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## IT Workforce Trends: Implications for Curriculum and Hiring

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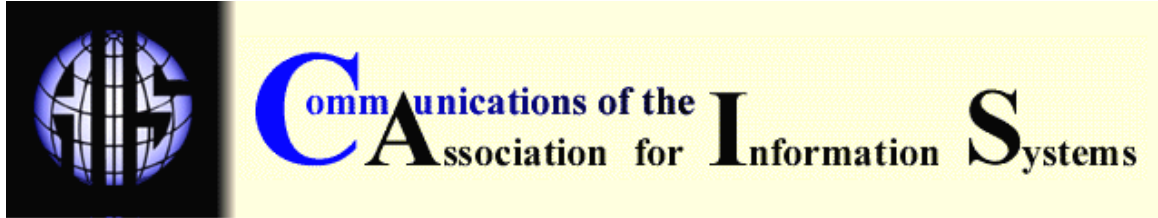
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## IT WORKFORCE TRENDS: IMPLICATIONS FOR CURRICULUM AND HIRING

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### ABSTRACT

At the 2007 Americas Conference on Information Systems (AMCIS), panelists discussed a continuing research project about the current IT workforce and future trends, presenting the latest results of an international Web-based survey. The project is sponsored by the Society for Information Management (SIM) International Advocacy Program and consists of two phases. The initial phase was a study of workforce trends in IT client companies and was completed in 2006. IT executives from client firms say it is critical to own business and project management capabilities, and they especially value them in their mid-level hires. Technical capabilities are more likely to be externally sourced, but they are also sought in entry-level hires.

The second phase is a study of trends in service provider companies and is ongoing. Our preliminary results indicate that provider firms also value project management and business domain capabilities over technical capabilities. In the panel, we compared the Phase 2 (provider) results to the Phase 1 results from client organizations and discussed the implications of the data for curriculum design, hiring and training practices.

**Keywords:** IT capabilities, IT curriculum, outsourcing

### I. INTRODUCTION

Information technology (IT) management is under increasing pressure to find the resources needed to comply with business and government demands for IT services. At the 2007 Americas Conference on Information Systems (AMCIS), a panel of researchers discussed an ongoing research project sponsored by the Society for Information Management (SIM) International Advocacy Program that investigated the current state of the IT workforce and identified future trends that may affect the supply and demand of IT resources. The research study was divided into two phases; the initial phase was a study of workforce trends in IT client companies and was completed in 2006, and the second phase is a study of trends in service provider companies and is still ongoing.

The panel discussion opened with each panelist introducing an aspect of the research, and then the discussion was opened to the 50 or so attendees for questions and answers. The session evolved into a lively discussion between the panelists and the attendees.

This paper is organized in the same order of the panel presentation, with a brief summary of the project, a comparison of the results of the two phases of the project, the implications for IT curriculum and hiring, and a summary of the discussion. A representative set of audience questions is included with the answers from the panelists.

## II. SUMMARY OF PROJECT OBJECTIVES

Global IT sourcing, baby-boomer retirements, and low IT enrollments in universities are prompting changes in the IT capabilities 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. To address these concerns, the Society for Information Management (SIM) is sponsoring research on the current and future needs for IT capabilities. The project is being carried out in two phases, focusing on client firms initially and then on provider firms.

Key questions asked of top level managers in both phases of the research were: 1) what capabilities are important to maintain in-house today (2005 in Phase 1, 2006/7 in Phase 2); 2) what capabilities would become irrelevant or otherwise go away by 2008 (2009 in Phase 2); and 3) what capabilities would become more important by 2008 (2009 in Phase 2). The IT capabilities were organized into five categories:

1. Technical
2. Project Management
3. Business Domain
4. Sourcing
5. IT Administration

## III. COMPARISON OF PHASE 1 AND PHASE 2 RESULTS

The Phase 1 findings were 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 [Zwieg et al. 2006]. We refer to the Phase 1 companies as *client firms* to distinguish them from firms in the IT industry itself. Most Phase 1 respondents were from U.S. firms, although about half these firms had operations in other parts of the globe (see Table 1). Most participants (61 percent) were CIOs or Senior VPs.

