THE INFORMATION TECHNOLOGY WORKFORCE: TRENDS AND IMPLICATIONS 2005-2008[1]

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Executive Summary

In 2005, a team of researchers sponsored by the Society for Information Management Advocacy program interviewed senior executives in Information Technology (IT) departments about their current and future workforce trends and skill requirements. This paper presents the results of that research: more organizations are increasing their in-house IT staffs than are decreasing them. IT executives say it is critical to own business and project management skills, and they seek these skills in their mid-level hires. The use of offshore workers is increasing, primarily through domestically headquartered providers. Technical skills are more likely to be externally sourced, but they are also sought in entry-level hires. The study points out the challenge of transforming technically skilled entry-level hires into mid-level IT managers with strong business and project management skills, given current IT recruiting and hiring trends. It also highlights the need for practitioner-academic collaboration to ensure appropriate development of IT professionals throughout their careers.

WHY STUDY THE IT WORKFORCE?[2]

Global IT sourcing, baby-boomer retirements, and low IT enrollments in universities are prompting changes in the IT skills available to and desired by IT departments. The resulting potential for a mismatch of supply and demand is a concern for business executives and academics alike.[3]

To address these concerns, the Society for Information Management (SIM) sponsored research on the current and future needs for IT skills in IT departments. A team of over 20 U.S. and European investigators interviewed senior IT executives between May and October 2005. See Appendix A for a brief description of the research methodology. This paper reports five key results from this study.[4] Overall, our results indicate that most IT departments are building up the quality and quantity of their IT workforces, not downsizing them.

PROFILE OF PARTICIPANTS AND ORGANIZATIONS

In this report, we present findings based on data gathered from 81 IT executives in 77 IT departments from a broad spectrum of industries but excluding firms that produce IT products or services.[5] Most respondents were from U.S. firms, and about half of these firms had global locations. Most participants (61%) were Chief Information Officers (CIOs) or Senior Vice Presidents (VPs).

Organizations in the Fortune 500[6] size range (those with revenues greater than US$ 3B) accounted for nearly half (46%) of our sample. Thus, our sample is more skewed towards Fortune 500 organizations than one would find in the population of organizations in the U.S.[7] Small and medium-size enterprises (SMEs) (those with revenues less than US$ 500,000) made up just over a quarter (28%) of our sample. The remaining organizations (31%) had revenues under US$ 3 billion and over US$ 500 million. We refer to these as "Large" companies, as distinct from Fortune 500 companies. SMEs are often less differentiated than much larger organizations in terms of jobs, roles, and titles, and they often operate more informally than larger organizations. To help MISQE readers relate our results to their own organizations, we indicate below where size accounted for differences in findings.[8]

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5   We excluded from our analysis data from IT product and service industries because we believe human resource strategies at these firms differ from those of the typical client IT department. Industry representation in our sample included: 25% heavy industry (including mining, utilities, and manufacturing); 19% financial services and insurance; 21% professional services; 45% other services (healthcare, education, government, retail, entertainment, transportation, and logistics).

6   The term "Fortune 500" refers to the 500 largest U.S. manufacturing firms and the 500 largest service firms as defined by *Fortune* magazine. We use the term to include any organization in our sample with revenues over US$ 3 billion, whether they are listed on the Fortune 500 or not. Hereafter we will refer to these very large firms as "Fortune 500" firms. We categorized non-profit organizations based on their total expenses.

7   The United States Small Business Administration reports that over 99% of U.S. businesses have less than 500 employees. http://www.sba.gov/advo/research/data.html. Worldwide, the definition of "small business" varies, based on revenue and number of employees; however the percentage of the economy that small organizations represent is a large majority of businesses in most countries.

8   Industry did not account for any meaningful differences in our results. There are three possible explanations for this unexpected result: (1) We excluded IT firms from the analysis; (2) Our sample size may be too small to tease out significant differences where they actually exist; (3) Industry differences may be confounded with size differences (e.g., financial service firms are typically very large, while "other services" organizations are typically smaller—what shows up as size differences may actually be industry differences).

Finding #1: Most IT departments will add staff by 2008.

