CHAPTER 13

INVESTIGATING THE EXISTENCE AND VALUE OF DIVERSITY IN THE GLOBAL IT WORKFORCE

An Analytical Framework

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This chapter explores the human resource themes of diversity and cultural differences as they relate to the development of a global IT labor force. Drawing upon research projects in Australia, China, India, Ireland, New Zealand, Singapore, and the United States, we present a framework for diversity and IT research that focuses on the influence of diversity on the IT profession and the ultimate impacts on organizations and society. We problematize the relevant literature on diversity, using two themes: recognizing the existence of human diversity and recognizing the value of human diversity. Finally, we describe a research program on global diversity currently being carried out by the Center for the Information Society at The Pennsylvania State University by discussing our own individual diversity research agendas.

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INTRODUCTION

Much is written in the popular and scholarly press, claimed in educational settings and discussed in business meetings about diversity in the IT workforce. This topic engages human resource professionals, researchers, and educators alike. The focus of attention—whether from a practitioner or academic perspective—is generally about how to achieve diversity in the IT labor force.

Underlying this discourse are two assumptions. The first is that there is a common understanding of what diversity means. The second is that there is common agreement that diversity is a good thing to have in the IT labor force. Therefore, recommendations about achieving diversity tend to build upon these unexamined assumptions. The recommendations about recruitment flow into the domain of educational institutions; the recommendations about retention flow into the domain of human resource professionals. However, despite the best efforts of educators and human resource managers, the achievement of diversity remains an elusive goal. We would argue that part of the reason lies in the absence of a critical examination of the assumptions underlying these behaviors.

In this chapter we begin with a consideration of what is meant by the term “diversity.” In some quarters (particularly of the United States) diversity is equated with race. In other settings, diversity is expanded to include race and gender. However, we take a comprehensive view of diversity that builds upon the notion of diversity as “differences.” When applied to demographic characteristics of the workforce the term includes such meanings as: race, gender, sexual orientation, nationality, ethnicity, religion, age, and disability. But we do not stop here. The concept of diversity can be applied beyond demographic attributes to also include the characteristics of individuals that make them unique (context specific) in the ways that they bring different skills, thoughts, perspectives, ideas, and talents to the workplace.

However, consensus is absent that diversity is a worthy goal for organizations and societies to pursue (Broome, DeTurk, Kristjansdottir, Kanata, Ganesan, 2002; Kochan et al., 2002; Yu, 2002). Both the concept of diversity and the desire to have it are contestable. The International Public Management Association (IPMA)\(^1\) has undertaken a benchmarking project with the National Association of State Personnel Executives (NASPE)\(^2\) to understand the positive assets of diversity for organizations. This benchmarking project represents over 1,700 international organizations and 2,500 individuals involved in public sector human resource management to provide leadership, professional development, and information to public service. Diversity facilitates innovative problem solving efforts through the inclusion of different perspectives (Foldy, 2004;
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Reichenberg, 2001). In a business sense, then, diversity can be seen as a positive asset in strengthening the organization. Research has demonstrated that senior management teams that are comprised of diverse age, ethnic, and gender groups performed better than teams with lower levels of diversity. It follows that this diversity improves organizational productivity and creativity (Salomon & Schork, 2003).

However, it is a challenge to manage a diverse workforce (Bazile-Jones, 1996). In this environment, there are both potentials for great accomplishments and great conflicts. The presence of diverse opinions may affect the overall efficiency of an organization by requiring that it look into the diverse interests of a diverse workforce. In this discussion, it is important to make a distinction between diversity and affirmative action (Elmuti, 1996). The former is a state of demographical differences in a workforce. And the latter is a framework for diversity management. Hence, while diversity is potentially a positive asset, it may be an inhibitor of intra and interorganizational efficiency without effective management of the differences (including working styles) individuals bring to the organization (Kochan et al., 2002; Reichenberg, 2001).

Baird and Meshoulam (1988) explain that business objectives are more easily achieved when strategic human resources (HR) programs are in place, that is, when HR practices, procedures, and systems are developed and implemented based on organizational need. A primary function of these HR programs is to ensure that organizations have the right mix of skilled professionals to effectively perform its value creation activities. At the same time, HR functions must also ensure that professionals are adequately recruited, trained, motivated, and compensated to perform their value creation tasks (Hill & Jones, 1998). Hence, a common theme of modern management philosophy explains “that people are the only sustainable asset in modern business” (Schwarzkopf, Saunders, Jasperson, & Croes, 2004, p. 28). Therefore, it is critical that researchers and practitioners take an active role in creating HR solutions that meet the demands of today’s professionals. In order to accomplish this task it is important to understand diversity in terms of increasingly globalized enterprises.

For these reasons we see a need to undertake an examination of the topic of diversity that begins with consideration of these basic assumptions and then moves on to consider issues and research directed at addressing them. In this chapter we consider the topic of diversity and the IT workforce from this perspective.

We begin by presenting a framework for analyzing the topic of diversity and the IT sector. This framework has developed from our critical examination of the assumptions presented above. It is used as a conceptual tool for reviewing the existing literatures about diversity (such as gender, social exclusion and cross-cultural aspects of global IT). We also use this
framework to describe the research agenda for diversity and the IT sector that is being enacted in the research programs of our Center for the Information Society at The Pennsylvania State University that was established to respond to the diversity challenges and opportunities being presented to the twenty-first century IT labor force. Finally, we position each of ourselves and our individual research agendas within this overall research program as a way of demonstrating, concretely, how this research agenda can be moved forward.

