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Trends in the Delivery and Utilization of Enterprise ICT

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Abstract: In this decade, we can expect changes in enterprise information systems that are even more dramatic than the changes in the last decade of the previous century. The changes will have an impact on end-user organisations as well as on suppliers of ICT products and services. They will also influence the number of graduates in ICT disciplines that will be needed and the type of qualification they will require. The aim of this article is to shed light on these changes and suggest how end-user organisations, ICT supplier organisations and universities can prepare for them.

I.   Introduction

For the past two years G.Feuerlicht and I [6] [7] have been analysing the latest developments in information services worldwide. From this analysis we have concluded that the prevailing mode for supplying applications to users in the second half of this decade will be, with a high probability, outsourcing. In particular, one of the outsourcing variants "software-as-a-service" or ASP (Application Service Providing), is very likely to become dominant. Increasingly greater utilisation of externally supplied information services will influence the market in IS/ICT and the management of enterprise IS/ICT. During this year the author has carried out further interviews with leading Czech IS/ICT professionals - Martin Bednár, SAP ČR, Radim Hradílek, IBM ČR, Jan Kameníček, HP ČR, Jiří Polák, Deloitte&Touche. The main conclusion from these discussions and from the analysis is the prediction that in this decade we can anticipate even more dramatic changes than in the last decade of the previous century. These changes will affect both user organisations and organisations supplying IS/ICT products and services. The aim of this article is to shed light on these changes and indicate how the user and supplier organisations can prepare for them.

II. Significant trends in the utilisation of IS/ICT by enterprises

This section summarises the trends which in the opinion of t he author will have a substantial influence on future utilisati on of IS/ICT by user organisations and, consequently, on the composition of IS/ICT market.

Strategic importance of ICT has not ceased

Less than two years ago Nicolas Carr published a provocative article in the Harward Business Review "IT Doesn't Matter" [1] in which he declared that ICT is a commodity accessible to everyone. He compared ICT with railways and electricity and argued that it is no longer possible to use ICT to gain a strategic advantage against the competition.

Since this publication there have been many heated discussions on this theme in the Czech Republic and worldwide. Some debaters, including the author of this article, agree with much of what Carr wrote, but point out he makes a mistake of judging the influence and significance of ICT in isolation from entrepreneurial activities, business processes and company culture. The main difference between ICT and railways or electricity is that ICT has much greater influence on the business processes and the approach to management and production. Consequently, what can give a company (or a country) competitive advantage is not just ICT but appropriate integration of ICT with its entrepreneurial activities, its business processes and its culture. When this integration has a unique character that results in a product/service with higher utility value or lower cost then it will give the company a strategic advantage.

M.Bednár in an interview about the importance of ICT expressed it like this: "The deployment of ICT these days can be one of two types of applications:

- *applications that support business processes (back office, logistics, CRM etc.),*

- *applications that implement business processes, i.e. where the process exists only in an electronic form (electronic banking, mobile telephony, digital airline ticket etc.).*

For the first type of applications, it is possible to gain competitive advantage by combining ICT with an exceptional company culture and knowledge. This combination is unique for each company and enables the company to function effectively with flexibility and right priorities. The understanding of the importance and the potential of ICT is strategic because without ICT the assets of the company such as knowledge, culture and motivation will not be utilised. For the second type of application we have a product, its attributes and timely deployment to the marketplace – whoever gets there first gains a vital competitive advantage."

In support of the above claims, we can look at the success of Wal-Mart. In the Czech Republic, we can give an example published on www.ihned.cz in 2004: "The

company Czech Courier, operating a courier service eKurýr (www.ekuryr.cz) on the Czech and Slovak Internet, gained the representation of the international courier Sky Net Worldwide Express for the Czech Republic and Slovakia. Czech Courier was founded in 1999 to focus on express delivery of consignments with high added value. This added value lies principally in a unique electronic system eKurýr. As a result the deployment of this system the company has become a pioneer in utilising the Internet as a new commercial platform for courier services."

For an organisation, not every new technology is important, but to miss some utilisation of the available technology can be fatal. For example, those suppliers of accommodation services who do not offer their services on the worldwide web are losing clients who are using only this communication channel. This could be a substantial part of the potential clientele.