In 2001, the demand for IT workers fueled by Y2K ended, the dot-com bubble burst, a U.S. recession began, and organizations began reducing their internal IT staffing levels. Recent reports, however, suggest that the pendulum is swinging the other way. This study's results confirm those reports.

The organizations we studied showed a continuing trend towards modest increases in in-house IT staffs at most organizations. A few organizations anticipated large decreases in their in-house IT staffs, due to major outsourcing or large overall business decline, but most "Large" and Fortune 500 organizations expect to moderately increase staffing levels by 2008. Most SMEs anticipate dramatic increases in hiring. On balance, IT hiring will be stable in the short term.

Finding #2: The IT skill mix is shifting from technical to project management and business skills.

We asked respondents what skills were important to maintain in house today, what skills they thought would become irrelevant or less important by 2008, and what skills would become more important by 2008. We used a list of IT skills in five categories:

- Technical
- Project management
- Business domain
- Sourcing
- IT administration

The complete list of skills appears in Appendix B.

Our results confirm a shift in the mission of the information system function from delivering technology-based solutions to *managing the process* of delivering solutions. Client-facing capabilities are critical to this mission as are business and project management skills. (See Figure 1.) Organizations of all sizes described virtually this same picture.

Finding #3: External sourcing, especially of offshore staff employed by domestic third party providers (3PPs), will increase by 2008.

About three-fourths of our respondents currently source some skills from 3PPs or plan to do so by 2008. Among these firms, the number of full-time employees (FTEs) sourced from 3PPs is expected to go up by about half by 2008. (See Figure 2.) Among firms that sourced IT, the median firm outsourced

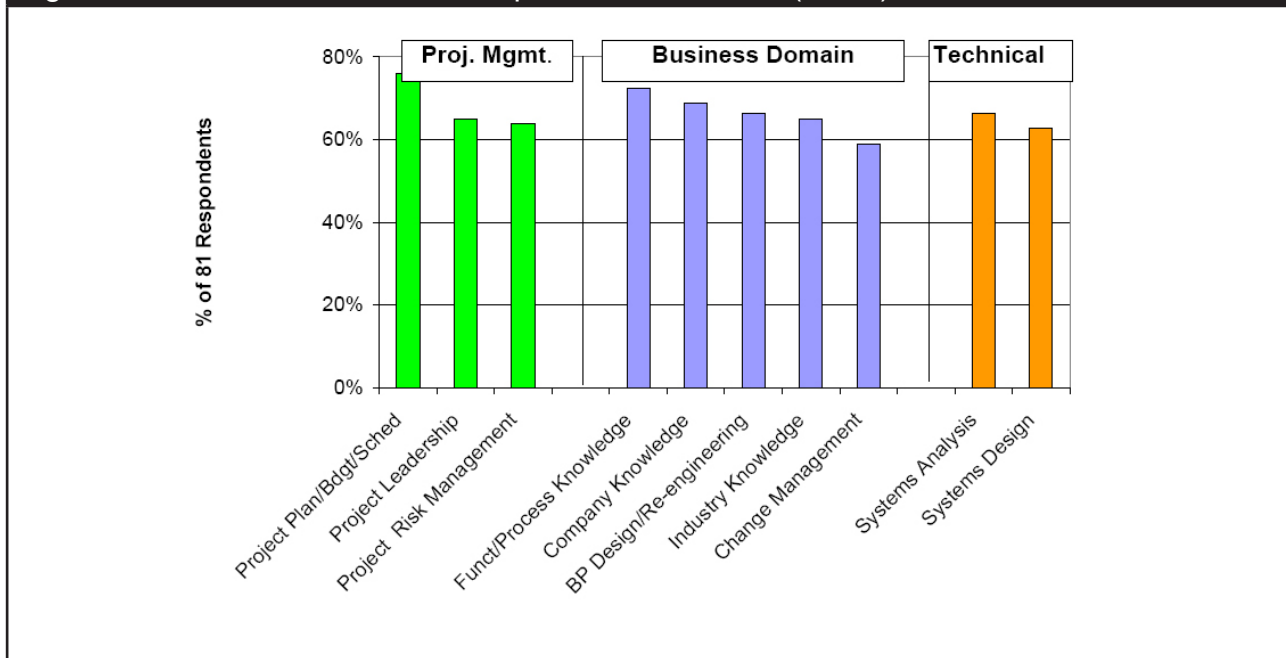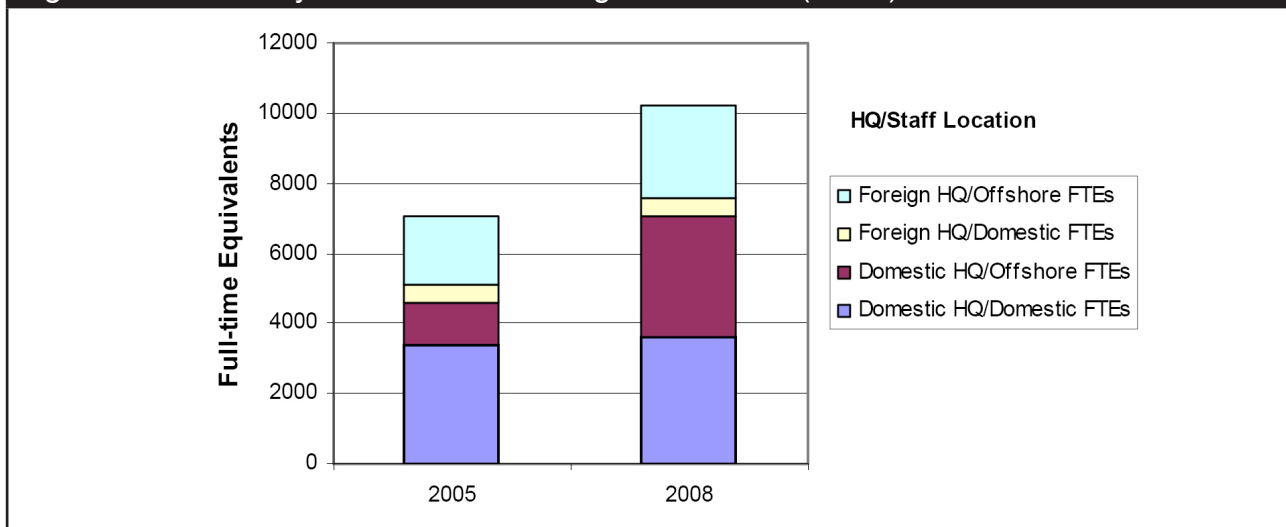Figure 1: Skills Most Critical to Keep In House in 2008 (N=81)

