Chapter III
The Impact of New Trends in the Delivery and Utilization of Enterprise ICT on Supplier and User Organizations

Jiri Vorisek
University of Economics Prague, Czech Republic

George Feuerlicht
University of Economics Prague, Czech Republic

ABSTRACT

Enterprise information systems have rapidly evolved over the last decade. We expect these changes to accelerate during this decade as a result of new trends in enterprise computing. We argue in this chapter that information and communication technology (ICT) remains strategically important to organizations in the 21st century despite the prevailing trend to outsource ICT and related business processes. We have identified a number of important trends that include the move towards the software as a service (SaaS) model for enterprise applications, increased commitment to process orientation, and emphasis on managing the relationship between business and ICT using services. These trends lead to more effective management of ICT and closer integration of ICT with entrepreneurial activities and business processes in organizations, resulting in improvements in return on investment. These trends will have dramatic impact on both the suppliers and users of ICT, and will necessitate the reevaluation of the approach to ICT education as both the composition and qualifications of ICT workforce will undergo a fundamental change.
INTRODUCTION

The high cost of information and communication technology (ICT) solutions combined with the fast evolution of hardware and software necessitating frequent and costly upgrades has led some observers to conclude that investment in IT does not provide a competitive advantage to organizations and in some cases can detract from the core business in which the organization is engaged. Nicolas Carr (2003), in his controversial article titled “IT Doesn’t Matter,” sparked a wide-ranging discussion about the benefits of IT in the context of enterprise computing, and in his follow up paper titled “The End of Corporate Computing” (Carr, 2005) he further argues that “IT is shifting from being an asset companies own to a service they purchase.” Carr predicts a momentous shift from the present enterprise computing environment based on ownership of ICT infrastructure and licensed software to the world of utility computing where software services are delivered to organizations from a remote data center in much the same way as electricity.

There is little doubt that enterprise computing is undergoing a dramatic transition driven by organizations looking for ways to reduce the cost of ICT solutions and at the same time to increase the effectiveness of ICT in supporting their business goals. Among the alternatives that are becoming increasingly more popular are various forms of outsourcing, including the software as a service (SaaS) model with enterprise applications and the corresponding infrastructure hosted by an external application service provider (ASP). Enterprise computing is being transformed from the traditional model based on licensed and on-site installed software towards subscription-based models with software delivered as a service by external providers. We have previously analyzed these trends (Feuerlicht & Voříšek, 2003, 2004) and concluded that the SaaS model will become a dominant form of delivering enterprise applications in the near future and that the use of externally provided information services will shape the ICT market and determine management decisions about deployment of enterprise ICT. This conclusion was supported by leading ICT professionals in recent interviews conducted in the Czech Republic (M. Bednár, personal communication, May 2005; R. Hradilek, personal communication, April 2005; J. Kameniček, personal communication, May 2005; J. Polák, personal communication, June 2005). These experts confirm that the changes currently taking place will have dramatic impact on both user organizations and organizations supplying ICT products and services. Our analysis in this chapter is based on these interviews and other relevant literature sources. We first identify the main enterprise computing trends, and then discuss the impact of these trends on ICT user and supplier organizations, and finally comment on the resulting changes in university-level ICT education.

KEY ENTERPRISE COMPUTING TRENDS

The claims about waning importance of ICT in the context of enterprise computing and the commoditization of enterprise applications (Carr, 2003, 2005) leading to the wide-spread adoption of the utility computing model requires a closer analysis in the context of the dominant ICT trends.

Strategic Importance of ICT

Direct comparison of ICT services with the supply of electricity by utilities ignores the rather complex relationship between software applications and business processes that these applications support or implement, treating ICT in isolation from entrepreneurial activities and company culture. In general, ICT has an important influence over the effectiveness of business processes and the success of the business model. Competitive advantage arises from close integration of ICT with
business processes and entrepreneurial activities within the organization. The unique character of the combination of a product or a service with the supporting ICT infrastructure and business applications can deliver significantly higher business value or a lower cost, giving the company a strategic advantage.

