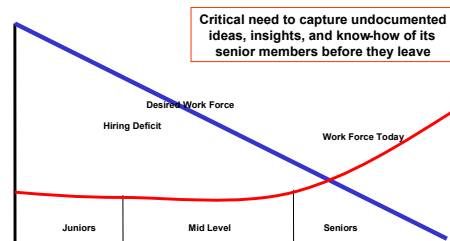


Fig 2

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## Understanding the Relationship Between Force Structure and Knowledge

Knowledge is usually an inverse function of experience and age. Knowledge is collectively greater at the senior level than at the mid and junior level.

### Normal Force Structure and Knowledge Maturity

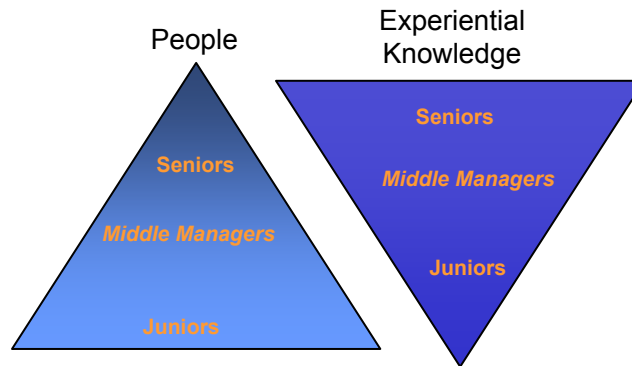


Fig 3

The hiring freezes during the past decade have resulted in a workforce-knowledge relationship as pictured below. The great number of seniors has inverted this pyramid. This inversion (fig 4) ensures that knowledge disappears as the workforce leaves and is likely to be relearned at great expense in resources.

### Likely Structure in Fire Management Workforce

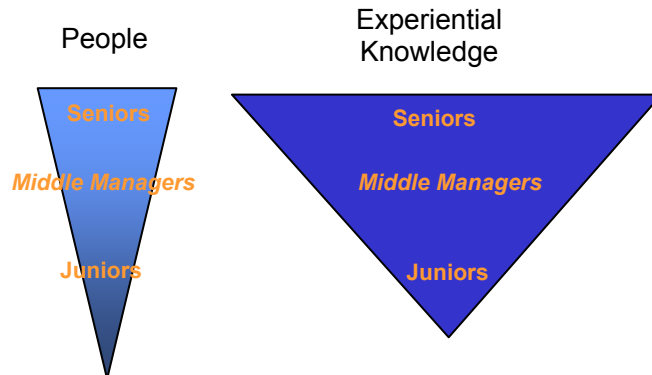


Fig 4

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The goal is ensure that the large amount of aggregated senior knowledge and experience is transferred from departing seniors' to mid-level and junior personnel (fig 5).

### Moving From Actual to Desired

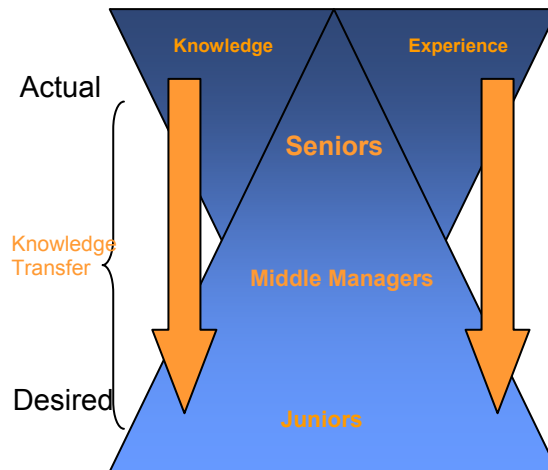


Fig 5

### What is Desired and Why?

This approach results in a shift (fig 6) from knowledge loss as the normal process (red line) to a consistent capture and reuse of knowledge (blue line) that ensures that the fire management profession is able to grow the leadership necessary for mission success – it becomes part of the way fire management does business.

