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The Information Technology Workforce: A Comparison of Critical Skills of Clients and Service Providers

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In this article the authors explore similarities and differences in skill needs of IT service providers and the firms that providers service (clients). The results show that providers and clients are more similar than different with regard to desired skills. Client firms emphasize technical skills for new hires more than providers do despite saying that these are the skills they would outsource to providers. The results have implications for organizations' recruiting and retention, for individuals' career development, and for educational programs.

Keywords skills; information technology; service provider; IT workforce; project management; human resources; global; offshore; entry-level; mid-level

THE IMPORTANCE OF THE INFORMATION TECHNOLOGY (IT) WORKFORCE

IT executives and academics alike continue to view IT workforce issues with concern (Luftman, Kempaiah, & Rigoni, 2009). On the supply side, the number of students graduating with IT-related degrees remains low, while demographic forces such as impending baby-boomer retirements threaten a further reduction of IT workers (Dychwald, Erickson, & Morison, 2006). On the demand side, increasing emphasis on business transformation (e.g., extending the value chain) coupled with increasing globalization are driving growth of the IT workforce. This situation is further complicated by changes in the skill sets required in IT professionals. The net result is a widening gap between a growing demand for and an insufficient supply of workers possessing future-oriented skills (Bureau of Labor Statistics, 2008–2009). Trends in information delivery also create needs for changing skills. For example, the recent trend toward global sourcing emphasizes different skills than providing those same IT services internally. The expectations of skills for IT professionals of today are much less technically oriented than the expectations of IT professionals of even five years ago.

A number of stakeholders benefit from a robust IT workforce, one with relevant and in-demand skills. Firms outside the IT industry (that is, firms whose primary purpose is to provide non-IT goods or services) with an internal IT staff depend heavily on critical skills that support their core competencies. Firms whose primary business is providing IT services are especially reliant on skilled IT professionals. The workforce is their bread and butter, while their clients depend on them to supplement skills the clients do not want to employ in house or have difficulty recruiting and retaining. These organizations, both providers and their clients, are motivated to develop, challenge, and engage their staff, thereby increasing retention (Moore, 2000). This can be accomplished by upgrading skills and searching for new hires with desired skills.

Organizations depend heavily on the educational institutions that feed their pipeline. University programs must maintain relevance in order to supply fresh skills. Understanding the skills demanded by employers is important for universities when revising their IT programs so their students graduate with the right portfolio of skills. From the individual perspective, experienced IT professionals may be in a cherished position because they possess high demand skills. However, they must always be aware of changes in skills sought by employers of IT talent so that they continue to upgrade their value. Knowing what skills are most desired provides a guide for their career choices,

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whether they are at the college level or have years of experience but looking to enhance their marketability.

The IT workforce is composed of workers employed by providers of IT services and products (hereafter termed "providers") and workers employed by the organizations who engage the providers (referred to as "clients"). The demand for skills impacts both sets of employees and may be exacerbated by assumptions of where to get what skills. In this research the authors explore why both client and provider organizations need to be aware of their similarities and differences in order to adequately plan staffing models. Both types of firms are competing for the same pool of talent even though some organizations concentrate on hiring IT workers with certain niche skills while others seek a broader portfolio of skill sets. With the increasing globalization of business in general, and the IT industry in particular, the pool of IT talent is likewise distributed, recruited, and employed globally.

LITERATURE REVIEW

Scholars investigating skills desired of IT professionals by their employers have reported diverse findings over time. The rise and fall of certain skill sets has paralleled the evolutionary development of the IT function. In the 1970s IT was viewed as a support function, not a strategic one. Consequently, technical skills were strongly preferred over managerial and business skills (Byrd, Lewis, & Turner, 2004; Roark, 1976). During the 1980s executives began to recognize the strategic potential inherent in IT (Porter & Millar, 1985; Sethi & King, 1994). This was accompanied by more emphasis on managerial and business skills, although technical skills remained important (Leitheiser, 1992; Nelson, 1991). As the importance of networks grew in the 1990s and the IT function became less centralized, the need for business and organizational skills increased (Lee, Trauth, & Farwell, 1995; Todd, McKeen, & Gallupe, 1995). Accompanying developments of the new millennium (e.g., the rise of the Internet, globalization, and increased emphasis on sourcing), there has been a growing consensus that IT professionals are expected to possess a blend of technical, organizational, business, and management skills (Bassellier & Benbasat, 2004; Byrd et al., 2004). Further complicating the situation is the tendency for technical skills to become obsolete much more rapidly than in the past (Prabhakar, Litecky, & Arnett, 2005), and the expectation by employers that IT professionals should possess an expanding number and variety of skills (Gallivan, Truex, & Kvasny, 2004).