THE IT DIVERSITY RESEARCH FRAMEWORK

The recent attention given to outsourcing is one way to focus our attention on the topic of diversity. The existence of global outsourcing serves as evidence to support the claim of a global IT sector. And this global IT sector, in turn, serves as evidence of diversity. At the same time, within a given population, there is evidence of social exclusion in the IT sector (Finkelsievich, 2003; Schienstock, 1999). Women, by and large, are underrepresented in all segments of information technology, from enrollment in courses in high schools and colleges to the numerous employment opportunities associated with the discipline (Margolis & Fisher, 2002). Thus, we can see that the topic of diversity in the IT sector is not simple and that research about this topic cannot be simplistic. It is at the same time diverse and not diverse, depending upon where one looks. Beyond understanding the nature of diversity in the IT sector, a second theme that emerges is: what value, if any, derives from diversity within the IT sector? Does the IT profession, as a whole, benefit from its global nature? Is it necessary to work for greater participation in the IT sector by women and certain racial minorities? The framework we propose is offered as an analytical tool to be used in conducting research to address these questions and contradictions.

This framework is comprised of two themes: recognizing the existence of human diversity and recognizing the value of human diversity (see Figure 13.1). Diversity here can refer to both demographical and psychographical diversity. As the framework shows, we argue that workforce diversity influences the dynamics and performance of IT work. These new dynamics of IT work, in turn, have benefits at the organizational and societal levels. This framework includes both the influences and impacts, and the management of this diversity in the IT workplace. These management techniques theoretically influence the dynamics and performance of IT work, which will then have implications on the overall benefits derived and experienced by the organization and/or society. At the organizational level, productivity, technological innovation, and work...
The IT sector has been established as being a forefront for the existence of diversity within the workplace. However, this is not simple as the same practices are some areas where the benefits of IT workforce diversity can be manifested. At the societal level, the impact is experienced in areas related to economic progress, industrial development, economic class relations, and social digital divides. However, given the problems of diversity, the possibility of it becoming an asset to the organization or society is dependent on the effectiveness of diversity management. In the remainder of this section we present an analysis of relevant research that addresses these themes.

Figure 13.1. The IT Diversity Research Framework.

RECOGNIZING THE EXISTENCE OF DIVERSITY IN THE IT SECTOR

When we use the term “diversity” to describe a subject domain, what we mean is that the domain is composed of distinct or unlike elements or qualities. However, the construct of diversity is different in different contexts. According to management literature (Beise, 2004; Harrison, Price, & Bell, 1998; Milliken & Martins, 1996), there are two types of diversity in the workforce. The high visible diversity (or surface-level diversity) refers to diversity in demographic factors that are observable or easily ascertainable, such as race, gender, age, marital status, religion, sexual orientation and ethnicity. The low visible diversity (or deep-level diversity) refers to the diversity in beliefs, values and experiences that are less detectable, such as education, experience, skill, knowledge, and socioeconomic background including culture. Much of current diversity research focuses on studying surface-level diversity because it is more visible. However, the two types of diversity are not unrelated. Surface-level diversity is usually associated with certain deep-level diversity. An example would be race and socioeco-
nomic status. Nevertheless, a challenge for diversity research and practice is to avoid the temptation to treat such correlations as unchanged phenomena, something that can easily lead to unwarranted stereotypes.

Perhaps the easiest argument in support of recognizing diversity in the IT sector is the existence of a global information technology (IT) workforce. This global IT workforce is largely the result of the global IT outsourcing phenomenon. As economic development becomes ever more tied to the information economy, we can expect global diversity with the IT labor force to grow.

Developing a nation’s information economy has been the priority of many nations, with both developed and developing economies. Such development activities include infrastructure building and upgrading, educational initiatives, tax incentives, or other policies for developing the IT sectors, and facilitating the diffusion of information and communication technologies (ICTs) into other sectors (see, for example, Heavin, Fitzgerald, & Trauth, 2003; Trauth, 1993, 1996, 1999, 2000, 2001). As a result, a variety of countries have been equipped with a maturing IT sector and a pool of talented IT workers, which enables them to enter the outsourcing market and to engage in the globally collaborative software work. At the same time, networking technologies have made both asynchronous and real-time communications between different regions and countries feasible, and have created new ways of working and collaboration. In modern economic development, the role of knowledge has been fundamentally changed. According to Drucker (1994), the basic economic resource is no longer capital but knowledge in the new economy. Therefore, more and more attention has now switched to how to effectively utilize and manage the intangible assets—the knowledge workers and their tacit knowledge.

Knowledge workers are people who face work demands requiring higher-order cognitive processes based on complex, emergent, dynamic, and profuse information (Hinsz, 2001). Amidst extensive IT infrastructure, e-governments seek to maximize their return on investment through organizational routines and processes with embedded knowledge (Wimmer & Traummuller, 2000). With this, there is an evident shift towards the softer side of IT whereby knowledge management and therefore, knowledge workers become important facets of an information and knowledge-based economy. In addition, the existence of extensive IT infrastructures requires extensive collaboration and teamwork. Intellectual teamwork involves higher cognitive processes that require collaborations among groups of individuals. It is comprised of the performance of an intellectual task and collaborative work of team members (Hinsz, 2001). In view of these, managing the knowledge within intellectual teamwork becomes crucial.
In the European Union, almost 51 million people were working as professionals or technicians. This amounts to 27.7% of the total labor force in 2003 (Gotzfried, 2004). In terms of recent growth, the highest rate of growth among the 25 nations in the European Union (EU-25) occurred in the sector comprising individuals who have completed a science and technology education program and are currently working in the science and technology sector, with an annual growth rate of 2.6%. “In 2003, over 17% of active 25-34 years old were HRSTC, compared with around 15% of active 35-44 year olds, 14.6% of active 45-64 years old and 15.5% overall. This distribution across the age groups indicates that growth in HRSTC is relative” (Gotzfried, 2004, p. 3). Comparing across other industries, the knowledge-intensive services industry in the EU-25 is most likely to employ the high-trained individuals, with 31.3% of the professionals and technicians employed having at least tertiary education. At the same time, other knowledge intensive services, including health and social work, employ 18.7% of the European labor force in 2003 (Gotzfried, 2004). These figures suggest the emphasis of knowledge work in post-industrial economies in the European Union.