The often accepted assertion, that using standard technology that is accessible to everyone (e.g. standard ERP or CRM) it is not possible to gain a strategic advantage, cannot not be right. The reason is that a unique integration of a standard ERP with business processes is very difficult to copy by the competition.

Interesting in this context is the view of J. Kameníček: "ICT still is not a 100% commodity. Hardware, operating systems and office applications have the characteristics of a commodity, but applications such as ERP, CRM and BI do not yet have them. Deployment, customisation and integration of these types of applications is complicated. Good integration of these applications with the business processes can bring a strategic advantage."

Another factor that supports an argument for the strategic importance of ICT is the unremitting growth in the demand for timeliness and quality of information for decision making in the global economy from all levels of management. When it comes to the speed of reaction to important events, e.g. Gartner (2004) claims:

➢ in 2002 most goals had up to 2 months to be achieved,

➢ in 2004 it was only 1 month,

➢ in 2006 it will be 14 days,

➢ in 2008 it will be 7 days,

➢ and in 2010, it will be the same day.

It is not really a question of whether this forecast is accurate. The significant trend in the shortening of companies' reaction response time to external events cannot be doubted.

Conclusion number 1:

ICT still has strategic importance but different ways of ensuring this have to be found. Strategic advantage cannot be achieved by just deploying new technology. The prerequisite is a unique and effective integration of ICT with entrepreneurial activities, the company culture and the business processes. Such integration will enable the company to speed up its response to important events, reduce cost and increase the quality, and help to provide new products or services to customers. Future ICT projects should focus on this type of integration.

Strengthening of the process orientation of an enterprise

In the end of the last century it was becoming clear that a functionally managed enterprise faces difficulties to solve problems (interests of individual departments can clash with organisational goals; an ambiguous, sometimes even an undefined process for customer orders; a difficult to predict time the enterprise will take to respond to important events etc.). The solution to such problems was to adopt process-management in the enterprise as depicted in Figure 1 [22]. With regards to the arguments in previous section, the
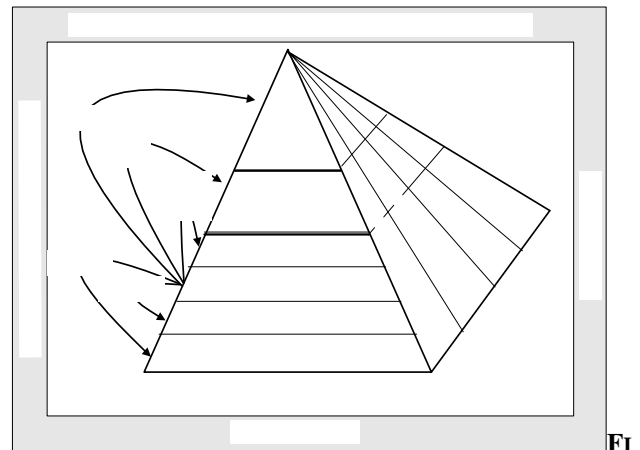

FIGURE 1: A process-managed enterprise

importance of process-management is still growing.

In a process-managed enterprise the key business processes are:

➢ business strategy formulation and implementation,

➢ new product/service development,

➢ production and supply processes definition and optimisation (methods, technological resources, personnel and know-how),

➢ supply-chain management (from integrating with suppliers to connecting with customers).

The aim of process-managed organisations is to achieve the state of so-called event-managed organisation and an organisation working in real-time. This means that the organisation has active sensors (usually using of IS/ICT) that indicate new events (arrival of an order, time to send VAT returns, production line failure, …). As soon as the event happens, the process that guarantees the right response is activated. The response of the enterprise should be in real-time, i.e. in time that is optimal from the perspective of the supply chain, external partner, customer and the like.

This trend is affecting even enterprise ICT, i.e. many enterprises are adopting process-management of their own IS/ICT. ITIL and COBIT methods are de facto standards in

this area.

ICT marketplace has responded to the transition to process-management with a relatively wide choice of tools for business process modelling and for optimisation, monitoring and management of live processes. The Organization for the Advancement of Structured Information Standards [14] has been defining standards in this area.