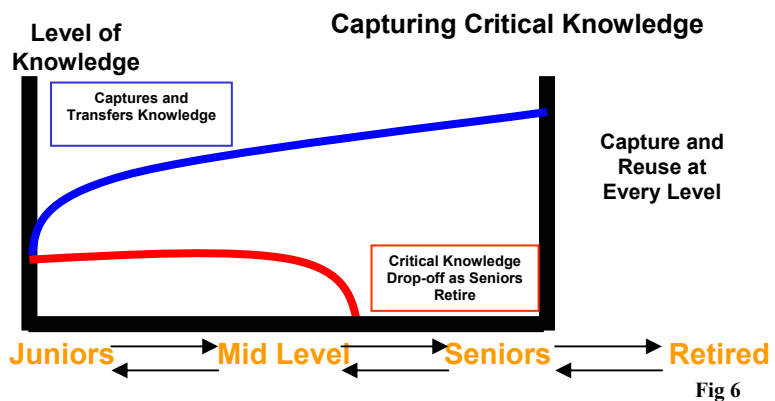


Fig 6

The retired workforce can and should be part of the knowledge process and should continue to be engaged to tap their critical experiential knowledge acquired over many years of government service. “Just because you leave the table, you don’t have to leave the conversation.

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## Answering the Critical Question(s)

SAIC would propose to develop a knowledge project designed to:

- Create a dialogue between the various levels of the fire management organization that enables the critical knowledge to surface for use at every level.
- Identify the practical needs of the next generation fire management incident manager and worker and harvest the current generation's experiential knowledge in those areas.
- Develop an archive of critical knowledge that can be exploited by all domains within the fire management profession.
- Establish a continuing dialogue with those that have retired to retain their critical experiences in key areas.

Our approach is not focused on technology or software. It is an approach based on the idea of not creating an encyclopedia of everything that everybody knows, but *keeping track of people who "know the recipe"* and nurturing the technology and culture that will get them talking and sharing.

This successful and proven SAIC process is described in the following section.

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# **Creating a Knowledge Enabled Organization**

## **The SAIC Approach**

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## Creating a Knowledge Enabled Organization

SAIC's commercial clients include 70 percent of Fortune's Top 100 delivering information technology and telecommunications as primary services. SAIC is using state-of-the-art technology to help commercial and government clients secure their data and conduct business. SAIC and its subsidiary Telcordia Technologies are converging voice, data and video to create Next Generation Networks.

SAIC's Knowledge Management practice is led by Kent Greenes, recognized by *Forbes* and *The Harvard Business Review* as a world leader in the field. SAIC has the experience and the expertise to support integration of knowledge management architectures in government and industry.

SAIC recognizes that within any organization, there are subject matter experts who can be facilitated to form networks and communities to share what they know. These Communities of Practice allow the creation, sharing, and reuse of the knowledge within a corporation, business, or Government agency. Knowledge management also provides a way to capture the expertise and experience that may be lost as personnel leave the work force. In a crisis, KM enables organizations to protect their human capital, manage effectively, and rebuild quickly. Knowledge management can be leveraged to prevent costly reinvention, reacquisition, or relearning of lessons. SAIC has extensive experience in helping customers in government and industry address each of these concerns.

## The SAIC Approach to Knowledge Management

SAIC's approach is based upon a proven knowledge management framework continuously enhanced through implementation with other commercial and government clients. This approach is distinct in several ways:

- SAIC devotes an equal amount of attention to (1) delivering specific, tangible, business-driven performance improvements and (2) embedding core KM practices and skills in the people impacted by the new practices.
- SAIC ensures that design, development, and implementation are *co-delivered with the client*, creating internal ownership of the outcomes.
- SAIC's KM approach meets people and teams 'where they are' in terms of culture, process and technology.
- SAIC integrates a common, simple set of core KM practices that are easily understood, supported, and performed on the job, resulting in an embedded, sustainable way of working.

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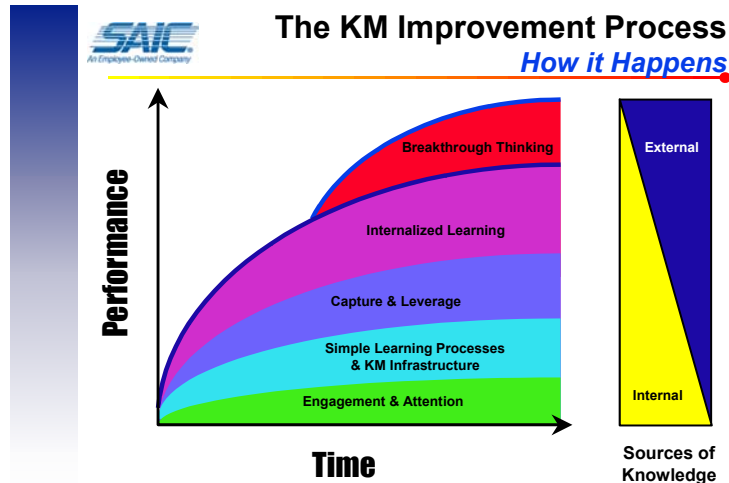
- SAIC leverages the existing investment in the organization’s technology base while weaving in new, scalable processes and enabling technologies at minimum risk within controlled pilot environments.