Figure 2: Third-Party Provider FTE Change 2005-2008 (N=57)

13% of its total workforce in 2005 (where "total" includes in-house, contractors, and externally sourced FTEs); in 2008 the median firm expects to source 17% of its total workforce. The bulk of this increase is in the engagement of *domestically* headquartered 3PPs to provide *offshore* employees. The increase is almost totally accounted for by Fortune 500 firms.[9] In contrast, SMEs have no plans to use any offshore FTEs, regardless of whether they are employed by foreign or domestically headquartered 3PPs.

Finding #4: Organizations use 3PPs to obtain technical skills—mainly back office operations skills and application-related skills.

The organizations we interviewed look to 3PPs for technical skills, in part to enable flexible staffing. The skills most commonly sourced externally by IT departments are all technical skills with programming the most frequently sourced skill. (See Figure 3.) The only two technical skills that CIOs considered critical to keep in house, systems design and systems analysis, are also sourced externally, probably to supplement or

9   Headquarters of the third-party provider is "foreign" if it is not in the same country as the respondent client organization and "domestic" if it is in the same country. "Offshore" FTEs of the third-party provider are employed in and probably natives of a country different from the client organization. "Offshore" FTEs may occasionally work onshore, but because their employment home is in another country, we classify them as "offshore" FTEs for the purpose of this research. "Domestic" FTEs are workers who are employed in and probably natives of the same country as the client organization.