It is possible to argue that hardware, operating systems, and some types of applications (e.g., office applications) have the characteristics of a commodity, but enterprise applications such as enterprise resource planning (ERP), customer relationship management (CRM), and business intelligence (BI) require extensive customization and integration with other business applications and can create a strategic advantage for an organization (J. Kameníček, personal communication, May 2005). While there are some types of applications that no longer provide strategic advantage to organizations over their competitors (e.g., e-mail, office automation applications, etc.), there are many other types of applications that support specialized business processes that are the very source of competitive advantage. It is important to differentiate between applications that support business processes (e.g., back office, logistics, CRM, etc.) and applications that directly implement business processes, that is, where the process exists only in the form of software (e.g., electronic banking, mobile telephony, etc.). Applications that support business processes can result in competitive advantage when combined with specialized business processes and knowledge within an organization. This unique combination can result in improved effectiveness and agility of business activities. Applications that directly implement business processes can produce competitive advantage by timely deployment leading to increased market share (M. Bednár, personal communication, May 2005). For example, the success of Czech Courier founded in 1999 to focus on express delivery of consignments can be largely attributed to their unique online application system, eKurýr (www.ekuryr.cz). As a result the deployment of this system the company has become a pioneer in utilizing the Internet as a new commercial platform for courier services and gained a significant market share.

Another important factor that supports the argument for strategic importance of ICT is the increasing demand for timeliness and quality of information used for making decision by all levels of management. Largely due to globalization, reaction times to external events such as changed business conditions or new business opportunities are today measured in days; responding within such a short period of time requires an agile and highly effective ICT architecture.

It can be concluded that strategic advantage cannot be achieved today by simply deploying new technology. However, strategic advantage can be derived from the close integration of ICT with organizational business processes and entrepreneurial activities that produces an environment which facilitates rapid responses to important business events, and at the same time reduces the cost and increases the quality of products and services.

Process Orientation

An important prerequisite for maximizing the value of ICT investment is process orientation of the enterprise (Hamm, 2005; Hammer & Champy, 1993; Nevens, 2002; Scheer, 2000). It is becoming clear that managing an enterprise along functional boundaries results in difficulties that include problems with reconciling the interests of individual departments with organizational goals, ambiguous business processes, and poor predictability of response times to important events. Adopting process orientation addresses these issues and at the same time improves the strategic value of ICT solutions (Voríšek, Pavelka, & Vít, 2003).

Figure 1 depicts a process-managed enterprise identifying key layers of the business architecture:
The Impact of New Trends in the Delivery and Utilization of Enterprise ICT

• Business strategy formulation and implementation (layer 1)
• Business processes and metrics definition and optimization (layer 2)
• Process planning and control, supply-chain management (from integrating with suppliers to connecting with customers) (layers 2, 4, and 5)
• Resources administration (acquisition, maintenance, utilization, etc.). (layer 6).

A process-managed organization responds to events such as the arrival of an order, or a production line failure in real-time using active sensors (layer 4). As soon as the event takes place, a corresponding process is activated.

Many enterprises are also adopting process-management of their ICT systems using methods such as ITIL and COBIT that are the de facto standards in this area. There is a relatively wide choice of tools for process modeling, optimization, monitoring, and management. The Organization for the Advancement of Structured Information Standards (OASIS) (“OASIS standards,” 2005) has defined several standards in this area.

Implementing process management is a time-consuming activity that requires specific knowledge and skills. The success of process-management depends on a number of critical success factors. The most important of these are:

• Appropriately skilled managers. Process management requires different knowledge and skills than the classical functional management; some managers do not have these skills and are not able to accept new responsibilities in this area.

Figure 1. Business architecture of a process-managed enterprise
Suitable process granularity and alignment of the process definition with the knowledge of the employees supporting the process (Voríšek, 2000). A detailed definition of a process enables less qualified but well-trained employees to support the business process. The disadvantage of this approach is that it prevents utilization of employees’ creativity and reduces the flexibility of the process.