SAIC’s approach identifies business opportunities where KM could make a difference to current and planned performance. Upon project initiation, SAIC and the client agree on a basic approach. Then SAIC develops a customized, project-specific detailed performance plan for client approval and joint SAIC/client project execution.

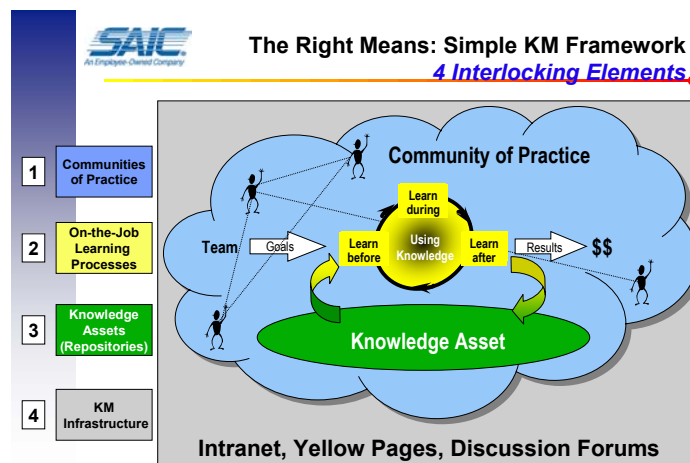
Each approved project proceeds through a set of facilitated processes for learning before, during, and after specific work activities. With SAIC coaching, the key learning resulting from these processes is applied by the client staff to improve their existing business and work processes on-the-job. The process tools to support learning are necessarily simple:

- “Learning before doing” is supported through the **Peer Assist** process which targets a specific challenge by importing knowledge from people outside the team, identifying possible approaches and new lines of inquiry, and promoting sharing of learning with each other through a facilitated meeting.
- A technique called **Action Reviews** aims to get people to “learn while doing” by answering four questions immediately after each activity: What was supposed to happen? What actually happened? Why are they different? What can we do about it? When people answer honestly, performance is dramatically improved as trust builds within the team.
- At the end of the project, a process called **Retrospect** encourages team members to look back at the total project to discover what went well and why, with a view to helping other teams repeat successes and avoid pitfalls -- “learning after doing”. The output of such a process provides content for a “knowledge asset” that ensures transferability of the learning throughout the organization.

In parallel with these learning sessions, SAIC performs interviews to elicit additional know-how from key knowledge sources within, and sometimes, outside, the client’s organization. SAIC always obtains client concurrence with the specific type, number and content of the interviews. Relevant good practices and lessons learned often are found among staff working in similar practice areas but in different locations. Local client staff involved in the project are coached and encouraged to take immediate advantage of this know-how and experience from outside their team, and to adapt and apply it to their work activities. The figure below illustrates how the application of the KM process and practices is used to improve performance over time.



Key learnings, experiences and good practices from these facilitated sessions and interviews are videotaped and transcribed, gathered, analyzed, and the learnings distilled by the team, and codified and packaged in the form of a reusable Knowledge Asset. This Knowledge Asset will become highly accessible and visible to others through the client's corporate Intranet. In the course of capturing this knowledge, SAIC facilitates the development of a Community of Practice (CoP), a cross-organizational group of people who share common skills and practices in the business processes being applied in the pilot. The initial members of this community are the practitioners interviewed in the processes mentioned above, along with the local client staff applying this knowledge on the job. This Community is coached and supported to take on the responsibility of gathering and analyzing, codifying and packaging new knowledge to keep the Knowledge Asset current to help ensure the transferability of their collective know-how throughout the client organization. The figure below illustrates how the Knowledge Management components fit together to deliver the performance goals of a specific business team.



SAIC has extensive experience in the private and public sector in developing and launching Communities of Practice (CoP). Communities of Practice are a fundamental component of the SAIC KM architecture: They allow for the integration of ideas and the sharing of knowledge

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across organizational boundaries. Properly organized, they become part of the fabric of the organization.