On the global front, global IT outsourcing work, as a knowledge intensive activity, is seeking diverse knowledge resources globally. Chaudhury, Nam, and Rao (1995) defined “information systems (IS) outsourcing” as the organizational decision to “contract various information systems functions such as managing of data centers, operations, hardware support, information systems maintenance, network, and even application development to outside service providers” in order to achieve certain goals (Grover, Teng, & Cheon, 1998).

Much of the IT workforce is derived from global outsourcing (Collins & Birkin, 2004). In 2001, statistics show that the United States of America represented 45% of the global IT services market, while Europe and Asia accounted for 30% and 16% respectively (Dutta, 2004). It is projected that IT outsourcing revenue may reach $159.6 billion by 2005 (Laplante, Costello, Singh, Bindiganaville, & Landon, 2004). The United States is the primary user in the global software and systems development market. This is followed by Western European countries such as the United Kingdom (U.K.) and Germany, as well as Asian countries including Japan and Korea (Sahay, Nicholson, & Krishna, 2003). Countries such as India, Ireland, and Israel, have dominated the offshore outsourcing market as suppliers, while China and Russia are beginning to catch up in this regard (Gopal, Mukhopadhyay, & Krishnan, 2002). Therefore, the global IT workforce is represented by labor from a wide range of nationalities, and thus, cultures.

Following this phenomenon, diversity can be seen as an integral component of global IT outsourcing. Furthermore, there is evidence that the
trends in global IT outsourcing are towards more diversification, including participant diversity, activity diversity, relationship diversity, and cultural diversity (Barr & Tessler, 1996; Lacity & Willcocks, 2001; Sahay, Nicholson, & Krishna, 2003). For example, participant diversity refers to the phenomena that global IT outsourcing participants are no longer limited to large corporations as more and more small suppliers are entering the market by focusing on their own specialties (Lacity & Willcocks, 2001). Activity diversity results from the changes in software outsourcing projects, which have changed from clear-defined activities such as coding and testing to more complex activities such as design and implementation, covering different stages of the software development life cycle and involving different levels of complexity (Barr & Tessler, 1996; Sahay, Nicholson, & Krishna, 2003). Other evidence of diversification is the different alliance relationships between outsourcing companies and the outsourced companies, varying from joint ventures, vendor-supplier relationships and subsidiaries, to newly emerging "broker" (a service to match the outsourcing and outsourced companies) and "hub" models (subcontracting) (Lacity & Willcocks, 2001; Sahay, Nicholson, & Krishna, 2003).

An increasing number of countries are now entering the IT outsourcing market. Companies in Japan and Korea join those of the United States, Canada, and other western European nations in outsourcing their software or information system development and services activities to other countries. Besides the current leading outsourced countries such as India, Ireland, and Israel, Russia, and China are now establishing their capabilities as outsourcing providers (Sahay, Nicholson, & Krishna, 2003). The more countries join the global IT market, the more cultural diversity that global IT work practices are facing. As more and more countries enter the outsourcing market, how to make sense of the influence and impact of cultural diversity in globally distributed work and how to manage the cultural diversity in the outsourcing relationship are becoming the primary concerns. Therefore, diversity is inherent in global IT outsourcing and how to manage such diversity is a challenging issue for both global IT outsourcing research and practice.

At the same time that diversity exists in the IT workforce by virtue of its global character, it can also be argued that, in terms of specific demographics, the IT workforce is not diverse. Women, racial minorities, and older employees have made fewer inroads into IT employment. Although, the extent of this under representation is wide spread, it is important to note the variations by geographical region. Thus, the remainder of this section will detail the underrepresentation of women, racial minorities, and older employees in the North America, Europe, and the Asia Pacific regions.
The historical underrepresentation of women in technical disciplines has been an area of study for many years (Arnold & Niederman, 2001; Crawford, 2001; Nielsen, von Hellens, Greenhill, & Pringle, 1997; Sumner & Werner, 2001; von Hellens & Nielsen, 2001). With regard to the United States, a recent study in 2003 produced by the Information Technology Association of America (ITAA) Blue Ribbon Diversity Panel found that women made few inroads into high tech employment and their representation fell from 41 to 34.9% between 1996 and 2002. This number is significantly low considering that, during the same period, the percentage of women in all occupations in the United States changed from 46% to 46.6% (see Table 13.1). The amount of women working in IT occupations has also declined in Canada over the last decade from 28% in 2001 to 25% in 2003. This is particularly unfortunate given the number of educational programs that were introduced throughout the 1980s and 1990s to encourage girls and women to pursue science and technology training (Downie, Dryburgh, McMullin, & Ranson, 2004). The Workforce Aging in the New Economy (2004) reports that with regard to Europe, the industry and policy initiatives to attract more women into the profession have not been met with success and the ratio of women in IT remains unchanged. In addition, the IT downturn in the late 1990s has led to more sustained job losses for women compared to men. In the United Kingdom and Germany, men outnumber women five to one in computing professions; in the Netherlands it is seven to one. Furthermore, in 2001, only 22% of the Australia IT workforce was comprised of women.

As with women, racial minorities are also underrepresented in the IT workforce. In the United States the percentage of African Americans in the overall IT workforce fell from 9.1% to 8.2% between 1996 and 2002. African Americans are underrepresented in the IT workforce as compared to their 2002 participation rate of 10.9% in the general U.S. workforce. Hispanic Americans and Native Americans in the U.S. IT workforce have 6.3% and 6.6% participation rates respectively in 2002. These minorities are also underrepresented in the IT workforce, as compared to their overall 2002 U.S. workforce participation rates of 12.2% and 9% respectively (Information Technology Association of America, ITAA, 2003; J.C. Morgan, Marshall, & Moloney, 2004a) (see Table 13.1).