While there is now general agreement that IT professionals are expected to possess a combination of diverse skills, there is less agreement on precisely what these skills are. Part of the difficulty lies in the fast-changing nature of the profession. Today's Java is tomorrow's FORTRAN. Today's internal IS function is tomorrow's outsourced function. But a more fundamental problem is a lack of consistency in identifying and categorizing IT skills, and the resultant difficulty in comparing and contrasting skill categories over time. For example, two studies of IT skills were published in *MIS Quarterly* in 1995. One used three skill categories; technical, business, and system (Todd et al., 1995), while the other used four; technical specialties, technology management, business functional, and interpersonal/management (Lee et al., 1995). Both categorizations have been used in subsequent studies (e.g., Byrd et al., 2004; Lee & Lee, 2006). This inconsistency hampers the field's ability to integrate studies and build cumulative theory.

RESEARCH OBJECTIVES

We sought to understand the types of skills that are most critical for firms—both client and provider—to retain in house (obtained from their own employees). It is important for organizations to protect these resources in order to service organizational needs. The pipeline of talent manifests different strengths during a professional's career. Responsibilities evolve over time. Therefore we also requested data about the types of skills for two levels of workers: entry-level and mid-level. The Society for Information Management (SIM), an association of senior IT executives and academics, sponsored this research project to understand the IT skills that organizations desire. SIM provided its membership list to the research team, encouraging members to participate, supporting virtual project team meetings, and facilitating distribution of the findings via workshops and publications. The research project was conducted in two phases by a team of academics and practitioners. Phase one involved data collection about IT professionals who work in the IT units of client organizations: that is, those organizations who are potential buyers of services. The results from phase one indicate that non-IT industry firms prefer business domain skills and project management skills over technical skills (Zwieg et al., 2006).

In phase one clients said they would seek a number of skills from IT providers with an emphasis on outsourcing technical skills related to application development and infrastructure management. The results from phase one indicate that clients plan to increase the proportion of their IT work carried out by IT providers in the future and that an increasing share of this work would be carried out by provider staff working in offshore locations.

While phase one sheds light on skills demanded by client organizations, these results may not apply well to IT service providers. The skills expected of providers by their clients suggest the need for a different skill profile on the part of providers in order for them to meet client expectations. Therefore information provided by phase one to university programs, IT professionals, and employers of IT professionals may not apply well when it comes to meeting the skill needs of IT service providers. Consequently, we conducted phase two, collecting data from a global sample of organizations that provide IT services to others. Given the increasing use of outsourcing as a means of

providing IT staff, these providers will employ an increasing share of the IT workforce. Extending the focus of research on IT skills to include IT providers is therefore necessary in order to provide a more comprehensive depiction of skills needed by the IT workforce overall. Although several studies have examined IT skill needs of client organizations, we are not aware of studies about IT skill needs of IT service providers.

Throughout the article we will refer to the organizations from phase one and two as clients and providers, respectively. We report on and compare the findings of these two phases throughout this report but highlight the more recent data collected from providers.

The investigation focused on the following questions:

1. A. What are the most critical IT skills for client organizations to retain in house?
   B. What are the most critical IT skills for provider organizations to retain in house?
2. A. What skills do client organizations desire for entry-level IT professionals?
   B. What skills do provider organizations desire for entry-level IT professionals?
3. A. What skills do client organizations desire for mid-level IT professionals?
   B. What skills do provider organizations desire for mid-level IT professionals?
4. What differences do client and provider organizations have with respect to critical, entry-level, and mid-level skills of IT professionals?

METHODS

Phase One: Client Organizations

This extended research project occurred in two phases. Phase one began in 2005. Twenty researchers and practitioners interviewed 104 senior IT executives regarding current and future workforce skill requirements and related trends. Central to the interviews were questions regarding skills that are critical to keep in-house, and skills sought when hiring at the entry and mid-levels. The research team used a list of skills as a checklist during interviews to record which skills were elicited by respondents as being critical to keep in house, or important when hiring at entry and mid-levels. This list was developed by the research team and was reviewed by a panel of experts and by senior IT managers in a pilot study. Pilot study interviews were conducted to review the initial list of skills for possible revisions and additions. This resulted in additional skills being included in the list.

Client Demographics

The mix of industries of participant organizations is shown in Table 1. The "Other" category includes education, health care, not-for-profit, government, retail, entertainment, logistics, delivery services, etc. There were 89 usable respondents.

TABLE 1
Phase one: Client organizations by industry and size

Industry	SME	Large	Total	%
Heavy Industry	4	18	22	24.7
Finance and Insurance	3	14	17	19.1
Professional Services	11	8	19	21.3
Other	12	19	31	34.8
Total	30	59	89	100

SME is <USD500M and Large is ≥USD500M

The findings in phase one included evidence that the skill mix sought in client organizations is shifting from technical skills to project management and business-oriented skills (Zwieg et al., 2006). Client organizations are also turning increasingly to IT service providers for technical skills. It is because of this finding that we pursued phase two to investigate skills that service providers were seeking to offer their clients.