The success of process-management depends on a number of critical success factors. The most important of these are:

➢ change in the thinking of enterprise managers. Process-management requires other types of knowledge and skill compared to the classical functional-management; some managers do not have these and are not able to accept and apply new responsibilities and authority that are required,

➢ appropriately chosen detail of business process definition and its alignment with the knowledge of the employees undertaking the process [20]. A detailed definition of a process facilitates using less well qualified but well trained employees (consider e.g. workers on car assembly lines). On the down side, it prevents utilisation of employees' creativity and reduces the flexibility of the process (try, for example, to order a schnitzel in McDonalds),

➢ appropriately chosen process maturity. CMM [3] defines six levels or process maturity. The lowest level is for a non-existent process, the highest describes an optimizing process. However, it is not sensible to plan for the highest level for each process. This would be too expensive for processes that are not vital to the enterprise and happen rarely,

➢ appropriate utilisation of process methods and standards. When implementing process-management it is a good idea to use methods and standards designed for this - e.g. the above-mentioned ITIL and COBIT. Experience from process-oriented projects shows that it very dangerous to apply the recommended standards mechanically. Each method must be tailored to the specific condition of the enterprise.

Conclusion number 2:

Enterprise process-management and process-managed ICT are now a necessity. Implementing process-management is a long-term activity that requires specific knowledge and skills, with success depending on specific critical factors.

Management of the relationship between business and ICT using ICT services

How to optimally link business and ICT is a problem that has eluded solution since enterprises first started to use ICT. For over 50 years, computer professionals and end-users have been looking for an optimal way to communicate with one another and for an optimum division of responsibility

for the costs and benefits of ICT projects. It seems like in this area things are looking up thanks to new methods for managing the relationship between business and ICT. These methods utilise the concept of ICT service, described using an SLA (Service Level Agreement), as a basic element on the boundary between the business and ICT. One of these methods - SPSPR - was described in [21]. One benefit of the SPSPR method is in that it defines the content of the communication 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 (TOP manager, owner of a business process, CIO, owner of an ICT process, manager of an ICT resource) for costs and benefits of ICT.

Similarly, to process-management the management of ICT services has a number of critical success factors. The most important of these are:

➢ the ability of the owners of business processes to define SLA for ICT requirements,

➢ the focus of ICT services. ICT services should be derived from the requirements of business processes, not from the interests of enterprise departments. I.e., the ICT services should be focused on improving performance of the enterprise, on bottlenecks in the business processes and on the business continuity. In the case where ICT services are not related to any business processes but to only to departments, the requirements for the ICT services are often inappropriate (e.g. the department requires a higher availability of the service than is absolutely necessary) and derived from particular interests of the department and not from enterprise goals.

➢ The ability of ICT managers to specify and manage ICT infrastructure that facilitates provision of agreed scalable ICT services.

Conclusion number 3:

Management of the relationship between business and ICT using ICT services has proved the best solution to the long-standing problem of communication between business and ICT professionals. However, this requires new knowledge and skill from both sides.

Emphasis on management of the returns on ICT investment

The ICT crisis since the beginning of this decade resulted in increased emphasis on the management of the returns on ICT investment. Progressively managed enterprises no longer invest into ICT without a thorough analysis of the return on investment and refuse to finance long-lasting ICT projects because they are very risky.

More and more TOP managers require that their CIOs ensure that any increase in the investment into ICT correlates with the increase in the turnover and that no projects is started unless an improvement in the performance of the enterprise can be guaranteed. The question is, how can

a CIO fulfil such expectations.

The first requirement needs a scalable ICT infrastructure and scalable ICT processes. When an enterprise operates its information systems on its own ICT infrastructure, scaling up or down may not be a realistic option. An enterprise has to plan its ICT infrastructure for the maximum anticipated required performance and incremental increases and reductions in capacity (e.g. disposing of surplus hardware, software licences and ICT specialists) are often impossible in practice. The solution to this problem is to buy external services; this will be discussed in the next paragraph.

The second requirement - guaranteed improvement in the enterprise performance - cannot be achieved by the ICT department alone. The requirement can be met only by an appropriate distribution of responsibilities of ICT and business managers - e.g. using the above-mentioned SPSPR model. According to this model, the benefits of the commissioned ICT services will be the responsibility of the business process owner. 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 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). By contrast, the CIO is responsible for ensuring that the cost of an ICT service is competitive with similar ICT services on the market.