Suitably selected process maturity level. Capability maturity model (CMM) defines six levels or process maturity (Software Engineering Institute, 2002). The lowest level is for a nonexistent process, the highest describes an optimizing process. However, it is not always required to plan for the highest level for each process, as this would result in excessive costs for processes that are not vital to the enterprise or are used infrequently.

Utilization of process methods and standards. When implementing process management it is essential to use appropriate methods and standards (i.e., sector-based reference models of business processes, ITIL). Experience from process-oriented projects shows that it can be dangerous to apply standard methodologies mechanically, and that methods must be tailored to the specific conditions of the enterprise.

Management of the Relationship between Business and ICT using Services

Since the early days of enterprise computing, computer professionals and end users have been looking for optimal ways to link business processes and ICT to facilitate the communication among ICT and business professionals, and to allocate...
responsibilities in order to minimize the costs and maximize the benefits of ICT projects. New methods that utilize the concept of ICT services described using service level agreements (SLAs) show potential for addressing this problem. For example, the SPSPR method illustrated in Figure 2 uses services to define the boundary between business and ICT (Voříšek & Dunn, 2001).

An important benefit of the SPSPR method is that it defines the content of communications between end users and ICT professionals without undue use of technological concepts. Another benefit lies in the clear demarcation of responsibilities of different types of managers (i.e., top managers, business line managers, owners of a business processes, CIOs, owners of an ICT processes, and managers of ICT resources) and their responsibilities for costs and benefits of ICT.

Management of the relationship between business processes and ICT using ICT services has proved to be an effective solution to the long-standing problem of communication between business and ICT professionals (Hohpe & Wolf, 2004; OGC, 2007). However, the management of ICT services has a number of critical success factors. The most important of these are:

- Ability of the owners of business processes to define SLA that closely reflect ICT requirements.
- Focus on ICT services; ICT services should be derived from the requirements of business processes, and should not be based on the interests of enterprise departments. ICT services should focus on improving performance of the enterprise, on resolving business process bottlenecks, and on business continuity. When ICT service is not related to any specific business process, the requirements for the ICT service are often inappropriate and based on the interests of a particular department, not on the goals of the enterprise (e.g., the department requires a higher availability of the service than is absolutely necessary).
- The ability of ICT managers to specify and manage ICT infrastructure that facilitates provision of agreed-upon scalable ICT services.

**Emphasis on Management of the Return on ICT Investment**

The ICT crisis that occurred at the beginning of this decade resulted in increased emphasis on the management of the return on ICT investment. Well-managed enterprises no longer invest into ICT without a thorough analysis of the return on investment and refuse to finance risk-prone long-running ICT projects. Increasingly, management requires that investment into ICT correlates with enterprise turnover, and that no project is started unless an improvement in the performance of the enterprise can be assured. This requires a scalable ICT infrastructure and processes. When an enterprise operates its information systems using its own ICT infrastructure, scalability (up or down) is often limited. Typically, the ICT infrastructure is implemented to support the maximum anticipated load, and incremental increases and reductions in capacity (e.g., disposing of surplus hardware, software licenses, or reducing the number of ICT specialists) involve excessive costs. A potential solution to this problem is to purchase external services, as discussed in the next section.

Improvements in the enterprise performance cannot be assured by the ICT department alone. This requirement can be met only by an appropriate allocation of responsibilities of ICT and business managers, for example using the SPSPR model (see Figure 3). According to this model, the ICT services are the responsibility of business process managers. The owner of the business process has to add the cost of each ICT service to other process costs and then evaluate the effectiveness of the business process. If the cost of an ICT service is too high, the requirements should be reconsidered (e.g., reducing functionality, the number of users or availability). The CIO is responsible for ensuring that the cost of an ICT
service is competitive with respect to similar ICT services on the market.