An older population is also underrepresented in the IT workforce. In 2002, only 29.4% of the U.S. IT workforce was comprised of workers over the age of 45 (as compared to 37.6% of the overall U.S. workforce) (Morgan et al., 2004a). Likewise, in Canada, older workers are underrepresented in the IT workforce with only 15% between the ages of 45 and 54 and only 3% between the ages of 54 and 64 (Downie et al., 2004). As with Europe, the overwhelming majority of IT workers are under the age of 45. In 2002, the German IT workforce was heavily comprised of
Table 13.1. Representation of Women and Minorities in the U.S. IT Workforce versus Overall U.S. Workforce (1996 and 2002)

<table>
<thead>
<tr>
<th></th>
<th>Total IT Occupations</th>
<th>All Occupations</th>
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<tbody>
<tr>
<td>2002 % Men</td>
<td>65.1</td>
<td>53.4</td>
</tr>
<tr>
<td>2002 % Women</td>
<td>34.9</td>
<td>46.6</td>
</tr>
<tr>
<td>2002 % White</td>
<td>77.7</td>
<td>83.5</td>
</tr>
<tr>
<td>2002 % African American</td>
<td>8.2</td>
<td>10.9</td>
</tr>
<tr>
<td>2002 % Asian/Pacific Islander</td>
<td>11.8</td>
<td>4.0</td>
</tr>
<tr>
<td>2002 % Indian</td>
<td>.6</td>
<td>.9</td>
</tr>
<tr>
<td>2002 % Hispanic</td>
<td>6.3</td>
<td>12.2</td>
</tr>
</tbody>
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|                |                  |                |
| 1996 % Men     | 59                | 54              |
| 1996 % Women   | 41                | 46              |
| 1996 % White   | 82.5              | 85.1            |
| 1996 % African American | 9.1  | 10.7            |
| 1996 % Hispanic| 5.3               | 9.2             |
| 1996 % Other*  | 8.4               | 4.2             |

* 1996 BLS data did not break out other race data, and thus statistics are not available.


under age 44 employees with 77.5% as compared to 79.5% in the Netherlands and 82.2% in the United Kingdom. Furthermore, in 2001, the Australian IT workforce was comprised of approximately 6% of employees over the age of 55 (Workforce Aging in the New Economy, WANE, 2004). While the statistical facts about the underrepresentation of women, racial minorities, and older employees have been widely investigated, much less is known about the reasons why these groups are underrepresented.

RECOGNIZING THE VALUE OF DIVERSITY IN THE IT SECTOR

We contend that a serious consideration of the value of diversity in the IT sector must move beyond simplistic and uncritical claims that diversity, in and of itself, is a good thing. That is, the claim that diversity is valuable in the absence of an articulated rationale for embracing it can lead to superficial efforts to achieve diversity that focus almost exclusively on "number counting." Rather, a productive discussion of diversity in the IT workforce
should consider both the opportunities and the challenges associated with it. We argue that diversity in the IT workforce should be embraced and studied because diversity is one of the basic characteristics of the information economy in the global context (the existence of diversity) and is an active force that pushes social transformation in the globalization process (the value of diversity).

One claim for the value of diversity comes from the features inherent in the information economy. In the information economy, an important phenomenon is the rise and dominance of knowledge workers, both IT professionals and IT-enabled knowledge workers. Knowledge and skills replace physical conditions as the key assets, which help to establish fairness and equal access among individuals in the workforce. In this manner, diversity initiatives should provide women, minorities and other under-represented individuals the opportunities to contribute positively to the knowledge economy. Wośczyńska, Meyers, Beise, and Moody (2004) documents that presently, “large and important groups within society do not have full access to the intrinsic and extrinsic rewards of exciting careers in IT today.” The value knowledge workers create is tightly related to not only their diverse experience, skills, knowledge, and specialties, but also to their diverse socioeconomic backgrounds. Globalization is not the same thing as unification, however. To develop a global market, to serve the different information needs of different people, we need to leverage the IT capability to the real needs of different end users and consumers. Thus, a distinguishing feature of the information economy is its focus on diversity and creativity in today’s fast changing world. For example, Klein, Jiang, and Tesch, (2002) study of information system project failures suggested that there should be a blend of IS professional orientations (technical, end user, and sociopolitical orientations) to minimize the risk of system failures.

A second claim for the value of diversity can be found in the literature of workforce productivity. Milliken and Martins (1996) studied managerial literature regarding the effects of diversity on the individual, the group and the organization. They pointed out that the perception of diversity and the effects of diversity are related to the organizational and social contexts with which they interact. In their framework, there are four different types of consequences of diversity: the “affective consequences,” which include the individual satisfaction, commitment, identification with the group, and the perceived discrimination; the “cognitive consequences,” which include the range of perspective, ideas, and innovation that represent the collective perspective; the “symbolic consequences,” which depict the organizational image as an outcome because the composition of a group or an organization has symbolic significance for both internal and external stakeholders; and “communication-related conse-
quences," which state that a diverse group may better fulfill the boundary-
spanning role when interacting with the external diverse environment.
Qureshi, Bogenrieder, and Kumar (2000) explored the issue of participa-
tory diversity in virtual teams and argued that diversity in groups may
bring out the social-cognitive conflicts (cognitive difference that represent
different socioeconomic backgrounds) in group dynamics and may create
conditions for enhanced organizational learning and innovation.

A third argument for the value of diversity comes from the change in
labor from manual to knowledge-based. With the movement from an
agrarian or industrial economy to a knowledge economy, the labor force
focus shifts, as well, "from brawn to brains." This argument is typically
used in research directed at increasing gender and racial representation
in the IT workforce. Thus, it can be said that the best brains are in
demand no matter what the body for two reasons. First and foremost, val-
ing diversity will help to address the IT skills shortage. Second, valuing
diversity will contribute to more diverse IT services and products.