Phase Two: Provider Organizations

In phase two, we developed an online questionnaire based on the information garnered in phase one. The skills included in the questionnaire are shown in Table 2. This was used to gather data from IT provider business units. In most cases the unit is the company, but because we sought different geographical regions, some firms have multiple representations. Respondents were solicited from SIM, professional contacts of the researchers, and professional organizations. We identified respondents who determined or executed the human resource strategy; specifically, we sought someone responsible for IT workforce strategy and recruiting plans.

For large firms, this might be a director in human resources who is dedicated to recruit and retain IT staff. In many of the smaller firms, it was the president. We then contacted these individuals by phone or e-mail and asked them to participate.

Provider Demographics

We received 126 usable responses. Table 3 provides a breakdown of responding service provider business units by size and type. Organization size is categorized in USD revenue as Large ≥USD500M and Small and Medium Enterprises (SME) <USD500M. For a discussion of differences of skills in organizational size, see Simon et al., 2007. The firms characterized themselves as either (1) consulting services; (2) software services (software development, systems integration, maintenance, or packaged software implementation and support); or (3) infrastructure services (facilities management, network services, server and storage administration, or help desk services). In instances where participant units provided several of these services, we asked them to choose the most predominant.

With regard to management level, the majority of our respondents were senior-level managers (senior vice president or equivalent) or executives (73% were CxO or above), with the

TABLE 2
IT skills

Skill category	Skill
Technical	Systems Analysis
	Systems Design
	Programming
	System Testing
	Database Design/Management
	Architecture/Standards
	Telecommunications
	Operating Systems
	Server Hosting
	Security
	Mainframe/Legacy
	Operations
	Continuity/Disaster Recovery
	Desktop Support/Help Desk
Project Management	Project Planning
	Project Risk Management
	Negotiation
	Project Leadership
	User Relationship Management
	Working with Virtual Teams
	Working Globally
	Capability Maturity Model Utilization
Business Domain	Industry Knowledge
	Company Knowledge
	Process Knowledge
	Business Process Re-engineering
	Change Management
	Managing Stakeholder Expectations
	Communication
Sourcing–Selling	Customer Go-to-Market Strategy
	Customer Selection or Qualification
	Contracting and Legal
	Customer Relationship Management
Sourcing–Buying	Sourcing Strategy
	Third-party Selection
	Contracting and Legal
	Managing Third-party Providers

remainder describing themselves as middle managers. We did not ask for specific job titles. They are well-seasoned veterans of the IT industry, with 69% having more than 10 years of experience. Taken as a whole, this indicates that the respondents have a significant presence in their firm's management structure and possess a wealth of experience in the IT industry. This affords us a high degree of confidence in their subsequent responses.

TABLE 3
Phase two: Provider organization by type and size

Type of service	SME	Large	Total	%
Consulting	26	8	34	27.0
Software services	58	24	82	65.1
Infrastructure	6	4	10	7.9
Total	90	36	126	100

SME is <USD500M and Large is ≥USD500M

TABLE 4
Headquarters' locations by region and size

Region	SME	Large	Total	% of total
North America	59	24	83	66%
Western Europe		2	2	2%
Oceania	6		6	5%
Latin America	1	1	2	2%
Eastern Europe	2		2	2%
CIS	17		17	13%
Indian sub-continent	5	9	14	11%
Total	90	36	126	100%

SME is <USD500M and Large is ≥USD500M

Global Distribution of Providers

To reflect the global nature of the IT service industry, we solicited input from business units around the world. Table 4 shows the location of their corporate headquarters. A majority of the units (64%) are headquartered in the United States. The next most-represented geographic regions are the Commonwealth of Independent States (CIS; countries of the former Soviet Union) and India, with 13% and 11%, respectively. There were no respondents from China, Africa, or the Middle East.

IT SKILLS

We presented phase two participants with a list of skills derived from phase one and asked them a series of questions designed to elicit their responses regarding the nature of skills desired in IT professionals. Table 2 shows the skills included in the phase two survey. Most of the skills included in this survey were the same as those included in phase one. Maintaining the same skills derived from phase one was done in order to allow comparison of the results from the two phases. Because the skills were elicited from interviews in the first phase, we felt comfortable that we had a robust set of skills from which to have phase two participants respond. However, to ensure that no significant skills were overlooked we also included the option of "other". None of these few "other" entries had much repetition, and they were as broad as offshore and supply chain outsourcing to as particular as Linux and SAP. Hence we believe the list used is comprehensive and thorough.

One change for phase two was the addition of four skills in a new sourcing category related to selling IT services, reflecting the criticality of this activity to the livelihood of IT service providers. These skills are included in the "sourcing-selling" category. There also were four sourcing skills from phase one that focused on working with IT providers from the client perspective. These were retained in the "sourcing-buying" category. Buying skills were included in phase two's survey since some IT providers subcontract work to other IT providers and are therefore both sellers and buyers of IT services. The skills included in the two sourcing categories are shown at the bottom of Table 2.