Phase 1 results<sup>1</sup> confirm a shift in the mission of the typical internal information system function from delivering technology-based solutions to managing the process of delivering solutions for their organizations. Client-facing capabilities are critical to this mission as are business and project management capabilities [Zwieg et al. 2006; Abraham et al. 2006].

In Phase 2, more than 140 executives from IT service provider firms, firms that produce IT products or services, have responded so far to a Web-based survey. We refer to these companies as *provider firms*. As noted earlier, we asked respondents to rate the capabilities from the same five categories we used in Phase 1.

Our preliminary<sup>1</sup> results indicate that provider firms, like client firms, rate business and project management capabilities as more critical than technical capabilities (see Figure 1). Specifically, provider firms value project management capabilities, such as project leadership and user relationship management, more highly than business domain capabilities such as functional

<sup>1</sup> All results for Phase 2 must be considered preliminary, as data is still being collected and verified.

knowledge. Client firms, in contrast, rated business capabilities somewhat higher [for comparable client firm results, please see Abraham et al. 2006].

Table 1. Phase 1 (client) Sample Firms (N=77)

Industry	% of Sample
Professional Services	21%
Financial Services	21%
Heavy Industry	26%
Other Services	33%
Revenue	
Fortune 500+ (over \$3 billion)	41%
Large (\$500 million – \$3 billion)	22%
SME (less than \$500million)	37%