Figure 3: Top Skills Sourced from Third-Party Providers 2005 (N=81)
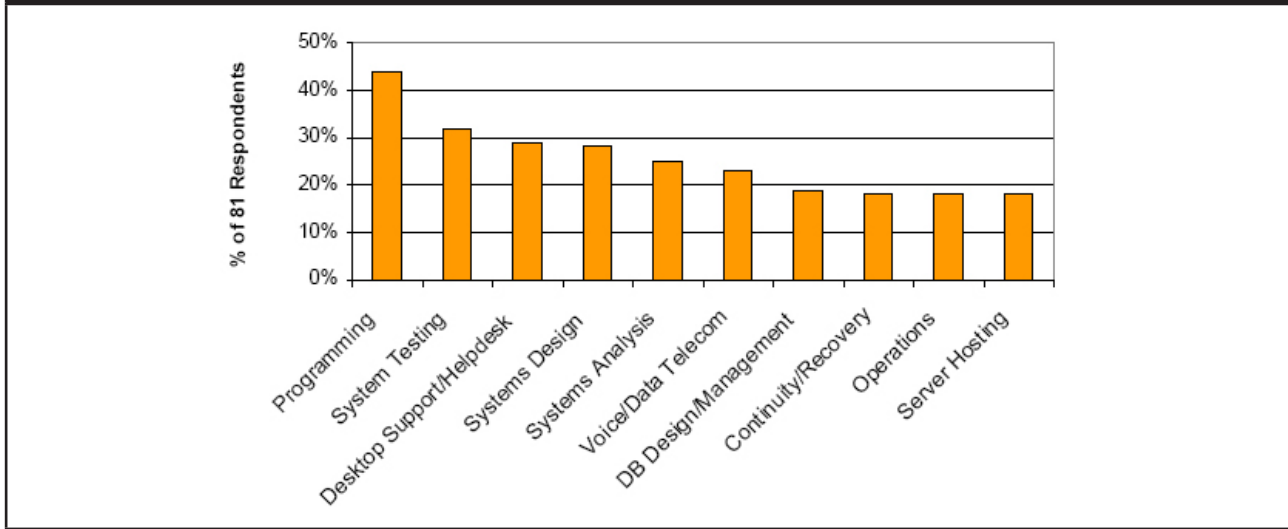
complement internal skills. Some organizations have difficulty finding candidates with systems analysis and systems design skills.

Finding #5: A technical foundation is still important for entry-level IT workers.

The data paints a picture of an organization of IT professionals who know the industry and business and who can work well with clients and colleagues to solve business problems. Mid-level candidates whose skills fit this picture are highly prized. However, we observed a marked divergence between the skills IT departments seek to keep in house and the skills they seek in their entry-level hires. The only points of overlap are systems analysis, systems design, and industry knowledge. Moreover, seven of the skills sought in entry-level hires are the technical skills that are most frequently sourced from 3PPs. This raises questions about how organizations plan to groom staff as they move through the pipeline.

All but two of the skills our respondents seek in their entry-level hires are technical skills. (See Figure 4.) Organizations filling programmer positions emphasized the traditional technical skills—programming, analysis, database, and operating systems—while those seeking to fill analyst positions placed more emphasis on architecture, communication skills, and skills related to managing projects. The desire for industry knowledge reinforces the importance of business domain skills even in entry-level candidates.

When asked what was missing from entry-level skill candidates, most respondents said "communication skills." Entry-level candidates with good communication skills are likely to be of high value to employers.

Technical degrees are far more highly valued in entry-level candidates than they are in mid-level candidates. Organizations seeking to hire programmers have a slight preference for candidates with undergraduate computer science or electrical engineering degrees. Those seeking to fill entry-level positions requiring systems analysis skills tended to look more frequently at candidates with undergraduate business, MS/IS, or MBA degrees. Those filling help-desk positions are more open to candidates with associate degrees as well as non-business, non-computer science degrees.

IMPLICATIONS FOR THE FUTURE IT WORKFORCE

This research provides information about trends in the IT workforce. In the past, technically skilled entry-level hires transformed themselves into mid-level managers with strong business and project management skills through the experiences they gained over many years and many projects. Organizations need new means for effecting this change more rapidly than in the past, if the need for business domain and project management skills is as critical as they state. This will require changes in how organizations and individuals envision career paths, how organizations develop young workers, and what curricula universities offer.