Our list of technical skills is relatively generic, including "programming," for example, rather than specific programming languages (e.g., Java), tools (e.g., Access), or enterprise systems (e.g., SAP). We were more interested in the need for programming capability rather than particular languages. How organizations view the criticality of skills defined in this more generic way should be more stable when compared to skills defined in terms of more specific technologies, such as particular languages or operating systems.

Project management capabilities include knowledge and skills related to working with users and team members, as well as those related to planning, budgeting, and scheduling. Skills in this category are also defined somewhat generically without linking them to specific project management tools or techniques.

The business domain capability category includes knowledge of industries, companies, and how they operate. Business domain skills are defined broadly and are not tied to specialized areas of business knowledge or specific types of business applications. This approach was important for the phase two study since there could be considerable variation in which vertical industries or types of business applications different providers specialize.

Finally, sourcing skills related to managing client and third-party relationships were offered in two sub-categories: effective selling capabilities, such as customer go-to-market strategy and selection and managing contractual matters and customer relations; and effective buying capabilities, include sourcing strategy, third-party provider selection, and managing those contracts and relationships.

Even with the approach adopted in this research for defining skills, there may be some skills that may be added or dropped if the current list were to be revised at some point. For instance, mainframe skills may no longer be a significant concern for some organizations in the future. Likewise, skills in emerging areas such as cloud computing may not be captured well merely by acknowledging that it draws from some of the current technical and sourcing skills. However, to allow a comparison of findings from the two phases we used the same skill list as in phase one.

For each skill shown in Table 2, respondents were asked three sets of questions. The first set of questions was used to identify whether a particular skill would be critical to keep in-house (i.e., obtained from employees) in the next three years. The second and third sets of questions asked respondents to identify which skills were currently desired when hiring entry-level and mid-level employees respectively. Entry-level positions are those filled by recent university graduates without significant practical experience, and mid-level positions are those that require five or more years of experience.

ANALYSIS AND FINDINGS

Critical Skills to Retain in House for the Future

Table 5 shows the skills that both sets of respondents (clients and providers) considered to be critical to retain in house. In this and the following two tables we present the top 10 responses ordered by skill category. Responses to the skill questions from each phase were analyzed by first counting the number of times a skill was identified as critical to keep in house or important when hiring at the entry- or mid-level. The top 10 skills (and ties) in these three tables are those that had the most responses indicating the skill was critical or important when hiring at each of the two levels. The individual rankings within the top 10 were relatively unimportant since differences in number of responses for each of the top 10 skills were relatively small.

Surprisingly, providers seem to value technical capabilities no more than clients. Both phases of this study found only

TABLE 5
In-house critical skills

Category	Client	Provider
Technical	Systems Analysis Systems Design	Systems Analysis Architecture/ Standards
Project Management	Project Leadership Project Planning Project Risk Management	Project Leadership Project Planning Project Risk Management User Relationship Management Working Globally
Business	Industry Knowledge Process Knowledge Company Knowledge Business Process Re-engineering Change Management	Industry Knowledge Process Knowledge
Sourcing - Selling		Customer Relationship Management

two technical skills among the top 10 critical skills. Clients ranked systems analysis and system design in their top 10. Providers ranked systems analysis and architecture/standards in their top 10. The technical skills shown for clients and providers would be important for customer-facing, strategic/tactical level technical tasks rather than operational or entry-level technical tasks.

Provider firms place greater emphasis on project management skills, while client firms place greater emphasis on business-oriented skills. This finding is most likely related to the different nature of their corporate missions.

Finally, providers value managing relationships with customers, while clients do not identify any corresponding skill as critical for managing relationships with providers.

Skills Needed in Entry-Level Hires

In stark contrast to the skills considered critical to be maintained in house by clients and providers (primarily project management and business skills), our client respondents indicated a strong preference for technical skills in entry-level hires. Nearly three-quarters (72%) of the client units hired programmers, 44% hired PC support/help desk staff, and 37% hired systems analysts.

The comparisons shown in Table 6 indicate that both types of organizations rate systems analysis, programming, system testing, and desktop support/helpdesk very highly in entry-level hires. Overall, however, clients tend to be much more interested in technical skills at entry-level hiring than provider units. Nine of the eleven skills for clients were technical, compared to four out of eleven for provider units. Furthermore, provider units place greater emphasis on project management, business, and relationship skills than clients with seven of the eleven most desired entry-level skills coming from these categories.

The question arises as to why technical skills are sought for entry-level positions, especially by clients, yet not considered as critical to retain in house, with the exception of the user-facing skills of systems analysis and system design. One possible explanation is that technical skills serve as qualifiers for entrée into the professional IT workforce—establishing one's credibility. Most professionals at later career levels would require a base knowledge of technical skills in order to manage or work on a team with more technical workers. Clearly most of these hires will need to supplement their skill sets with project and business-oriented skills to advance in their careers. This leads to a subsequent question regarding how business units intend to develop those skills in their entry-level employees in order to prepare them for subsequent career progression.