Provider Critical Capabilities 2006

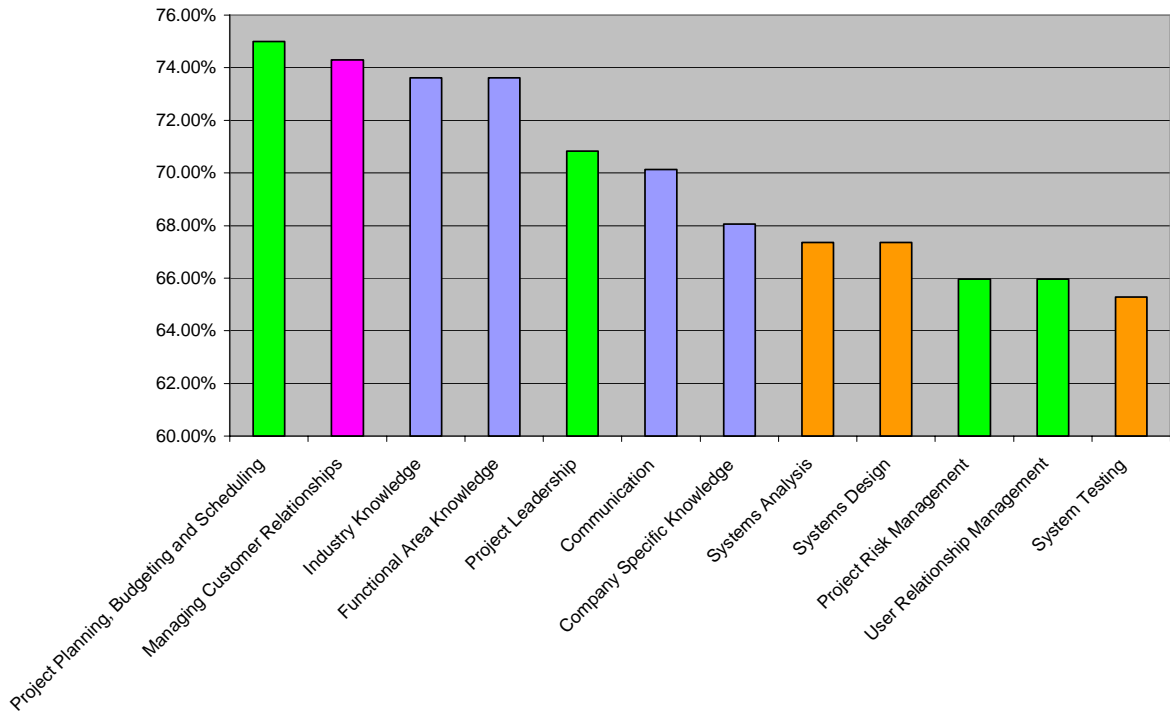


Figure 1. Provider Critical Capabilities 2006

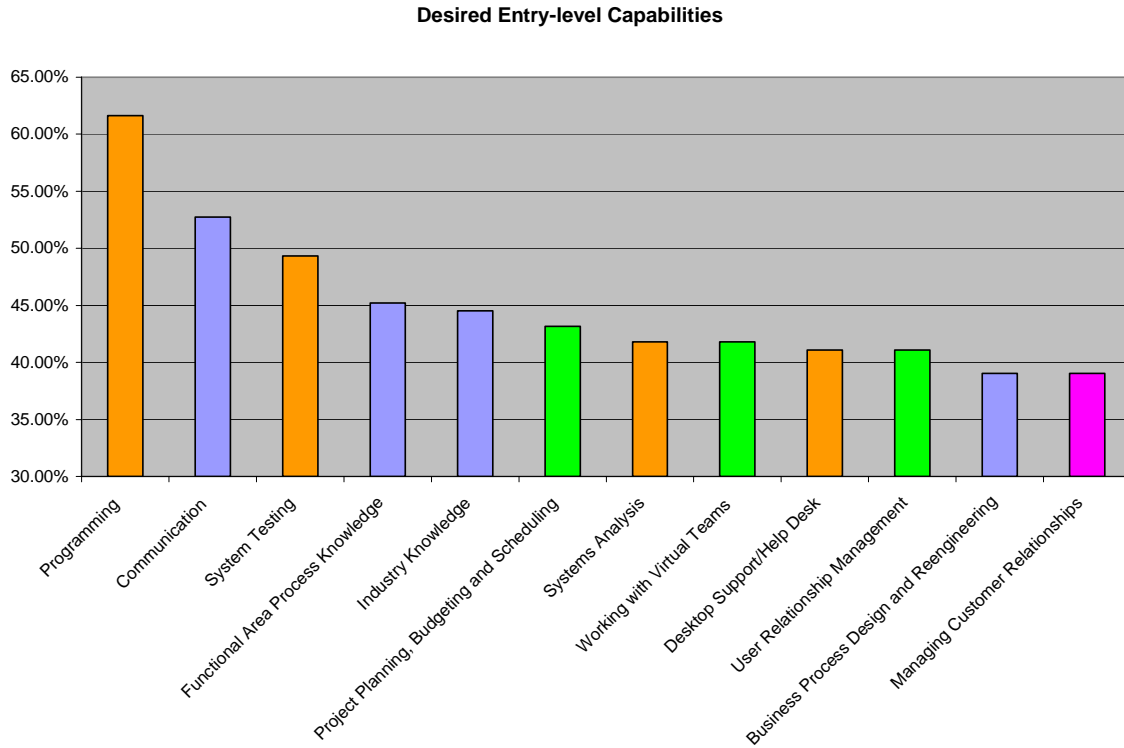


Figure 2. Provider Entry-Level Capabilities Desired

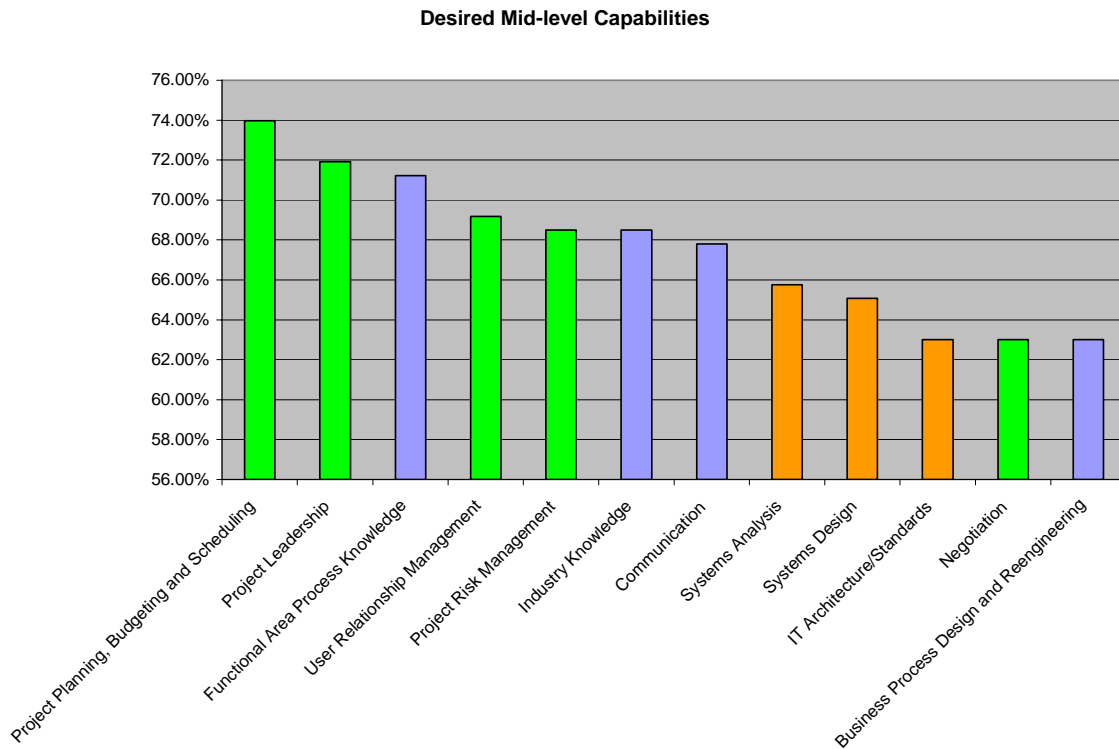


Figure 3. Provider Mid-Level Capabilities Desired

For their entry-level new hires, client firms ranked technical capabilities, such as programming and systems analysis, as the most important. Somewhat surprisingly, provider firms listed communication as a top capability for entry-level hires (see Figure 2). Moreover, while client firms listed technical capabilities as four out of their top five capabilities desired in new hires, provider firms included capabilities from business, project management and technical categories in their top five.

For mid-level hires, the capability desires of both client and provider firms are very similar. Like client firms, provider firms (see Figure 3) ranked the project management capabilities of project planning, project leadership and user relationship management as their top three capabilities. Both clients and providers ranked business domain capabilities as the next most important capabilities. In both client and provider firms, the only technical capabilities listed in the top ten for mid-level hires were systems analysis and systems design. Finally, provider respondents listed several emerging capabilities and skills, beyond those in the capability categories we provided, which are reported here in Table 2.

Table 2. "Other" Emerging Capabilities (e.g., not in the lists provided)

Technical	Business	Project Management
Business Intelligence	Leadership	Program Management
CRM/ERP	Productivity	PMO
RFID		Agile Project Management
Wireless		Supply Chain Outsourcing
Enterprise Search Engines		Conflict Management
System Integration		
Linux/Open source		
Capacity Planning		
Agile Processes		
Virtualization		
Service Oriented Architecture		

#### IV. IMPLICATIONS FOR IT CURRICULUM AND HIRING

The marketplace - that is, both client firms and provider firms - is demanding a new pattern of capabilities in entry and mid-level hires. While technical capabilities continue to be valuable as a foundation for the development of more highly valued IT capabilities, there is an increasing need for a better foundation for the development of client-facing capabilities, such as project management and business domain capabilities (e.g., communication). This new pattern should be recognized by educational institutions, and adjustments must be made in the curriculum of computer science and information technology programs to incorporate related course work and, more importantly, *practical* experience for undergraduate students.