Global ICT trends, such as outsourcing the development of software, and manufacture of hardware to countries with lower labor costs, have resulted in reduced overall cost of ICT. However, the increased demand on ICT services will ensure that ICT investment will remain a significant component of expenditure in most organizations.

**ICT Services vs. ICT Products**

The need to focus enterprise activities on core business combined with the requirement for scalable ICT services (i.e., the cost of services should reflect the level of their usage, based on the “pay as you go” principle), lead enterprises in the direction of outsourcing ICT of supporting processes. In 2004, PMP Research carried out a survey into the extent of ICT outsourcing in end user organizations (Sweet, 2004). The results of this research show that more than a fifth of end user organizations spend more than half of their ICT budget on outsourcing and almost two thirds of organizations expect equal or greater expenditure on outsourcing services.

Deciding which software services to purchase from external services providers requires careful analysis. An enterprise should have a sourcing strategy to facilitate making such decisions. The development of a sourcing strategy as well as its use for decision making is a complex process since a large number of variants with different critical success factors need to be considered (Feuerlicht & Voříšek, 2003). The outsourcing variants include:
1. Business process outsourcing (BPO), where the entire business support process is removed (e.g., layer “P” - Support Process in Figure 2), accounting or transport including ICT services and their support.

2. Total outsourcing of IS/ICT, where a selected external partner takes over all the ICT services, processes and resources—see layers “S,” “P,” and “R” in Figure 2.

3. Partial outsourcing of ICT, where some ICT services, processes, and resources are provided externally. Partial outsourcing has a large number of variants, including the following:
   a. Traditional ASP, where the application is hosted and operated by an external provider, and used by many customers (companies). An example of such a service provider is Salesforce.com that currently supplies CRM applications for more than 38,000 customers.
   b. ASP that operates single-customer applications (e.g., SAP R/3) on its own ICT infrastructure.
   c. As b), but each customer has its own dedicated infrastructure.
   d. The customer operates an application on its own infrastructure but the administration of the infrastructure is outsourced.
   e. ICT infrastructure is outsourced by the customer who operates and administers its own applications.
   f. External administration of end-user workstations.
   g. External operation of a call centre.

4. Outsourcing the development of applications.

Recent analysis (Dignan, 2005; Voříšek & Feuerlicht, 2004) and predictions (Cohen, 2004) show that the prevailing forms of outsourcing will be those described in 1), 2), and 3a) above. According to Hradilek (2005), IBM expects that most of their customers will move to complete outsourcing of their IS/ICT by 2010.

Effective utilization of outsourcing depends on a number of critical success factors:

- Choosing an appropriate variant of outsourcing.
- Choosing an appropriate granularity of ICT services. At one extreme an ICT service can be all of the functionality of an ERP system, at the other extreme a service could be a single transaction (e.g., ordering an airline ticket using a Web service).
- Monitoring of ICT services to be able to carry out a detailed analysis of the cost of the services, processes, and resources. Without effective monitoring it is not possible to compare the cost of internally-implemented services with the cost of externally-supplied services.
- Quality of information about the ICT market (services on offer) and the quality of the sourcing strategy.

According to M. Bednár (personal communication, May 2005), an outsourcing contract can significantly complicate enterprise restructuring and attempts at ICT innovation. When an enterprise disposes of all of its ICT expertise, it can find itself in a difficult situation regarding the future development of ICT.

IMPACT OF THE TRENDS ON END USER ORGANIZATIONS

Given the above ICT trends and critical success factors we can anticipate the following impact on end user organizations:

- Increasingly, the decision about utilizing ICT will be made by the owners of business processes and within the context of strategic management. This will require
changes in their qualification. Managers, who understand how to use ICT to develop new products or services, or how to gain new customers, will become indispensable members of the top management team in most enterprises (Santosus, 2001).

• ICT professionals will need to be able to demonstrate the value of ICT for the business and offer new ways of utilizing ICT by the business. This requires a good understanding of the company’s strategy, as well as marketing and commercial activities.