Figure 4: Top Desired Entry-Level Skills (N=48)
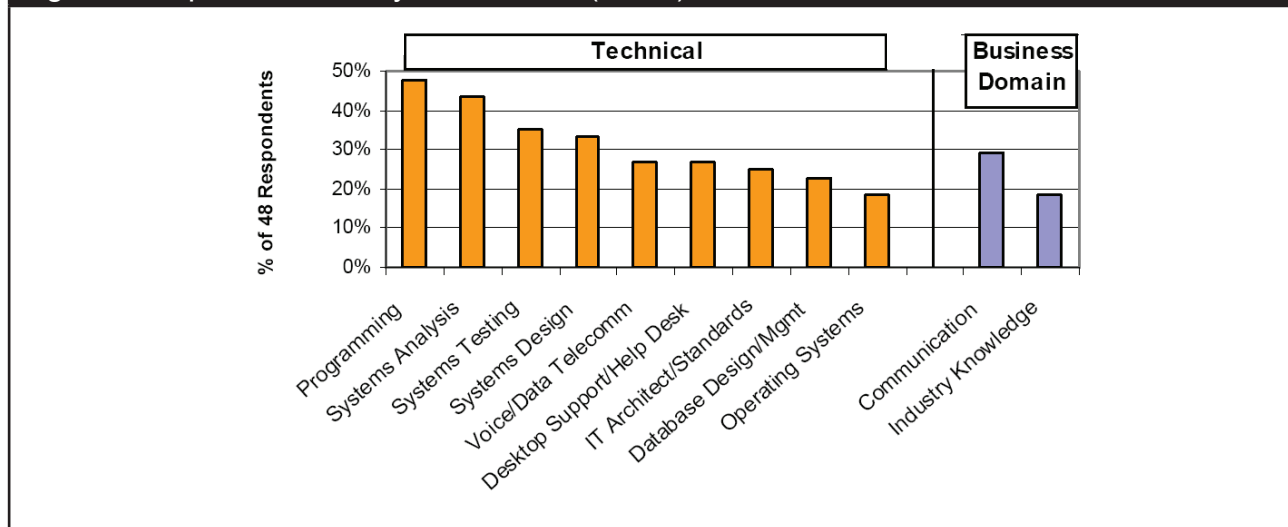
More career paths will include 3PP experience.

Like their clients, IT service providers require not only technical skills but skills related to managing projects and sufficient business skills to insure that they deliver value to their clients.[10] As the market for IT services matures and grows, it is likely that future IT career paths will involve more movement between IT service providers and client organizations than we have seen in the past. We have observed that the younger generation of workers expects to move from one organization to another more than their predecessors did. Consequently, CIOs and their human resource professionals need to adjust their human resource practices to leverage this mobility, especially as it may produce well-rounded IT professionals.

Externally sourcing entry-level work has unintended impacts.

Our research showed a trend toward increased use of FTEs located offshore (except among SMEs). CIOs are under pressure from senior management and shareholders to reduce costs. While externally sourcing and offshoring entry-level jobs may reduce costs, it also eliminates opportunities for entry-level hires to develop important project and business-related skills. As a result, CIOs must find new approaches to developing these critical skills. For example, relationship managers might take a more proactive role in developing entry-level technical employees. Some CIOs may seek to groom people from non-IT areas for mid-management IT roles. It may be easier for individuals with business skills

to pick up IT knowledge than the other way around. Other approaches include using externally sourced project managers to train in-house junior staff and exposing entry-level workers to project management experiences much earlier in their careers. These can help them accumulate valuable knowledge and compensate for external sourcing of technical IT roles.

If CIOs do not proactively seek new ways to develop entry-level workers, CIOs will be faced with some unappealing alternatives. They may be forced to rely even more heavily on outsourcing, feeding a vicious cycle of more and more outsourcing. Their project managers may not have enough technical skills to question and supervise 3PP-provided developers with any credibility. Or, CIOs may find themselves competing for very scarce mid-level managers.

Some IT departments have an enduring demand for mainframe skills.

Some organizations continue to depend on mainframes and to include them in their enterprise architectures. Unfortunately, few organizations or universities have fed the pipeline for mainframe skills. Younger faculty at universities are not prepared to teach these skills. Thus, CIOs who need these skills must cultivate them in younger workers through an internal development program, source them from 3PPs, and/or transition their mainframe and legacy systems to newer technology. For some industries, new technologies are not an option, due to the nature and volume of their transactions. Moreover, for security, contract, or privacy reasons, some mainframe applications cannot be sent offshore. A few universities, with support from IBM, are considering a reintroduction of mainframe skills into their curricula. This is a serious concern for

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10   The research team has begun a study on the skills sought by IT industry product and service firms.

some CIOs. This problem requires creative solutions from both faculty and practitioners.