In our discussion of our Phase 1 results in the *Communications of AIS* [Abraham et al. 2006], we called for a review of existing educational programs with an eye toward providing more content on the business-context driven approach that client organizations are demanding. Phase 2 supports those recommendations by showing the same demand exists in the service provider organizations.

Specifically, the following approaches were recommended and should continue to be considered:

- Adjust the IT curriculum to increase programs delivering capabilities that the marketplace demands, by incorporating business applications of technical capabilities.
- Provide meaningful practical experience for students through internships
- Help students gain a foundation for developing desirable client-facing, business domain capabilities in the real world in one or more of the following ways:
  - Inter-disciplinary course integration
  - Global experiences
  - Faculty internships to allow faculty to stay in touch with business needs
  - Better marketing
  - Cooperation with government and industry

With respect to hiring, Phase 2 highlights some unique aspects of service provider capability desires including:

- More balanced capabilities at the entry level
- More project management capabilities
- Emerging capabilities include working globally and with virtual teams

A particularly interesting aspect of our Phase 2 results is the expressed desire of service providers for even *more* balance (than clients) in the capabilities of entry-level hires, in terms of seeking a combination of technical, project management and business domain capabilities, rather than mainly technical capabilities. Some of the reasons that may be behind these differences will be discussed in a review of the audience questions and comments.

The critical capabilities for hiring at the mid-level are almost identical for both clients and service providers. (Mid-level positions are those that require at least five years of experience.) Competition for competent mid-level employees should be fierce.

The similarity between what clients and service providers are considering critical is evident in our preliminary data. This raises some interesting questions about the potential mismatch that could occur, if clients choose to source capabilities in which service providers may no longer be building expertise (e.g., programming) or may be outsourcing the expertise to other service providers.

## V. QUESTIONS AND COMMENTS FROM THE AUDIENCE

The attendees for this session contributed some interesting comments and raised some important questions about the results.

*Why is the programming capability critical to have in entry-level hires if it's going to be sourced?*

As part of the interviews associated with Phase 1, the research team probed this question and determined that the senior-level executives being interviewed had the strong belief that learning programming as part of the undergraduate program provided a fundamental grounding in analysis and problem solving that they viewed as valuable. Second, the logical career path for entry-level hires is toward project management, where they would be managing programming, and thus they should have a basic understanding of the task in order to do that well. Finally, because most of the respondents studied programming in their undergraduate programs, they may feel comfortable requiring this and/or evaluating programming capabilities in an entry-level candidate.

*Why is CMM capability declining in importance in service providers?*

This result from Phase 2 suggests that service providers are finding their CMM levels are becoming less important. This is probably because their client base has grown and future clients have more ways to evaluate the service provider based on their body of work rather than their certifications. In addition, most client firms do not have CMM levels that are anywhere near the

service provider levels (based on our Phase 1 results). As a result, the providers may be finding they do not need the highest levels of CMM to get their work done effectively.

*Are providers sourcing?*

This was not a direct question in the survey; however, from the researchers' work with provider firms we know that they are increasing their sourcing in order to remain cost-effective for their clients. This aspect of subcontracting may also be part of why programming is a declining capability in both the Phase 1 and Phase 2 results – as clients source programming work from service providers, service providers source it from other providers, while they build up other, more valuable capabilities and other aspects of their business.

A follow-up to this question suggested that perhaps moving away from basic programming was a "wish list" for providers. This is an interesting interpretation, especially in view of the comments from top executives of the largest providers in India that they are moving their future business to increasing managerial-level services. Another way of saying this is that the experienced providers are "moving up the food chain" as they gain expertise and client trust.

*Why are clients looking for entry level technical capabilities?*

The answer to this question is really the same as to the first one. We believe the respondents value fundamental technical skills, such as programming, as a knowledge foundation for the future development of their new hires.