• Outsourcing will result in a decrease in the number of technical specialists (e.g., programmers, ICT administrators, etc.). However, the number of employees involved with the relationship between business and ICT services (e.g., requirements definition for ICT, SLA specification, monitoring of the supply of services, etc.) will increase. This trend is already evident from the results of the research conducted in the Czech Republic by the CSSI, SPIS, and CACIO associations (Doucek, Novotný, Pecáková, & Voříšek, 2007).

• The integrative and innovative role of ICT departments will grow (Levy, 2004; McCabe, 2001). This is particularly the case for the ICT-based industries. This is because ICT processes are not like standard support processes such as accounting or purchasing; ICT processes tend to have an immediate impact on the effectiveness of most core business processes.

• The volume of ICT services will be scalable, and ICT costs will correlate with the level enterprise activities and the turnover.

Even though many ICT services will be purchased from external suppliers, the number of employees concerned with the utilization of ICT will not decrease, but the structure of their qualifications will change. An enterprise must maintain the following key expertise:

• How to gain a competitive advantage using ICT, that is, how to use ICT to create new products and services, gain new customers, improve the response of the enterprise to external events, and reduce process costs. This involves supporting business processes with appropriate ICT services, that is, ICT services that provide appropriate functionality, quality, and volume at a competitive cost.

• How to design the overall architecture for ICT services.

• Which services, processes, and resources should be owned and which should be outsourced.

• Selection of the best supplier of an ICT service.

• Monitoring and control of the supply of ICT services.

• Monitoring of ICT services and measurement of the benefits of ICT for business processes.

IMPACT OF THE TRENDS ON SUPPLIER ORGANIZATIONS

If the above trends are realized, particularly outsourcing of ICT services and effective monitoring of the relationship between costs and benefits, we anticipate the following impact on supplier organizations:

• The sale of new software licenses to end user organizations will decrease. The information provided in Table 1, 2, and 3, and compiled using company annual reports confirm this trend. We can observe a decline of license revenues during the period of 2002-2003; however, the support revenues had been growing during the same period. In the subsequent years (2004-2006) license revenues started to grow again, however, the ratio of license/maintenance revenues...
The Impact of New Trends in the Delivery and Utilization of Enterprise ICT

Table 1. Oracle – license and support growth rates

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>License</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>annual growth</td>
<td>20%</td>
<td>6%</td>
<td>-25%</td>
<td>-6%</td>
<td>8%</td>
<td>16%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>as a fraction of the total income</td>
<td>41%</td>
<td>43%</td>
<td>42%</td>
<td>36%</td>
<td>34%</td>
<td>34,9%</td>
<td>34,7%</td>
<td>34,1%</td>
</tr>
<tr>
<td>Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>annual growth</td>
<td>27%</td>
<td>20%</td>
<td>8%</td>
<td>8%</td>
<td>15%</td>
<td>18%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>as a fraction of the total income</td>
<td>27%</td>
<td>29%</td>
<td>33%</td>
<td>40%</td>
<td>44%</td>
<td>44,6%</td>
<td>45,2%</td>
<td>46,1%</td>
</tr>
</tbody>
</table>

Table 2. SAP AG – license and support growth rates

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Licence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>annual growth</td>
<td>27%</td>
<td>5%</td>
<td>-11%</td>
<td>-6%</td>
<td>10%</td>
<td>18%</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>as a fraction of the total income</td>
<td>38%</td>
<td>39%</td>
<td>35%</td>
<td>31%</td>
<td>31%</td>
<td>31,4%</td>
<td>32,7%</td>
<td>28,4%</td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>annual growth</td>
<td>44%</td>
<td>27%</td>
<td>15%</td>
<td>6%</td>
<td>10%</td>
<td>12%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>as a fraction of the total income</td>
<td>23%</td>
<td>27%</td>
<td>29%</td>
<td>33%</td>
<td>37%</td>
<td>37,6%</td>
<td>37,3%</td>
<td>40,1%</td>
</tr>
</tbody>
</table>

Table 3. SAP AG: Software revenue – old vs. new customers

![Software revenue - old vs. new customers](chart.png)

declined further. Haber (2004) came to similar results, concluding that 80% of software cost can be attributed to maintenance of applications and related activities. The increasing cost of maintenance is another factor that contributes to growing interest of end user organizations in outsourcing their enterprise applications. Because of the decrease in the sale of new licenses and the increase in outsourcing of
enterprise applications, the total number of software companies is likely to fall. This trend is already well under way with many medium and small size software companies being bought out by large software vendors.