From the perspective of the current trends, the ICT market offers one good and one bad news. The good news is that thanks to the transfer of the development of a number of ICT products to China and India the cost will be coming down, perhaps even faster than the Moore's law would suggest. The bad news is that the requirements for the content, volume and quality of ICT services will be go on increasing, probably even faster than the decrease in the cost of ICT products. The reason for this are the trends mentioned above.

Conclusion number 4:

Well-managed enterprises want to control their ICT costs. The development of ICT has to reflect the growth in the turnover of the enterprise. Preconditions for success in this area are scalable ICT services and a clear allocation of responsibilities for the benefits and costs of ICT between the business and ICT managers.

Purchasing external ICT services instead of purchasing ICT products

The aspiration to concentrate enterprise activities on the core business of the enterprise and the consequent aspiration to outsource support business processes, together with the aspiration to buy scalable ICT services (based on the "pay as you go" principle), lead enterprises in the direction of ICT outsourcing.

In 2004, PMP Research carried out a survey into the scale of ICT outsourcing in end-user organisations. The results of this research show that more than a fifth of end-user organisations spend more than half of their ICT budget on outsourcing and almost two thirds of organisations anticipate same or greater expenditure on outsourcing services.

Deciding about what to own and what to buy as an external services is not easy. An enterprise should have a sourcing strategy and use it to make 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 [6] needs to be considered. Some possible variants are:

1) BPO (Business Process Outsourcing), where the whole business support process is removed - e.g. accounting or transport - including ICT resources and their support,

2) total outsourcing of IS/ICT, where a selected external partner takes over all the ICT services, processes and resources,

3) partial outsourcing of ICT, where some ICT services, processes and resources are removed. Partial outsourcing has a large number of variants:

   a) "classical ASP, where an external provider operates an application, used by many customers (companies) on its own infrastructure. An example is the service of Sales Force that currently provides CRM functionality for more than 100,000 users,

   b) ASP operates single-customer applications (e.g. SAP R/3) on its own ICT infrastructure, but the infrastructure is shared by the applications. An example of such an ASP is the company Corio,

   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 operates and administers its own applications,

   f) external administration of end-user workstations,

   g) external operation of a Call centre,

   h) etc.

4) outsourcing the development of an application.

The latest analysis [23] and predictions [2] show that the prevailing forms of outsourcing will be those described in 1), 2) and 3a) above.

For example, according to R.Hradílek, IBM is assuming that most of their customers (companies) will move to a complete outsourcing of their IS/ICT by 2010.

Just like in the case of the previous trends, effective utilisation 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 one 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 good monitoring it is not possible to find out what is a better value - internal or external supply,

> quality of decision-making when deciding whether to outsource or not depends on the quality of information about the ICT market (services on offer) and on the quality of the sourcing strategy.

Another critical success factor in outsourcing has been proposed by M.Bednár: "An outsourcing contract can significantly complicate enterprise restructuring and attempts an ICT innovation. When an enterprise disposes of all of its ICT expertise, it can find itself in precarious position when it comes to the development in ICT.

Conclusion number 5:

It is highly probable that by the end of this decade outsourcing and particularly one of its forms - ASP - will be the prevailing means of acquiring ICT services.

Impact of the trends on end-user organisations

If the above-mentioned trends are realised, we can anticipate the following impact on end-user organisations:

> More and more decision about utilising ICT will be made by the owners of business processes and as a part of strategic management. This will require changes in the qualification required by these types of managers. Managers who understand how to use ICT to develop new product or service, or how to gain new customers, will become indispensable members of the top management team in most enterprises [17].

> Employees of an ICT department will have to know how to better demonstrate the value of ICT for the business and offer new ways of utilising ICT by the business. Wal-Mart is a good example. According to their CIO J.Carey the members of his team sit on all the top discussions about the company's strategy, as well as discussions about changes in the marketing and commercial activities.

> Because of outsourcing, the number of technologically oriented specialists (e.g. programmers, ICT administrators) in companies will decrease. However, the number of employees involved with the relationship between the business and ICT services (requirements definition for ICT, SLA specification, monitoring of the supply of services and the like) will increase. Not all of these employees will be working in the ICT department. In 2004 Gartner predicted that in the North American and European companies the fraction of employees

working in ICT will reach 8% in 2006 and in the "ICT driven industries", i.e. organisation such as banking, post, insurance, utilities and retail, it will be as much as 15-20%.