We note that phase one clients expressed an intention to look to providers for outsourcing services which entail broad sets of technical skills. The top 10 skills outsourced to third-party providers are all technical (Zwieg et al., 2006). Yet providers did not view these technical skills as critical in importance (the exceptions being systems analysis, system design, and testing). Even when hiring at the entry level, technical skills are not ranked as high as non-technical skills.

TABLE 6
Desired entry-level skills

Category	Client	Provider
Technical	Systems Analysis Programming Desktop Support/ Help Desk System Testing Systems Design Architecture/ Standards Operating Systems Database Design/ Management Telecommunications	Systems Analysis Programming Desktop Support/ Help Desk System Testing
Project Management		Project Planning User Relationship Management Working with Virtual Teams
Business	Industry Knowledge Communication	Industry Knowledge Process Knowledge Communication
Sourcing – Selling		Customer Relationship Management

Skills Needed in Mid-Level Hires

Many more of the skills sought in mid-level hires come from the non-technical skill categories for both IT providers and clients. This is not surprising given the positions that respondents reported being filled at the mid-level. For clients the five leading mid-level positions were either related to project management or customer-facing technical skills of systems analysis and system design. For IT providers, the leading mid-level positions were project managers (73%), programmers (64%), systems analysts (60%), architects (53%), and development team managers (53%).

Although clients and providers differ considerably in the skills they seek in entry-level hires, Table 7 shows remarkable similarity between the two groups when it comes to mid-level hires. Clients and providers seek an almost identical mix of customer-facing technical skills, project management skills, and communication skills. The only difference between the two groups is the inclusion of project integration/program management skills by clients and communication skills by providers. Project management and communication also have

TABLE 7
Desired mid-level skills

Category	Client	Provider
Technical	Systems Analysis	Systems Analysis
	Systems Design	Systems Design
Project Management	Project Leadership	Project Leadership
	Project Planning	Project Planning
	Project Risk Management	Project Risk Management
	Negotiation	Negotiation
	User Relationship Management	User Relationship Management
	Project Integration/ Program Mgmt	
Business	Industry Knowledge	Industry Knowledge
	Process Knowledge	Process Knowledge
		Communication

been noted in the top 10 of recession-proof skills (Schultz, 2010) and top 11 hot skills for 2011 (Collett, 2010).

DISCUSSION

Clients and Providers Are More Alike Than Expected

Clients and providers are very similar in the relative emphases placed on non-technical skills. Neither includes many technical skills among the most highly rated critical skills. Almost all of the technical skills identified as critical to obtain from employees are user-facing skills relevant for systems analysis and system design. Not one operational or infrastructure skill is found among the highest rated critical skills from either phase of this research. The same is true when examining the technical skills sought in mid-level hires. The only place where operational, infrastructure, or implementation-related technical skills (e.g., programming and testing) are highly rated are among the skills sought in entry-level job candidates. Although there are considerable differences in skills desired at the entry level, clients and providers are very similar in the skills desired at the mid level, as nine out of the ten most desired skills are common across the two groups and most are not technical. This is consistent with the type of skills needed for cloud computing where IT professionals are managing data, project, and human resources rather than code (Erlanger, 2009).

But There Are Differences

Table 8 summarizes key differences between the skill needs of clients and IT providers. Perhaps the most striking difference is the importance that clients give to technical skills when hiring at the entry level. Nine out of the eleven skills desired by clients are technical. IT providers seek a more diverse set of entry-level skills, with seven of the eleven most desired skills being non-technical.

TABLE 8
Client and provider differences

Skills	Clients	Providers
Entry-level Technical	Nine of the top 11	Four of the top 11
Relationship	Not emphasized in hiring	Critical Emphasized in hiring
Project management	Sought at mid-level	Sought at entry and mid-level
Global delivery	Not emphasized	Highly rated
Business	Critical to retain in house	Less important

Although the survey did not include a "relationship" skill category, certain skills that are essential to building and managing relationships are found in the non-technical skill categories. Included in this are negotiation, user relationship management, communications, managing stakeholder expectations, and customer relationship management. Providers identify more relationship skills as critical to keep in house and place greater emphasis on relationship skills when hiring at the entry and mid-levels.

IT providers also give more weight to project management, particularly with respect to critical skills and skills sought at the entry level. Project management is named as one of the top 10 recession-proof skills in interviews with mostly service providers (Schultz, 2010). Only providers identified skills related to global delivery, such as working globally and in virtual teams, among the most highly rated skills. This could reflect the more global nature of provider business units either in our sample or due to their employee location with respect to delivery to clients in other locations.