- Hardware and software products are “returning” to their producers who use them to offer services on a large scale (Dubie, 2004). According to F. Hoch, the vice-president of the Software & Information Industry Association, “The software industry, as we know it, is passing away and a new industry is being born” (Ulfelder, 2005). According to Hamm and Ante (2005), Accenture, thanks to BPO, added $2.2 billion to its revenue,

**Table 4. IBM**

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>servers</td>
<td>22.68%</td>
<td>22.32%</td>
<td>20.04%</td>
<td>18.72%</td>
<td>18.89%</td>
<td>14.2%</td>
</tr>
<tr>
<td>PCs</td>
<td>17.83%</td>
<td>14.51%</td>
<td>13.78%</td>
<td>12.97%</td>
<td>13.47%</td>
<td>12.48%</td>
</tr>
<tr>
<td>HW total</td>
<td>40.51%</td>
<td>36.83%</td>
<td>33.82%</td>
<td>31.68%</td>
<td>32.35%</td>
<td>26.68%</td>
</tr>
<tr>
<td>SW</td>
<td>14.81%</td>
<td>15.58%</td>
<td>16.10%</td>
<td>16.06%</td>
<td>15.68%</td>
<td>17.29%</td>
</tr>
<tr>
<td>IT services</td>
<td>38.96%</td>
<td>42.08%</td>
<td>44.79%</td>
<td>47.83%</td>
<td>47.99%</td>
<td>51.96%</td>
</tr>
<tr>
<td>Financial services</td>
<td>4.07%</td>
<td>4.12%</td>
<td>3.98%</td>
<td>3.17%</td>
<td>2.71%</td>
<td>2.64%</td>
</tr>
<tr>
<td>others</td>
<td>1.65%</td>
<td>1.39%</td>
<td>1.31%</td>
<td>1.26%</td>
<td>1.27%</td>
<td>1.43%</td>
</tr>
</tbody>
</table>

**Table 5. Hewlett Packard**

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>servers</td>
<td>26.00%</td>
<td>25.26%</td>
<td>22.33%</td>
<td>21.03%</td>
<td>20.12%</td>
<td>19.26%</td>
</tr>
<tr>
<td>PCs</td>
<td>35.85%</td>
<td>33.04%</td>
<td>30.23%</td>
<td>29.03%</td>
<td>30.81%</td>
<td>30.84%</td>
</tr>
<tr>
<td>Printers, scanners</td>
<td>22.47%</td>
<td>24.01%</td>
<td>28.20%</td>
<td>30.89%</td>
<td>30.28%</td>
<td>29.02%</td>
</tr>
<tr>
<td>HW total</td>
<td>84.32%</td>
<td>82.31%</td>
<td>80.75%</td>
<td>80.95%</td>
<td>81.22%</td>
<td>79.12%</td>
</tr>
<tr>
<td>IT services</td>
<td>14.05%</td>
<td>15.84%</td>
<td>17.10%</td>
<td>16.91%</td>
<td>17.24%</td>
<td>17.92%</td>
</tr>
<tr>
<td>Financial services</td>
<td>2.00%</td>
<td>2.62%</td>
<td>2.89%</td>
<td>2.63%</td>
<td>2.37%</td>
<td>2.42%</td>
</tr>
</tbody>
</table>