Several agencies, associations, and researchers are attempting to track
the size and shortage of people in the IT workforce and studies have sta-
tistically revealed the extent to which the IT workforce is suffering from a
shortage (Freeman & Aspray, 1999; ITAA, 2002; Office of Technology Pol-
icy, 1998, 1999; Roberts, 2000; Schenk & Davis, 1998). IT related posi-
tions are the fastest growing occupations in the world and are among the
largest professional specialties, rivaling that of nursing, elementary, and
secondary teaching and engineering. For example, the U.S. Department
of Commerce (2000) expects new jobs for IT workers to increase 78.7%
between 1998 and 2008. In addition, the United States will need to
replace 306,000 workers who are leaving these occupations due to retire-
ment, change of profession, and various other reasons. Therefore, the
United States will require 2 million new IT workers in the 10 year period
(1998 to 2008), which is an average of approximately 201,800 workers
each year. An additional analysis of data, reports that "IT jobs will grow
slightly more than 7 percent per year over the decade, far more quickly
than the 1.4-percent average across all jobs" (Hilton, 2001). Also, in 2004,
ITAA reported that what appeared to be a 2% increase in IT employment
from 2003 to 2004, has a now "shrinking forecast" for growth in the
future. Even so, the forecast is for continued IT employee shortages,
despite the underrepresentation of the women, racial minorities, and
older workers the IT workforce. Addressing this underrepresentation of
diverse workers would make a clear effort at resolving the worker short-
age. If the IT labor force were open to more diverse workers then fewer
shortages would exist. Thus, IT workforce diversity is of vast importance
because it directly impacts the IT skills shortage.
The lack of diverse perspectives in the IT workforce also has a direct influence on the diversity of products and services of the IT industry. Wardle (2003) highlighted the importance of diversity in IT with the example of automotive airbags and videoconferencing technologies. Wardle explained that the original automotive airbag developers were comprised of a predominately male team and as a result they overlooked the needs and requirements a diverse range of body types and sizes. Consequently, the first airbag prototypes proved to be dangerous for women and children. Wardle also discussed the initial limitations of video conferencing technologies. An all male team designed a videoconferencing technology that could redirect the video and audio to follow the speaker. Yet, upon implementation the technology could not register a female vocal pitch and therefore overlooked them (Wardle, 2003). These two examples highlight the limited diversity of products and services which results from a homogenous workforce. Thus, valuing diversity will contribute to more diverse and innovative IT products and services that appeal to a wider audience.

This claim for the value of diversity in the IT sector speaks to a more generic claim that *can* be made—but that is not often found in the literature—that the IT sector benefits from “embodied brains.” That is, the IT sector benefits from having diverse people in it who bring to their work the totality of who they are and how their life experiences (deriving, in part, from their demographic characteristics) inform how they do their work. According to Lakoff the human brain utilizes input from the body. In addition, the way in which our bodies function, influences the construction of the concepts used in the thought process. Lakoff asserts that “we cannot think just anything—only what our embodied brains permit” (Brockman, 1999). In arguing for the importance and value of diversity coming from the embodied brain, we are claiming that both the intellect and the experience that comes from cultural, social, and environmental experiences distinctly set individuals apart in their thinking, action, and approach to situations.

Individuals do not interact in an environment in an isolated manner. There are undoubtedly different elements of people’s personal characteristics, backgrounds, and experiences that shape and influence the way in which they interact and view the world. The challenge of achieving diversity in a workforce lies in the fact that diversity encompasses much more than a variety of races and genders to be checked off on a human resources survey. Diversity in the workforce is beneficial in gaining a competitive edge in the marketplace by positioning the organization’s workforce to be sensitive to a variety of cultures and lifestyles (Elmuti, 2001). There is also evidence that workgroups that are diverse are shown to make higher quality decisions, are more creatively motivated, and have a higher
productivity potential than less diverse groups (Hartenian, 2000). Lastly, diversity in the organization requires the value of different cultures and interpretations of work styles and practices to achieve cohesiveness and progress (Borchers, 2003).

Woszczynski, Beise, Myers, and Moody (2003) discuss the influence of these different demographic groups on technology. They argue that without the participation of women in development of technical artifacts, for example, the process may be more geared towards speed than innovation. Also, with the input of disabled individuals, more emphasis may be placed on accessibility and usability of different attributes of technology. Diversity of age in IT teams provides rich knowledge that facilitates an understanding rooted in history and experience in the field. Last, culturally diverse teams are necessary to meet the demands of globalization in the IT workforce.

Embodied brains may come in many forms, representing a range of demographic characteristics that make an individual’s experience and understanding both very rich and unique. All are important to creating intellectual and human capital in a workforce. They may be realized through the lens of gender, race, age, cultural background, sexual orientation, or other demographic characteristics. The IT sector needs embodied brains largely because of the nature of the audience for whom the artifacts are created. IT is often integrated into environments of non-homogenous users and if we do not integrate the contribution of those who represent the diversity of the user pool, a disadvantage may be built into the process, resulting in the poor design and use of the technology.

An emergent argument for the value of diversity is that it is intimately bound up with IT innovation capacity. In a demographic study of the population characteristics of U.S. high tech sectors, Florida (2002) showed the strong correlation between the most successful high tech economies and certain diversity indices. Specifically, he showed a strong correlation between the thriving high tech regions in the United States and their scores on the: (1) gay index; (2) Bohemian (i.e., artists) index; and (3) melting pot (i.e., immigrant) index. Florida used these data to make the case that high performing IT professionals are drawn to regions with significant demographic diversity. Hence, he argues that one aspect of developing the IT innovation capacity of a region is developing the diversity of the local population. The objective, then, is to develop not just technology and talent but also tolerance for human differences.

Trauth (2004) has extended this argument. She believes that there is another factor at work beyond a desire on the part of high tech professionals to be surrounded by other creative people. She speculates that the connection between demographic diversity and innovation in IT
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...derivates from the changed thinking that results from the interaction of people who are different from each other. Her argument is that creativity underlying technology innovation is fueled by interactions with people from different cultures, religions, ages, racial, and ethnic backgrounds and sexual orientations. When an individual interacts with someone who possesses a different history (e.g., ethnic differences), belief system (e.g., religious differences), or life style (e.g., sexual orientation) she or he is quite often required to adjust underlying assumptions about human behavior, motivation, and so forth. As a result of this clash of assumptions, one gets practice in thinking differently. And it is this ability to "think differently" about a topic that is often identified as the essence of creativity.