Clients view business skills as more critical to keep in house than do providers. Clients also rate company knowledge, Business Process Reengineering (BPR) and change management among the leading critical skills. It is worth noting, however, that providers do give some weight to industry and process knowledge as both critical to keep in house and desired in new hires. For providers, company knowledge could help in meeting the needs of a specific client, but is arguably less applicable when working with other clients. There also could have been different interpretations of what it meant, the provider's company knowledge, or the providers' knowledge of their clients' companies. On the other hand, industry and process knowledge provide a valuable knowledge base that can be leveraged across multiple customers.

Possible Explanations of the Similarities and Differences

Why aren't providers more interested in technical skills? Results from the first phase of this research indicate that clients plan to reduce their technical workload through outsourcing. This suggests a need for providers to have the complementary

technical skills needed to meet this demand. Not only is there no evidence of this, the opposite appears in the case of desired entry-level skills; clients' entry-level hiring is driven much more by technical qualifications of their candidates than is true of IT providers. While the focus on technical skills on the part of clients could be explained by the necessity of entry-level hires having the requisite foundation of technical skills initially as a basis for developing other skills, the same should also be true for IT providers.

Possible explanations for this key difference were presented in some follow-up interviews we conducted with providers:

1. The pool of talent from which providers are hiring is dominated by individuals with strong technical skills. Therefore providers have few concerns about their applicants having the requisite technical skills and are focused on finding the other important capabilities.
2. A large number of the providers were in the SME category and were hiring for breadth rather than depth.
3. Some of the providers had a strategic plan to move up the outsourcing value chain from doing commodity-type technical work to high-level customer-facing work. As they already have a strong base of technical staff, they were seeking other skills.
4. In some instances, providers are doing secondary sourcing to obtain technical skills in lower-wage locations than their own and substituting technology for staff to improve efficiency, for example, through automatic programming generators.

The difference in relationship skills appears to be related to the need for IT providers' staff to have strong skills in this area since relationship building is central to their success in the marketplace. Clients develop relationships with internal customers by virtue of the fact that they are in the same organization and have been working with each other for many years and assume these relationships will continue, unlike providers who more often need to establish a working relationship with a new client when moving on to the next project.

These results are significant for individuals, organizations, and universities. Individuals can choose to develop certain skills depending on whether their career goals are aligned with client firms or with provider firms. Organizations can apply these findings to their recruitment and training strategies. Universities can draw from the results to mold future IT professionals who will thrive in client and provider environments. The next section describes in more detail the implications for these three perspectives: individuals with respect to skills, organizations with respect to hiring, and universities with respect to curriculum.

IMPLICATIONS

Requisite Skills

The conclusion that can be drawn from both phases of this research is that a set of requisite skills is emerging that all information systems professionals will need for a successful career in IT, regardless of whether they are employed by clients or providers, and in anticipation of the increasing globalization of the IT profession (Gallagher, Kaiser, Beath, Simon, & Goles, 2010). These skills that enable individuals to work globally are becoming more critical regardless of firm size and location.

Entry-Level Hiring

Respondents from organizations of all sizes show differences between what they seek for entry-level and mid-level workers, but do not address how they will accumulate the skills to make this transition. The positions most sought by providers were programmers (mostly in Asia and Eastern Europe regions) and PC support/helpdesk and systems analysts (mostly in North America, Western Europe, and Oceania). Despite the cry for business skills, entry-level hiring practices often give preference to computer science graduates over business IT/MIS degrees. The emphasis on process knowledge and project management skills in the research contradicts this preference. Computer science students rarely earn business area (marketing, finance, supply chain, accounting) credits except as electives and many of their programs have little flexibility to do so. Organizations seeking new hires with the requisite skills would be better advised to explore IT/MIS programs where students earn a business degree requiring business area courses as a foundation and then major in IT/MIS.

The results reported here emphasize the need for organizations to adopt strategies for career development of entry-level hires in order to create the balance of skills that they seek in their long-term staff. The orientation process provides company and industry knowledge, but new hires need to be nurtured and enhanced with the experiential knowledge from mentors over time. The few entry-level hires who have project management training will develop the desired mid-level project management and process knowledge expertise only when carefully assigned to projects that gradually increase project management responsibility. The results also can provide guidance for human resource personnel engaged in hiring at the entry level. They may look to educational institutions that excel in certain skills or at least can influence the curriculum by becoming more active in advisory boards. If the need for working globally is important, what preparation have college graduates had for doing so (such as studying abroad or working with those in other countries)? For example, since 2006, Marquette University has partnered with the Management Development Institute of Gurgaon, India and the University of Glasgow for an undergraduate project management course where Marquette students develop requirements that they send to their offshore partners for coding (Adya, Nath, Sridhar, & Malik, 2008).

The direct producers of entry-level hires are the educational institutions with IT-related programs. Faculty who are active in placement and aware of changing skills must continually monitor course offerings to be consistent with area needs. Curriculum revisions require bureaucratic channel approvals that question the need for change. The results of this research provide evidence of shifting skill sets that can substantiate the

relevance of curriculum changes. From the individual perspective college students have many options for career paths. The entry-level job and the early years of new hires' careers often determine whether they take a technical or non-technical route. This research can inform students' choices for majors or electives. Knowing what skills are more valued at entry level helps them assimilate their interests with what is most desired when they are in the recruiting stage at the end of college.