**Table 6. SUN Microsystems**

<table>
<thead>
<tr>
<th>SUN Microsystems</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servers</td>
<td>67.88%</td>
<td>59.19%</td>
<td>54.60%</td>
<td>52.34%</td>
<td>52.63%</td>
<td>45.89%</td>
</tr>
<tr>
<td>Storage</td>
<td>14.39%</td>
<td>13.58%</td>
<td>13.56%</td>
<td>13.42%</td>
<td>11.74%</td>
<td>18.17%</td>
</tr>
<tr>
<td>Products total</td>
<td>82.27%</td>
<td>72.77%</td>
<td>68.16%</td>
<td>65.76%</td>
<td>64.37%</td>
<td>64.06%</td>
</tr>
<tr>
<td>Support services</td>
<td>11.99%</td>
<td>20.31%</td>
<td>24.87%</td>
<td>26.81%</td>
<td>27.38%</td>
<td>28.15%</td>
</tr>
<tr>
<td>Professional and Knowledge services</td>
<td>5.74%</td>
<td>6.92%</td>
<td>6.97%</td>
<td>7.43%</td>
<td>8.25%</td>
<td>7.8%</td>
</tr>
</tbody>
</table>
50% more than in the previous year, while IBM achieved an income of $3 billion from outsourcing and related activities, representing an increase of 45%.

The gradual transition of large ICT suppliers from products to services is evident in the information provided in tables Table 4, 5, and 6.

Hamm and Ante (2005) provide further evidence about the transformation from product to service orientation of large ICT vendors:

The change is tangible. The number of employees focused more on the commerce than on pure technology has risen from 3,500 in 2002 to the today’s more than 50,000 (out of the total of 330,000 worldwide), and this represents a growth of over 10,000 annually. As a part of a painful process, other employees are leaving in their thousands—for example from the administrative and computer maintenance divisions. With the sale of the loss-making PC manufacturing to Lenovo Group, Palmisano cut off a large part of the company’s computer inheritance. At the same time he netted more than a dozen of companies in the area of support for entrepreneurial activities, including Daksh, an Indian customer relationship management company with six thousand employees.

- The approach to delivering ICT services to customers is changing. It is no longer a question of supplying as much as possible for the highest price without considering the real needs of the customer. The aim of the leading suppliers of ICT services is to understand what the customer requires, and then plan and manage the supply of ICT services accordingly.
- There will be changes in the structure and culture of ICT supplier companies that reflect the fact that supplying ICT services requires a different business model from the traditional business model used for the supply of products and software licenses.

**INTERVIEW WITH REPRESENTATIVES OF IBM, SAP, HP, AND DELOITTE&TOUCHE**

Recent interviews conducted in Prague, Czech Republic with leading providers of ICT products and services confirm that the above trends are already taking place. The following is an extract from the discussion between representatives of IBM, SAP, HP, and Deloitte&Touche:

According to J. Kameniček (personal communication, May 2005): “HP—formerly primarily a product company is increasing its focus on services. The traditional ASP is not yet part of the HP’s services portfolio, but outsourcing IS/ICT is our fastest growing service segment. Outsourcing services are offered as a part of the ‘utility computing’ concept, that is, the cost of services is derived from unit costs (per user in a particular category, per server, etc.). The customer can thus easily change the volume of the service as required and pay only for the actual number of users or supported servers in a given month. In the Czech Republic, the transfer to ASP will not happen quickly. The reason is the conservatism of customers and unwillingness to relinquish control of data and key ICT infrastructure.”

According to J. Polák (personal communication, June 2005), Deloitte&Touche has begun to offer ERP in the form of ASP. “From January 2005 we are offering SAP and Peoplesoft in this way. It will be possible to rent individual modules as an application service. However, it is still not a part of our core business.”

According to R. Hradílek (personal communication, April 2005): “Recently, in the Czech Republic, there has been a decline in the demand for strategic and business consulting services, and an increase in the demand for ICT services and outsourcing. IBM has been strengthening its focus on supplying ICT services. We offer these under the label ‘On-demand Services’ and ‘Managed Services.’ In the near future large ICT companies, as well as offering ICT services, will
be offering other types of services that require ICT (e.g., collecting parking fees and fines, accounting, etc.)."