> The integrative and innovative role of ICT departments will grow. This is particularly the case for the "ICT driven industries". This is because ICT processes are not like standard support processes such as accounting or purchasing, they have an immediate impact of the effectiveness on 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 a number of ICT services will be purchased from external suppliers, the number of employees concerned with the utilisation of ICT will not decrease, but the structure of their qualifications will change. An enterprise must preserver the following key expertise:

> how to gain a competitive advantage using ICT, i.e. how to use ICT to create new product/service, gain new customers, speed up the response of the enterprise to external events and reduce process costs. In other words: how to support the business processes with appropriate ICT services - i.e. 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.

III.   Impact of the Ttrends on Supplier Organisations

If the above-mentioned trends are realised, particularly outsourcing of ICT services and stricter monitoring of the relationship between costs and benefits, we can anticipate the following impact on supplier organisation:

> The sale of new software licences to end-user organisations will decrease. The following tables confirm this trend. They were compiled using annual reports of large software houses. It should be noted that while the income from new licences decreased, income from maintenance and related services grew. Haber's research [8] came to the same conclusions. He found that currently 80% of software cost is for maintenance of applications and related activities. The increasing cost of maintenance could be another factor that will

contribute to the greater orientation of end-user organisations on outsourcing of their applications.

Oracle	1999	2000	2001	2002	2003
Licence					
annual growth		20	6	- 25	- 6
as a fraction of the total income	41	43	42	36	34
Support					
annual growth		27	20	8	8
as a fraction of the total income	27	29	33	40	44

PeopleSoft	1999	2000	2001	2002	2003
Licence					
annual growth		46	30	- 18	2
as a fraction of the total income	24	29	30	27	24
Services					
annual growth		5	23	3	22
as a fraction of the total income	74	64	65	72	76

SAP AG	1999	2000	2001	2002	2003
Licence					
annual growth		27%	5%	-11%	-6%
as a fraction of the total income	38%	39%	35%	31%	31%
Maintenance					
annual growth		44%	27%	15%	6%
as a fraction of the total income	23%	27%	29%	33%	37%

Siebel	1999	2000	2001	2002	2003
Licence					
annual growth		118%	- 4%	- 34%	- 31%
as a fraction of the total income	62%	61%	51%	43%	36%
Services, Maintenance etc.					
annual growth		126%	44%	- 8%	- 7%
as a fraction of the total income	38%	39%	49%	57%	64%

➤ Because of the decrease in the sales of new licences and the growth in outsourcing the number of software companies will fall. Those that do not adapt their business to these trends will fail.

➤ The key commercial article, instead of software and hardware products, will be scalable ICT services on-demand services, software-as-a-service…). Thus the hardware and software products will be "returning" to their makers who will use them to offer services on a large scale. In this context, F.Hoch – vice-president of the Software & Information Industry Association [19] declared "We believe that the software industry, as we know it, is passing away and a new industry is being born". Hamm and Ante [9] declare "Accenture, thanks to BPO, added 2.2 billion dollars to its revenue, 50% more than in the previous year, while IBM achieved an income of 3 billions from outsourcing and related activities, representing an increase of 45%!".

The gradual transition of large suppliers from products to services is illustrated by the following tables:

IBM % revenue	2000	2001	2002	2003	2004
servers	22,68	22,32	20,04	18,72	18,89
PCs	17,83	14,51	13,78	12,97	13,47
HW total	40,51	36,83	33,82	31,68	32,35
SW	14,81	15,58	16,10	16,06	15,68
IT services	38,96	42,08	44,79	47,83	47,99
Financial services	4,07	4,12	3,98	3,17	2,71
others	1,65	1,39	1,31	1,26	1,27

Hamm and Ante [9] have given some interesting facts about IBM: "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 (in 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 the Chinese company 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."