A final argument for the value deriving from greater diversity in the IT workforce comes from literature that more generally addresses social exclusion and the digital divide. According to this claim, diversity in the IT workforce is also important in terms of the social good that results: addressing the gap between those who participate with technology, and those who do not. The digital divide is a phenomenon that explores the "haves" and "have-nots" in the information society. In an effort to address this situation, increasing the diversity of those creating the technology for a global audience will help to better suit the artifacts to a wider audience. In doing so, greater attention is being paid to the social access (Kvasny & Payton, 2004) beyond the physical access.

Importantly, current design practices do not always take into account the diversity of the user population or their backgrounds. This situation may contribute to the advantaging of some users and the disadvantaging of others, thereby reinforcing the digital divide. Amichai-Hamburger (2002) explores how Internet designers often choose not to take Internet users' personalities into account when developing their technology. The author describes an attitude on the part of Internet developers that they "know what's good for you," and make decisions based upon that principle (p. 3). Perhaps the only user aspect that Internet developers take into consideration is the role of the user as a consumer.

Technology users are a diverse group of individuals. No one type of user can be identified as the benchmark for the development of universal systems. Many differences exist among types of users such as race, education level, socioeconomic status, cognitive style, nationality, and so forth. A major difference in users has to do with the dichotomy of insiders versus outsiders. Insiders are those privileged enough to have the resources that make technology both easily accessible and beneficial. Outsiders can be characterized as those information "poor" who are disadvantaged in the information, skills or items necessary to be productive on the Internet. This dichotomy highlights the fact that Internet technology is cur-
rently targeted toward insiders, and provides an additional obstacle for those already in a disadvantaged position in relation to Internet technology.

Chatman (1996) discusses the experience of the "information poor" in a world of insiders to information technology. Outsiders often live in a world excluded from the knowledge and awareness enjoyed by insiders. The "information disconnect" that exists between the worlds of insiders and outsiders may possibly be explained by outsiders being disadvantaged in understanding the world of the insiders. This point is important because much of the design and development of information technology occurs by and with the needs of insiders as the focus.

In an information or knowledge economy, power is conferred upon those who possess information and knowledge. Power shifts from one class to another but hierarchies are still evident. There is increased competition through the introduction of more players, higher expectations, heightened communication among players, removal of infrastructural constraints and an infinite economic environment. However, the ability to compete is determined by access to information (Hamelink, 1986). In the information or knowledge economy, information is accurately conceptualized as a commodity that extends capitalism with its value ascertained by digitization (Mosco, 1989). In this regard, information products and services become commodities that are sold. These include for instance digital stock information and music downloads, that are available within a few clicks at the comfort of a consumer's home. With the commoditization of information, culture, and communication, it represents a shift from one industrial mode of organization to another mode of industrial organization, that is, from Fordism to Gatersm (Tremblay, 1995), but preserves the industrial class relations.

The introduction of diversity in the workforce changes the class distinctions and social digital divides that were the result of socioeconomic disparities among different ethnic groups. Through outsourcing IT work to developing regions, the dynamics of these socioeconomic disparities change. Social and economic opportunities are extended to ethnic groups of lower socioeconomic statuses, thereby altering the dynamics of class relations at a societal level.

A RESEARCH AGENDA FOR DIVERSITY IN IT

The diversity in the IT workforce research agenda in the Center for the Information Society at The Pennsylvania State University is addressing both the existence of diversity and the value of diversity in our research
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projects. Below, we show how both of these themes are being made concrete by describing our individual diversity research agendas.

**Haiyan Huang: Situated Culture in Globally Distributed IT Work (Outsourcing)**

Global IT outsourcing has become an established practice of information system and software development. Initially driven by economic incentives and strategic concerns, it has become a distinct social phenomenon that stimulates a variety of economic and political debates and posts intriguing challenges in many research disciplines. Situated in the contemporary globalization context, the work practices and management of global software development are complex and multifaceted in nature.

Several researchers have commented on the process of globalization and its influences on information system development, arguing that globalization is not a homogeneous process and would not lead to a decrease in cultural diversity (Avegerou, 2002; Sahay, Nicholson, & Krishna, 2003; Walsham, 2001). On the contrary, cultural diversity and its effects are influential and critical to the development and adoption of information systems in different nations and organizations, and to globally collaborative work practices.

In our framework, we argue that recognizing the existence of diversity and recognizing the value of diversity (see Figure 13.1) influence the IT work. In the context of global IT outsourcing, most of the IT work is conducted by globally distributed virtual teams, in which individual team members from different cultural backgrounds may have different beliefs, values, attitudes, competencies, and perceptions towards work relations and work processes (Dafoulas & Macaulay, 2001). Dafoulas and Macaulay (2001) pointed out that cultural diversity may be beneficial for team performance. Especially on tasks for which differing perspectives might increase team performance, culturally diverse teams are expected to perform better than homogeneous teams in the long run (Dafoulas & Macaulay, 2001; Watson, Kumar, & Michaelsen, 1993).

In addition, globally distributed IT work will have impacts on work practices, productivity, and work management (see Figure 13.1). For example, according to Herbsleb and Mockus (2003), the change of communication patterns and the lack of effective communication channels (formal or informal) in globally distributed software development teams usually lead to delays in global software development projects. Cramton and Webber (2005) studied virtual teams specializing in designing customized software package and demonstrated a negative relationship
between geographic dispersion and perceived team performance with respect to complex and interdependent tasks. Therefore, globally distributed software development faces the dilemma of taking advantage of human resource diversity and at the same time, space, and cultural distance barriers to effective communication and coordination in geographically dispersed environments.