Mid-Level Hiring

Provider respondents anticipate strong growth in hiring mid-level employees. The positions most sought were project managers, programmers, and systems analysts. Smaller organizations emphasized the technical, but still client-facing, skills of systems analysis and systems design for mid-level hires. Larger units emphasized project management and business skills. Units hiring mid-level staff in developed areas emphasized industry knowledge while those in offshore locations sought technical skills of systems analysis, system design, and skills in working virtually and globally.

For organizations, mid-level employees are highly valued with industry and company experience. One of the challenges is how to develop entry-level workers into mature productive staff. The data shows that firms seek technical skills but do not value those skills within a few years. Organizations need to question the technical orientation of new hires, and design programs to help their IT workers develop more managerial-oriented competencies. Organizations should also ask themselves what career development opportunities can human resources and IT managers provide for recent hires so they can transition into project managers?

Universities are expanding graduate programs and continuing education to serve the needs of working professionals. This research guides the enhancement of existing curriculum and creation of new programs for experienced workers. Programs in project management have increased as the need for this skill increased, as the research substantiates. Experienced IT professionals may not feel the need for graduate degrees but may want some credential to emphasize valued skills. One example is Villanova University's online Masters' Certificate in IS/IT Project Management (Villanova, 2010).

Individuals can seek educational opportunities at universities but may also use the results of this research to seek out projects for which to volunteer or position themselves for career development. These efforts can round out their competencies in areas where they have gaps with the marketplace. For example, companies that are expanding globally in their marketplace might have new opportunities for IT professionals to work in global teams.

University Programs

IT programs need to be aware of the skills desired by IT providers and take them into account as they adapt curricula to changing conditions. The needs of IT providers will likely become more important relative to those of clients as more work is outsourced. At the time of the data collection (prior to the fall 2008 economic downturn), both clients and providers indicated plans to expand, but IT providers forecast much greater hiring at both the entry and mid-levels than clients. The economic meltdown pressure forced client organizations to decrease their costs, which, logically, may lead to increased outsourcing. Although the number of megadeals has declined, the total cost of outsourcing has not (TPI, 2011). A movement to multisourcing and smaller contracts indicates maturity in outsourcing, offshore or domestic, and argues for more need of associated skills (Overby, 2011) Unless widespread protectionism increases, global IT providers' business will likely continue to increase to offset hiring freezes or reduced internal hiring of their clients. This, in turn, will create an increased need at client organizations for the managerial skills such as project management to oversee the increase in outsourced work. University programs in both computer science and information technology should be cognizant of these trends and prepare graduates accordingly. Most universities place more resources on undergraduate curricula. Although graduate programs may draw upon the results for the mid-level hiring, we will focus our discussion on undergraduate curricula that are relevant to the most students.

The years of declining enrollments raised awareness for a review of curricula. Schools should consider enhancing their offerings to be more closely aligned with hiring organizations' needs. This can be used to draw more students as placement increases. Examples of application for the results of the study are primarily in questioning the emphasis on technical topics (in particular, programming) and how to incorporate project management in existing courses as well as adding a project management course (which has not been the norm).

The IS Model Curriculum raised controversy about removing application development (programming, data, file, and object structures) from the prescribed core (Topi et al., 2010). Our results support this view on one hand but also emphasize the need for a technical base on the other hand with respect to findings about what entry-level skills that client and provider firms desire. These findings raise questions about the depth of programming skill needed for undergraduate majors. Some schools have a reputation for a strong technical base and require multiple courses in programming languages and tools. Faculty may want to revisit the degree to which students need exposure rather than expertise in this area. For example, Java coding is a valuable and marketable skill but so is integration or enterprise resource planning (ERP) systems. The latter requires an understanding of program design and structure but may rarely apply directly any programming techniques.

While it is not common to see project management courses in undergraduate curriculum, the trend is increasing. Those programs who have made this addition to their curriculum have found that their graduates were moving into project manager positions much sooner than had been the case. One reason

for this may be increased use of offshore outsourcing which employs development resources. Faculty need to review existing courses at the very least in order to incorporate better project management topics. The most likely venue is a systems analysis and design class.

CONCLUSION

Requisite skills make up a set of critical areas in which individuals will need education and/or experience to develop successful careers as information systems professionals. The results of this research define those requisite skills as combining a foundation in technical skills along with exposure to managerial skills, specifically project management. The roadmap for career development provided by these results will aid both individuals and organizations in building a successful IT workplace in the future.

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REFERENCES

Adya, M., Nath, D., Sridhar, V., & Malik, A. (2008). Bringing global sourcing into the classroom: Lessons from an experiential software development project, *Communications of the Association for Information Systems*, *22*(1), 34–48.