### **Perspective on SAIC's KM Consulting Practice**

While there are many companies that offer KM consulting and propose solutions, SAIC is not focused on explicit knowledge capture -- delivering an IT solution with a focus on technology. We are a world leader in integrated knowledge architectures that combine explicit knowledge access with the capture and reuse of *tacit* knowledge and the connection of the workforce together to share, reuse, and create new knowledge. The ability to distill and characterize tacit knowledge for use and reuse is both a skill and an art. It is only acquired through successful project experience

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**Some examples of our KM Teams' successful past performance include:**

## **OIL INDUSTRY**

### ***British Petroleum (BP) KM Projects***

SAIC initiated, designed, and delivered multiple knowledge management pilots and projects using our proven KM methodology. Results over a 2-year period included tangible, documented cost savings of over \$260 million, the internalization of KM competency in over 300 knowledge managers, and adoption of KM practices in 25 out of 100 Business Units. There currently are over 160 Communities of Practice operational in BP, and their Connect system is providing yellow pages capability across the corporation. Specific focus areas supported include:

- BP Refinery FCC Turnarounds
- BP Refining Technical Operations and Health, Safety, Environment and Quality (HSEQ)
- BP Retail Site Engineering and Construction
- BP New Market Entry
- BP Mergers and Acquisitions
- BP Restructuring
- BP Mobil Fuels Joint Venture
- BP Production Efficiency
- BP Drilling Learning Network.

The KM effort developed in BP under the leadership of Kent Greenes has been recognized in numerous books, magazines, and among KM practice leaders as a world-class knowledge management practice.

### ***PDVSA (National Oil Company of Venezuela)***

In an extensive 2-year KM program, SAIC and *Intesa*<sup>™</sup> led PDVSA in a number of KM-based cost savings and new value additions in production optimization initiatives.

Accomplishments include:

- Developed, planned and implemented the entire KM program
- Designed and built a KM infrastructure platform, supporting 16,000 users
- Implemented over 30 Communities of Practice
- Created multiple Knowledge Assets dealing with production optimization capturing Oil & Gas Business Knowledge Process Models
- Credited with over \$180 million savings over 2 years
- Credited with 6,900 BPD increase in production

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- Awarded Finalist status for IT projects at the 2000 6th Annual Lotus Beacon Awards for “Greatest Business Impact.”

***British Gas (BG) Well Engineering and Production Operation KM***

SAIC developed and facilitated the start-up of BG’s Well Engineering and Production Operations (WEPO) Community of Practice in 1Q2000. Not only did SAIC kick-start the formation of the Community, but we also facilitated the identification and start-up of several well engineering performance improvement projects for their international business. This community is thriving in BG, and has led to other start-ups in the geo-technical disciplines as well as their own formation of a corporate KM practice.

**INTERNATIONAL DEVELOPMENT AGENCIES**

***United Nations Development Program (UNDP) KM Strategy***

SAIC facilitated an on-line forum for the United Nations to tap the collective views of its global workforce for input into its effort to develop a KM strategy and implementation plan. SAIC’s facilitation focused on the UNDP as a learning organization and what is required to deliver performance through learning.

**DEPARTMENT OF DEFENSE**

***Project Exodus***

Project exodus is the largest current KM endeavor in the U.S. Government. Large numbers of senior civilian leaders in DoD will be retiring in the next five years; this is especially acute in the acquisition workforce. Critical “Know-how” and experience developed over 30 years and through three wars will leave with the retiring workforce. There is no formal mentoring process with the large number of anticipated retirements and the informal mentoring process is short-circuited with the large loss of senior personnel. Furthermore, historic hiring patterns have produced an asymmetry in the workforce; there are more senior personnel in DoD than there are junior and mid-levels.

In Project Exodus, a joint SAIC and DoD team led by the DoD Change Management Center (CMC), will identify the next generation of leadership and help transfer the current generation’s experiential knowledge in order to maximize DoD future organizational integrity. Project Exodus is a means to transfer domain expertise through a state-of-the-art knowledge transfer process on some of the Department’s thorniest problems. It is designed to assist DoD in managing impending change and the attrition of skills essential to the national defense.

***Knowledge Management System for Defense Acquisition University (DAU)***

SAIC developed and delivered a Knowledge Management System for the U.S. Department of Defense under the sponsorship of the Deputy Under Secretary of Defense (Systems Acquisition) and the Defense Acquisition University. SAIC worked with the DoD

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acquisition community, using subject matter experts who, as acquisition practitioners in the daily conduct of business, voluntarily formed their own networks and Web-based communities to share their knowledge, the “know-why” and “know-how” of acquisition. The globally distributed nature of the acquisition world makes it difficult to effectively and efficiently share learnings and better practices using existing methods and processes. The objectives of this project were:

- To achieve significant, measurable improvement in the ability of the acquisition workforce to apply contractual incentives in structuring and executing successful business relationships.
- To build an Internet/Intranet-based Knowledge Asset and facilitate a Community of Practice (CoP) that helps ensure the transferability of knowledge.
- To provide a foundation for a comprehensive KM practice within the Defense Acquisition University.