All technical jobs are not moving offshore.

This study does not lend credence to the threat that all technical jobs will move offshore. The evidence shows that some client organizations turn to third-party providers for some technical IT skills. But most IT departments do not. Those that do, often source the tactical or lowest level of a technical skill. Many use sourcing to supplement their own internal technical skills. Furthermore, those who source technical skills continue to require a base level of technical skills in house to select and manage providers and to help reduce friction and misunderstandings during engagements.

IT workforce trends suggest a need to rethink curricula and training.

The trend towards offshoring is blamed for lowered interest among young people in IT-related careers. Low IT enrollments and the impending retirement of baby boomers are just two compelling reasons to increase IT-related program marketing and outreach efforts to young people. Given the lead-time needed to attract, enroll, and graduate students, immediate action is needed to promote the alignment of MIS/IT/CS programs with client organizations' expressed desire for business and project management skills. IT executives can participate in the alignment process (and many already do) by joining advisory councils, influencing curriculum development, offering internships to IT majors, and engaging in outreach programs to middle and high school students. However, educational institutions are notoriously slow to change. Thus, in addition to these more traditional efforts to encourage interest in IT, academics and practitioners need to jointly define how, when, and where future IT professionals will develop the range of skills they need to contribute to organizational needs at all levels and to enjoy satisfying careers.

DEVELOPING FUTURE IT PROFESSIONALS

This study argues strongly for IT professionals with a balance of technical, business, and project management skills. This ideal blend is not found in the typical freshly minted undergraduate. In the past, this blend could be developed over time with the right opportunities and experiences. Today, organizations

want individuals to have this profile of skills and experience earlier, and ideally, as new graduates. We hope that practitioners and academics will collaborate to define new IT career paths, new development programs for IT workers, and new IT degree and certification programs to better meet the needs of the changing IT workforce.

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APPENDIX A: RESEARCH METHODOLOGY

Participants in this study were primarily solicited from SIM chapters through presentations at chapter meetings, e-mails to chapter members, and announcements in *SIM News.* Researchers also approached contacts that were active in placement at their universities or otherwise known to the researchers as authoritative about hiring practices in their organizations. A subteam developed a structured interview guide through a collaborative process involving extensive pilot testing at multiple sites. Each respondent was interviewed by one or two researchers, usually by phone and occasionally in person. Each interview lasted approximately one hour. To supplement the data collected via the interview guide, we captured explanations and background stories in a brief summary of each interview These summaries were very useful in interpreting quantitative results. Another subteam analyzed the data and produced a white paper, "The Information Technology Workforce: Trends and Implications 2005-2008," which is available to SIM members at www.simnet.org. Others may obtain a copy by sending an e-mail to kate. kaiser@mu.edu. This paper draws on the data in that report. In responding to questions about workforce skills, IT executives typically chose from the list of skills in Appendix B, which was assembled by the research team.

APPENDIX B: SKILL CATEGORIES

TECHNICAL
- Systems Analysis
- Systems Design
- Programming
- System Testing
- Database Design/Management
- IT Architecture/Standards
- Voice/Data Telecommunications
- Operating Systems
- Server Hosting
- Security
- Mainframe/Legacy
- Operations
- Continuity/Disaster Recovery
- Desktop Support/Help Desk

PROJECT MANAGEMENT
- Project Planning, Budgeting, and Scheduling
- Project Risk Management
- Negotiation
- Project Leadership
- User Relationship Management
- Working with Virtual Teams
- Working Globally
- Capability Maturity Model Utilization

BUSINESS DOMAIN
- Industry Knowledge
- Company-specific Knowledge
- Functional Area Process Knowledge
- Business Process Design and Reengineering
- Change Management/Organizational Readiness
- Managing Stakeholder Expectations
- Communication

SOURCING
- Sourcing Strategy
- Third-party Provider Selection
- Contracting and Legal
- Managing Third-Party Providers

IT ADMINISTRATION
- Financial Management
- Internal IT HR Management
- IT Governance