Bureau of Labor Statistics (2008–2009). Occupational Outlook Handbook, United States Department of Labor, Retrieved from http://www.bls.gov/oco/ocos042.htm#related

Bassellier, G. & Benbasat, I. (2004). Business competence of information technology professionals: Conceptual development and influence on IT-business partnerships. *MIS Quarterly*, *28*(4), 673–694.

Byrd, T. A., Lewis, B. R., & Turner, D. E. (2004) The impact of IT personnel skills on IS infrastructure and competitive IS. *Information Resources Management Journal*, *17*(2), 38–62.

Collett, S. (2010). 11 Hot Skills for 2011, *ComputerWorld*, Retrieved September 13, http://www.computerworld.com/s/article/351231/11_hot_skills_for_2011?taxonomyId=14&pageNumber=1

Dychwald, K., Erickson, T.J., & Morison, R. (2006). *Workforce crisis: How to beat the coming shortage of skills and talent*. Boston, MA: Harvard Business School Press.

Erlanger, L. (2009) *The Tech Jobs that the Cloud Will Eliminate*. Retrieved July 22, from http://www.cio.com/article/497824/The_Tech_Jobs_That_the_Cloud_Will_Eliminate

Gallagher, K. P., Kaiser, K. M., Beath, C. V., Simon, J., & Goles, T. (2010). The requisite variety of skills for IT professionals. *Communications of the ACM*, *53*(6), 144–148.

Gallivan, M. J., Truex, D. P., & Kvasny, L. (2004). Changing patterns in IT skill sets 1988–2003: A content analysis of classified advertising. *The DATA BASE for Advances in Information Systems*, *35*(3), 64–87.

Lee, D. M. S., Trauth, E. M., & Farwell, D. (1995). Critical skills and knowledge requirements of IS professionals: A joint academic/industry investigation. *MIS Quarterly*, *19*(3), 313–340.

Lee, S. M., Lee, C. K. (2006). IT Manager's Requisite Skills. *Communications of the ACM*, *49*(4), 111–114.

Leitheiser, R. L. (1992). MIS skills for the 1990's: A survey of MIS managers' perceptions. *Journal of Management Information Systems*, *9*(1), 69–91.

Luftman, J., Kempaiah, R., & Rigoni, E. H. (2009). Key issues for IT executives 2008. *MIS Quarterly Executive.* 8(3), 151–159.

Moore, J. E. (2000). One road to turnover: An examination of work exhaustion in technology profession. *MIS Quarterly*, *2*(1), 141–168.

Nelson, R. R. (1991). Educational needs as perceived by IS and end-user personnel: A survey of knowledge and skill requirements. *MIS Quarterly*, *15*(4), 502–525.

Overby, S. (2011). Why IT outsourcing deals are getting smaller. Retrieved July 27, from http://www.cio.com/article/686749/Why_IT_Outsourcing_Deals_Are_Getting_Smaller

Porter, M. E. & Millar, V. E. (1985). How information gives you competitive advantage. *Harvard Business Review*, *63*(4), 149–160.

Prabhakar, B., Litecky, C. R., & Arnett, K. (2005). IT skills in a tough job market. *Communications of the ACM*, *48*(10), 91–94.

Roark, M. L. (1976). Information systems education: What industry thinks. *Data Management*, *14*(6), 24–28.

Schultz, B. (2010). 10 recession-proof IT skills. Retrieved February 8, from http://www.cio.com/article/533767/10_Recession_Proof_IT_Skills?page=1&taxonomyId=3074

Sethi, V. & King, W. R. (1994). Information technology application provides competitive advantage. *Management Science*, *40*(12), 1601–1627.

Simon, J., Kaiser, K. M., Beath, C., Goles, T., & Gallagher, K. P., (2007). Information technology workforce skills: Does size matter? *Information Systems Management*, *24*(4), 345–360.

Todd, P. A., McKeen, J. D., & Gallupe, R. B. (1995). The evolution of IS job skills: A content analysis of IS job advertisements from 1970 to 1990. *MIS Quarterly*, *19*(1), 1–27.

Topi, H., Valacich, J. S., Wright, R. T., Kaiser, K., Nunamaker, J. F., Sipior, J. C., & de Vreede, G. J. (2010). IS 2010: Curriculum guidelines for undergraduate degree programs in information systems. *Communications of the Association for Information Systems*, *26*(18), 359–428.

TPI (2011). TPI index: Outsourcing industry sees growth in regional markets, restructurings, TPI information services group. Retreived July 20, from http://www.tpi.net/web/media-center/press/110720-US.asp

Villanova University (2010). Masters certificate in project management. Retrieved http://www.villanovau.com/online-certificates/project-management.aspx

Zwieg, P., Kaiser, K. M., Beath, C. M., Bullen, C. V., Gallagher, K. P., Goles, T., . . . Wion, R. (2006). The information technology workforce: Trends and implications 2005–2008. *MIS Quarterly Executive*, *5*(2), 47–55.