*Perhaps small service providers do not have the resources to train business capabilities.*

The Phase 2 respondents included a large percent of companies that fall into the Small-Medium Sized Enterprises (SMEs). Since the United States (US SBA.) Small Business Administration states that more than 99 percent of U.S. businesses have less than 500 employees and are categorized as SMEs [US SBA 2006], then having a large number in our data is representative of the world at large. It was suggested by an audience participant that this might account for the service-provider response of looking for more business capabilities in entry-level hires than the clients had reported. SMEs have fewer resources to train entry-level hires and may require them to move into client-facing situations earlier. We will be able to answer this question with additional analysis when our data collection and verification is completed. However, this is a very useful comment and one we will pursue.

*There is a need for a longitudinal analysis based on IS 2002.*

The research team plans to update and administer the survey regularly to capture longitudinal data that can be analyzed for trends.

*Explain the trend toward respondents seeking project management capabilities at both entry and mid-level hiring.*

It is not surprising that project management capabilities would be critical for service providers, as this is a focus of all their business. And the emerging need for working globally and with virtual teams is also logical. Regarding the client organizations, one research conclusion is that there is a shift in the mission of the information system function from delivering technology-based solutions to *managing the process* of delivering solutions. This shift in mission requires more talent in the project management areas.

*What about declining capabilities?*

Both phases of the research asked the following question: "Which capabilities will decline in importance over the next three years, because they will become irrelevant, automated, or outsourced?" The answers to this question gave an additional indication as to which capabilities would not be acquired and developed in-house. The longitudinal study will continue to identify capabilities that are decreasing in demand and will be able to indicate the patterns over a longer



time period. The recent study is a snapshot of the current demand for capabilities and knowledge. It is our hope that educators will use the trend data from our study to aid them in future program decisions.

*What about an outsourcer that sources to another outsourcer? Where is desktop support going?*

The survey of providers did not explicitly ask about their sourcing relationships. However, members of the research team working with providers report that they are “sub-sourcing” to improve their pricing models [See also Giridharadas 2007]. Economic research in sourcing predicts that as the salary levels in a location increase due to successful sourcing business, the economies will shift to a location where the salary levels are lower [Gomory and Baumol 2004]. The provider answers to the survey question of declining capabilities, e.g., programming, are one indication that the providers may be sourcing these standardized technical capabilities.

*What are the legal issues when an outsourcer sources to another outsource?*

This was not a topic covered in the survey; however, members of the research team working with clients and providers have found that the level of sophistication in legal agreements has increased as experience with sourcing relationships has matured. Client organizations generally write their agreements to state explicitly who is performing the work and to prevent the option of the work being carried out by a subcontractor, unless the client approves of this arrangement. When there is planned subcontracting, this is all clearly stated in the agreement, including issues related to performance (and failure of performance) and security.

*Do the other departments in colleges of business care about the issues we are facing in IT departments?*

This is not an easy question to answer as it is dependent on the individual institution. Clearly, issues about enrollments and the quality of the graduates are generally of interest throughout an academic institution.

## **VI .CONCLUSION**

The high level of attendance at the panel and the lively discussion that ensued underscored the interest in this research and the importance of the study. Academia and industry need to rethink the IT curriculum and the hiring requirements for IT professionals. Our panel shed some light on the capabilities industry is seeking and some strategies for how academia can deliver them.

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Judy Simon	University of Memphis

## REFERENCES

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**Christine V. Bullen** is a faculty member at the Howe School of Management, Stevens Institute of Technology where she is the director of the four-course concentration/major in IT Outsourcing in the MSIS and MBA programs and the coordinator of the capstone course in strategic issues in IT. She is currently conducting research on the IT workforce as part of a team of academics under the sponsorship of the Society for Information Management (SIM). She is developing an IT Workforce Decision Model looking at the impact of sourcing strategy on the in-house needs for IT skills. She earned her MS from MIT and is a PhD candidate at Stevens. She is an active member of AIS, the New York Chapter of SIM, INFORMS, IAOP and is a founding member of the Global Sourcing Council. She has co-authored and contributed to eight books and numerous articles in the areas of impacts of outsourcing on the IT workforce, computer-supported cooperative work, electronic communications, critical success factors, managing the I/S function, in a variety of

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