M. Bednár (personal communication, May 2005) “Agrees that the number of technically oriented specialists in end-users organization will fall. However, outsourcing results in new problems for which the customers should be ready.”

According to Polák (2005), “The increase in the required number of specialists who integrate business processes with ICT services will not affect just end-user organizations. It will be an opportunity for new consulting firms that specialize in this area. I do not think there will be less demand for developers. I can imagine that there will be tens of new software houses, each with tens of programmers. There are examples of outsourcing that involves a UK company that successfully bids for a development projects, but actual development will take place in the Czech Republic. Compared to China or India this form of outsourcing will have the advantage of the knowledge of cultural and legislative conditions in Europe.”

J. Kameníček (personal communication, May 2005): “Agrees that there is a trend to decrease the number of ICT specialist in customer companies. However, this will not affect Czech economy in the next few years. Centralization and remote administration of ICT may make the operation of ICT more effective, but thanks to cheaper labor, there is a significant trend in relocating companies from Western Europe to Central and Eastern Europe. These transfers are creating many new work opportunities in ICT so that the number of ICT workers has been increasing, particularly in Prague and other large towns.”

According to Bednár (2005), “The reduction in software implementation services is real. However, this is true more for financial and administrative business processes than for production and logistics.”

R. Hradilek (personal communication, April 2005) agrees that the coming market changes will affect the organizational structure and company culture of large ICT suppliers. “Such changes have taken place in IBM during the merger with PWC. ICT companies will have to train many new specialists in the sale of services—we shall be looking at new graduates for this type of role.”

According to M. Bednár (personal communication, May 2005), “The return of hardware and software products to their originators is more relevant for hardware than software companies. The question of who is interested in this sort of business depends on whether the service is focused on the operation of ICT infrastructure or whether it also includes a responsibility for outsourcing of business processes. In the latter case, there will be room for specialist companies. For example, outsourcing of payroll and human resources has consequences well beyond ICT. The main expertise of such providers will be in human resources and social sphere, not in ICT.”

**IMPACT OF THE TRENDS ON HIGHER EDUCATION**

The changes in the orientation of suppliers and users of ICT will be reflected in the number of ICT graduates that will be required and the type of qualifications they will need. The following changes can be anticipated:

- Lower demand for purely technical professionals due to the decrease in the number of such specialists in end user organizations. However, technically oriented graduates will continue to be in demand by the ICT suppliers. The knowledge and skills required will include traditional skills such as the ability to develop new applications, but also ability to deploy and manage secure and highly available applications used by thousands of users. There is some evidence of lower demand for technically oriented specialists. For example, in 2004, the average level of
unemployment in Australia was 5.7%, but in the ICT sector it was over 10% and for programmers 18% (Philipson, 2004). While there was a recovery in ICT employment recently, the demand is mainly for professionals with a combination of business and technical skills, rather than purely technical specialists.

The lower demand for technical professionals will not be so pronounced in the countries of Central and Eastern Europe. The reason for this is the transfer of a number of development and operations centers of large ICT supplier organizations to this area (including IBM, Sun Microsystems and Computer Associates International development and delivery centers).

- High demand for specialists who are able to integrate ICT with business processes has been noted above. Graduates with two specializations, for example, those who major in ICT and minor in production logistics are likely to be in very high demand.

CONCLUSION

We have argued in this chapter that ICT remains strategically important to organizations in the 21st century despite the prevailing trend to outsource ICT and related business processes. We have identified a number of important trends that include the transition to the SaaS model for enterprise applications, increased commitment to process orientation, and focus on managing the relationship between business and ICT using services. These trends lead to more effective management of ICT, closer integration of ICT with entrepreneurial activities and business processes in organizations, and a corresponding improvement in the return on investment. These trends will have a dramatic impact on both the suppliers and users of ICT, and will necessitate the reevaluation of the approach to ICT education as both the composition and qualifications of ICT workforce will need to change.

REFERENCES