Walsham (2000a, 2001) focused on the national level of analysis and stressed that the existing culture of a country is a critical factor in mediating the globalization process in the specific context and, in turn, will have an impact on the complexity of globalization. Avegerou (2002) studied the institutional issues of globalization and proposed a relativist perspective and a situated approach to understanding the diversity in national and organizational culture. Sahay, Nicholson, and Krishna (2003) criticized the functionalist view of culture and the predominant national level of analysis of studying the cultural diversity in global distributed software work. They focused on studying culture in the process of communication between actors from across national and organizational borders and how cultural differences may shape the subsequent communication.

At the center of my research agenda on global IT outsourcing, I take the stand that diversity is inherent in global IT outsourcing. Hence my research agenda focuses on understanding cultural diversity, and how to make sense of and manage such cultural diversity. My research questions include: What is cultural diversity? How does cultural diversity, at different levels, affect knowledge workers from different cultures who are engaging in globally collaborative software work? How is cultural diversity manifested in global IT outsourcing activities and relationships? How may such cultural diversity evolve with the processes of global IT outsourcing? And what are the theoretical, practical, and policy implications?

From the methodological perspective, I adopt the situated perspective (Avegerou, 2002) and would like to study cultural diversity by situating culture in the local context and socially negotiated work practices (Weisinger & Trauth, 2002, 2003). To explore the situated context requires the researcher to adopt a relational and constructive ontology and epistemology to study and understand the authentic local phenomena from an interpretative perspective (Huang, Yeo, & Trauth, forthcoming). I agree with Walsham’s proposal (2000a; 2001) that cultural study should not be constrained by a set of reduced variables and needs to go beyond the simple “universal approach.” Instead of positivist studies, I think that interpretative and action research methods that aim to explore an in-depth understanding of complex phenomena are more
appropriate for our future research on the issues of global IT outsourcing and global collaborative software work.

**Allison Morgan: Individual Differences in Web Searching Behavior**

The Internet is an increasingly important technology in today’s society. It provides a vehicle for communication, creation, and dissemination of information and education. This medium is now also influential in providing access to opportunities and resources that are unavailable through other sources. Many positive qualities of the technology center on the Internet’s ease of use and the unlimited amount of information housed on it. However, the benefits that are ascribed to the Internet do not appear to be sufficient to motivate the utilization of this technology.

According to Walsham (2000b) the challenge for the IT community is to “design information systems that enable an increased connectivity but also support this inherent diversity” (p. 1). This research follows in that stream by investigating the diversity of users and their information behavior. In addition, issues surrounding user behavior and the digital divide focus on enhancing technology and its use by the larger global community not just specific expert user groups. In addition, Ford, Miller, and Moss (2001) makes the argument that there is a need to acquire “knowledge of more fundamental and enduring factors that can help us improve people’s internet retrieval in deep and lasting—as opposed to relatively superficial and fleeting—ways” (p. 1049). The importance of this research is also echoed by Borgman (1987) who states that user diversity is an issue in the development of any interactive system, but that information retrieval systems are a particularly appropriate domain for study.

Currently, Web search engines provide users with their primary source for locating content on the Web. It appears, however, that different searchers have different experiences in terms of their ability to find the information that they seek using Web search engines. In addition, the experience that a user may have with a Web search engine may also impact her or his attitude towards Internet technology as a whole. The characteristics that make one searcher more effective than another are presently not well defined. Therefore, individual differences may play a role in the Web searching skills of users and their performance with Web search engines.

This research program seeks to explore the value of human diversity by evaluating individuals in their search for information on the Internet. It is an effort to better understand how the diversity of individuals may influence factors of system design to overcome the social exclusion of certain
groups from participation with Internet technology. The impact of this research may help to address issues of social digital divides in relation to information technology.

This important area of study would address the potential barriers to users of Internet technology and provide insight into a way to address a motivating factor for the digital divide and those persons who do not participate with Internet technology. This type of study will contribute to the research community and society by helping to identify the factors influencing different users’ Web search skills and identifying behavior that could provide developers with recommendations to build better, more usable systems.

**Jeri Quesenberry: Diversity in the IT Workforce**

An area of growing research focuses on the study of historically underrepresented groups in the information society and the IT workforce by investigating the factors that contribute to the interaction, consumption and usage (or disuse) of IT by people of different sexes, ages, sexual orientations, races, ethnicities, socioeconomic classes, and cultures. This research examines diversity from a sociotechnical perspective to problematize issues of underrepresented groups in IT and give voice to those marginalized by the power discourse of technology (Kvasny & Trauth, 2002; Kvasny & Truex, 2001; Tapia & Kvasny, 2004; Tapia, Kvasny, & Trauthe, 2004). My research goals are in line with this area and broadly speaking are aimed at understanding how technology changes and shapes lives and how people respond to technology from a wide range of perspectives.

More specifically, my research goal is focused on understanding the role of gender in technical fields and the reasons why women are underrepresented in IT careers. The goal of this project is to combine findings from two areas of research on women in the IT workforce: results of a meta-analysis of published quantitative studies coupled with emergent themes from a field-based qualitative study. In doing so, a quantitative survey instrument and a qualitative interview guide will be developed to use in testing and refinement of the individual difference theory of gender and IT (Trauth, 2002; Trauth, Quesenberry, & Morgan, 2004) (a more detailed description of this theory is given in the following section). The survey will be used to gather data from women employed in the IT workforce at an individual level of analysis and will primarily focus on examining issues related to the value of workforce diversity such as embodied diversity, innovation and overcoming social exclusion (see Figure 13.1). The interview guide will be used to gather data from employers in the IT...
workforce at an organizational level of analysis and will primarily focus on organizational factors of productivity, technological innovation and work practices (see Figure 13.1). These results will be analyzed for theory testing and refinement to make informed recommendations to organizational policy and practice.