***Defense Threat Reduction Agency: Using Knowledge Management to Capture and Leverage Critical Operational Know-how in the Cooperative Threat Reduction (CTR) Costing Process***

SAIC is on contract to design and implement a knowledge architecture to support the unique demands of the costing teams supporting the Defense Threat Reduction Agency's (DTRA) Cooperative Threat Reduction (CTR) Program. Because of their unique mission and operating environment, normal project costing processes are challenged to simultaneously satisfy the program management team’s need for standardized information with the instant fidelity necessary to make real-time decisions.

There is increased emphasis by DTRA to embed the costing function and it’s estimating and review processes into the overall acquisition planning process. This will allow for project-specific support and analysis. Additionally, it will provide important internal and external review and oversight functions, which will improve confidence in the CTR's ability to accurately determine resource requirements and its ability to justify and defend project funding in the PPBS process. SAIC is also developing a unique database management system and costing interface tool to support the costing estimates which will be embedded in the Costing Knowledge Asset. The project objectives are:

- Identify key learnings about the cost estimating and subsequent decision making process so they can be applied to future costing activities
- Improve the efficiency and accuracy of each new costing activity
- Build an internet/intranet based Knowledge Asset linked through an integrated knowledge architecture
- Facilitate a Community of Practice (CoP) that updates and ensures the transferability of costing knowledge
- Provide a foundation for a comprehensive KM system within the DTRA/CTR

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*Air Force Flight Test Center (AFFTC) Reengineering, Edwards AFB, CA*

SAIC is using KM tools and techniques to assist the Air Force Flight Test Center in reengineering its endeavors. Utilizing Knowledge Management techniques such as Peer Assist, Action Reviews and Retrospects, SAIC is facilitating knowledge transfer by teaching Test Center staff how to perform these tasks. SAIC also has briefed KM concepts to AFFTC Senior Leaders and is helping develop a Community of Practice for AFFTC Information Managers called "IM Connect."

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## SAIC Corporate Overview

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## SAIC Corporate Overview

### Continued growth is a measure of successful past performance

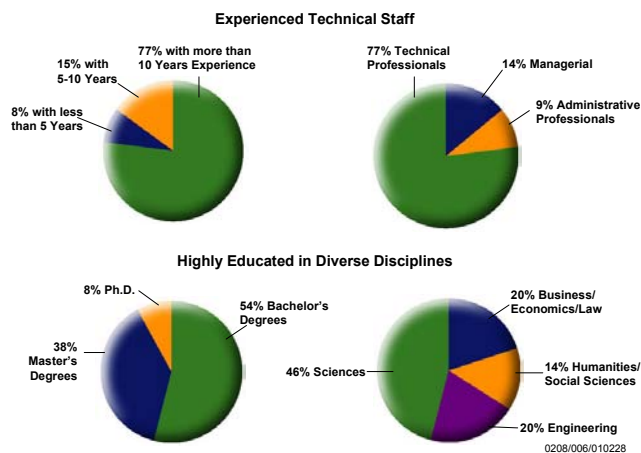
Founded by Dr. J.R. Beyster and a small group of scientists in 1969, SAIC, a leading systems integrator, ranks as the largest employee-owned research and engineering firm in the nation.

SAIC has grown to be a Fortune 500 company. From its inception, SAIC has been committed to making significant contributions to programs of national and global importance. SAIC also maintains its strong commitment to employee ownership, making sure that our family of employee-owners maintains a stake in the company's success. Our corporate culture is based on the value of the individual and rewards performance to motivate employees to provide quality of service to our customers.

SAIC and its subsidiaries have more than 41,000 employees with offices in over 150 locations worldwide. Revenues for SAIC's fiscal year, which ended January 21, 2002, were nearly \$5.9 billion, accounting for a gain of 6.6 percent over the previous year's \$5.5 billion. Net earnings were \$2.059 billion, a 232 percent increase over last year's net of \$620 million. Over 70 percent of our revenues are related to information technology and telecommunications. The past fiscal year represents the 32nd year of continued revenue and earnings growth, solidifying SAIC's position as one of the most successful employee-owned companies in the United States.

### Great depth in talent and expertise

The depth and breadth of talent within the company is impressive. The figure below illustrates the experience and background of SAIC's employee-owner staff.



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