**Benjamin Jwee Kiat Yeo: Diversity in Knowledge Economy Development**

The development of a knowledge economy must be supported by the national culture, because it is closely related to the success or failure of economic initiatives and hence the economy. For example, the success of the Russian revolution led by the then small Bolshevik party in 1917 was successful mainly because its revolutionary ideals coincided with the serfs’ (who constituted the majority) values in life. These values consisted of endurance, communal spirit, equality, and brevity. The Bolshevik party based its revolutionary ideals on these values and leveraged the cultural capacity of the serfs to emerge victorious. Citing another example, Japan’s economic success in the industrial era was largely due to leverage of its national culture. Its successful economy was shaped by its traditional values of cooperation, lack of self-achieving drives (“organization before self”), Japanese tradition, stability, and shared knowledge. Its economic supremacy is based on stability rather than quick results. In addition, the Japanese culture emphasizes knowledge and active learning processes. Hence they imitate other countries’ economic models and strategies and adapt them to their own economic context (Basu, 2003).

It follows, then, that economic development is not based simply on a success formula. Consideration must be given to national culture. Given that a knowledge workforce in a knowledge economy has considerable cultural diversity, it will be a challenge to simultaneously adopt different management strategies and economic initiatives to account for the different cultural values in its knowledge workforce. For instance, how can effective learning and training processes that are crucial to labor flexibility, be enforced on a diverse knowledge workforce?

On the one hand, cultural diversity boosts technological innovation. But on the other hand, it brings about challenges to the knowledge economy. Against this backdrop, my research agenda is two-fold. First, I wish to study the relationship between cultural diversity (in the form of human diversity as illustrated in Figure 13.1) in a knowledge workforce and the knowledge economy. My research agenda is primarily focused on the societal level of analysis. From Figure 13.1, my research studies the influence of human diversity on IT work, and the impact of this newly-shaped IT
work on society. Is cultural diversity (in the form of human diversity) a facilitator or inhibitor to the development of a knowledge economy at a societal level? Second, if diversity is a facilitator in a knowledge economy, how can it be managed to sustain the knowledge economy? In response to these research questions, the issues that I seek to address are illustrated in Figure 13.1: economic progress, industrial development, economic class relations, and social digital divides. These issues are situated within the phenomenon of a knowledge economy.

To study this, I propose to study agrarian economies that are developing knowledge economies and knowledge economies that are developing economic initiatives to sustain their growth. The former will relate to the influence of diversity as a facilitator or inhibitor, and the latter will relate to the challenge of diversity as a cultural impact of the knowledge economy.

**Eileen M. Trauth: The Individual Differences Theory of Gender and IT**

The objective of this research agenda is to develop theory to help us uncover the meaning behind the statistics about the underrepresentation of women in the IT workforce. It is being achieved by focusing attention on the differences among women, that is, the variation that exists with a gender group rather than across the two gender groups. In doing so, this approach stands in stark contrast to the majority of gender and IT research which focuses attention on the differences between men and women. Based on data from Australia, Ireland, New Zealand, and the United States, an empirically-grounded theory of individual differences is being articulated to explain the underrepresentation of women in the IT workforce (Kvasny, Greenhill, & Trauth, 2005; Morgan et al., 2004a; Nielsen, von Hellens, Beekjuyzen, & Trauth, 2003; Quesenberry, Morgan, & Trauth, 2004; Trauth, 1995, 2000, 2002; Trauth, Nielsen, & von Hellens, 2003; Trauth, Quesenberry, & Morgan, 2004; Trauth, Quesenberry, & Yeo, 2005).

The empirically-grounded theory of gender and IT focuses on individual differences among women in the ways they experience and respond to characteristics of IT work, the IT workplace and societal messages about women and IT. Thus, the theory demonstrates the differences within rather than between the sexes and examines issues at the individual level rather than at the group level of analysis. This perspective focuses on women as individuals that have distinct personalities, experience a range of sociocultural influences, and therefore exhibit a range of responses to the social construction of the IT field. The goal of this research is to engage that for shaping the IT influential, human
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engage in field-based theory refinement by examining the particular ways that female IT professionals are influenced by and react to the social shaping of both gender identity and IT. This research program employs the IT Diversity Research Framework (Figure 13.1) by focusing on the influence side of the Framework: the existence of human diversity (in particular, the existence of diversity among women) as well as the value of human diversity in the IT workforce.

CONCLUSION

The objective in writing this chapter is to explore the call for diversity in the IT workforce by critically examining both the meaning and the claimed benefits of diversity. Two themes are used to problematize the literature on diversity in IT: recognizing the existence of diversity and recognizing the value of diversity. To further this effort we present a framework for diversity in IT research that links diversity to the effects in the IT workplace and, ultimately, to effects in the organization and wider society. In order to show how both of these themes can be enacted in research, we describe our individual diversity research agendas.

As our analysis of the value claims of diversity shows, diversity in the workforce and in working groups has the potential for both negative effects (the emergence of conflicts and less cohesion) and positive effects (the innovation capability and better fit with the needs of consumers). Therefore, the challenge for managing IT workforce diversity is to determine how to leverage diversity in such a way as to resolve possible conflicts by turning them into a driving force for learning and creativity.

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NOTES

1. http://www.ipma-hr.org/
2. http://www.naspe.net/
3. Psychographics refer to qualitative definitions of people’s lifestyles, interests, and likes. Psychographic analysis is also referred to as life style analysis because it is based on an individual’s activities, interests, and opinions (American Marketing Association, 2004)
4. This framework is an extension of Trauth's influence-impact framework that resulted from her ethnographic study of the socio-cultural influences and impacts of Ireland's emerging information economy. See Trauth (2000) for greater elaboration of this framework. In that research the term influence is used to describe social forces affecting the establishment of the information economy whereas the term impact is used to describe ways in which the society is affected by the information economy. The terms are used in an equivalent manner in this chapter.

5. The term "information economy" as used here, employs Trauth's (2000) definition: that portion of a nation's economy devoted to the production and manipulation of information tools (i.e., hardware, software, systems, and content).

6. HRSTC stands for Human Resources in Science and Technology Core.

7. This includes knowledge-intensive high technology services, knowledge intensive market services, and knowledge intensive financial services (Gotzfried, 2004).

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