HP % revenue	2000	2001	2002	2003	2004
servers	26,00	25,26	22,33	21,03	20,12
PCs	35,85	33,04	30,23	29,03	30,81
Printers, scanners	22,47	24,01	28,20	30,89	30,28
HW total	84,32	82,31	80,75	80,95	81,22
IT services	14,05	15,84	17,10	16,91	17,24
Financial services	2,00	2,62	2,89	2,63	2,37

SUN Microsystems % revenue	2000	2001	2002	2003	2004
Servers		67,88	59,19	54,60	52,34
Storage		14,39	13,58	13,56	13,42
Products total	85,37	82,27	72,77	68,16	65,76
Support services		11,99	20,31	24,87	26,81
Professional and Knowledge services		5,74	6,92	6,97	7,43

➢ The concept of a supplied ICT service 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 best suppliers of ICT services will be to understand what the customer and the customer's customers require, and then plan and manage the supply of ICT services accordingly.

➢ There will be changes in the structure and company culture of supplier companies that respect the fact that supplying ICT services requires a different type of enterprise when compared to enterprises that supply products and licences.

Let us now look at the views of our interviewees on the probable consequences of the trends on end-user and supplier organisations.

M.Bednár: "From the perspective of ERP systems supplier the number of customer users is fundamental. The number of users and the number of dedicated servers are the basic metrics for calculating the cost of software. It therefore does not matter whether the users are supported via an ASP or directly. In both cases, the customer has to pay the cost of the licence. Positive effects can only be the result of quantity discount. Then it is a question of who benefits – is it the customer or ASP? The transformation from buying software up-front to renting it is only the result of financial engineering."

J.Kameníček: "HP – formerly primarily a product company, is increasing its focus on services.   The classical 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, i.e. 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 strong conservatism of customers and the distrust that leads to unwillingness to relinquish control of data and key ICT infrastructure."

J.Polák: "D&T 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, the difference from EDS and Accenture is that this is not a part of our core business."

R.Hradílek: "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: "I agree that the number of technologically oriented specialists in end-users organisation will fall. However, outsourcing results in new problems for which the customers should be ready."

J.Polák: "The increase in the required number of specialists who integrate business processes with ICT services will not affect just end-user organisations. It will be an opportunity for new consulting firms that specialise in this area. I do not think there will be less demand for developers. I can imagine that there will be several tens of new software houses, each with several tens of programmers. An example of what could happen is as follows: in England, a new company is started that bids for development projects. The actual development will take place in the Czech Republic and the English company will supply the software to the customer. Compared to China or India this form of outsourcing will have the advantage in the knowledge of cultural and legislative conditions in Europe."

J.Kameníček: "I agree that there is a trend in the decrease of ICT specialist in customer companies. However, this will not affect Czech economy in the next few years. Centralisation and remote administration of ICT may make the operation of ICT more effective, but thanks to cheaper labour, there is a significant trend in transferring of many 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."

M.Bednár: "The reduction in software implementation services is real. However, this is true more for financial and administrative process than for production and logistics."
R.Hradílek: "I agree that the coming market changes will affect the organisational 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."

J.Kameníček: "The important factors in the next development of the ICT market will be:

- *labour costs. Therefore, service companies will not be just large global companies such as HP or IBM. Although these companies will have a large market share, there will be room for smaller, locally active companies, with lower labour costs and detailed knowledge of the customer. This will be most apparent in the SME market. The key problem for these companies will be whether they will get a critical mass of customers (users),*

- *the ability of start-up companies to enter new untried market segments and to offer more innovative as well as more risky types of services will ensure their success in the market."*

M.Bednár: "The return of hardware and software products to their makers 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."

IV. Impact of the trends on universities

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

➢ lower demand for purely technological professionals due to the decrease of such specialists in end-user organisations. However, technologically oriented graduates will continue to be in demand by suppliers. The knowledge required will not be just the development of new application but also deployment and management of secure and highly available operation of applications used by thousands of users.

The evidence for the lower demand for technologically oriented specialists comes from Australia. In 2004, the average Australian unemployment was 5.7%, but in ICT, it was over 10% and for programmer 18% [16].

The lower demand for technological professions will not be so marked in the countries of Central and Eastern Europe. The reason for this is the transfer of a number of development and operations centres of large suppliers to this area (e.g. the Sun Microsystems and CA development centres in Prague).

➢ high demand for specialists who are able to integrate ICT with business processes – the knowledge they require is described in section above. The graduates with two specialisations will be in very high demand – e.g. those who major in ICT and minor in production logistics.

V. Conclusions

The key trends that will be affecting utilisation of ICT in end-user organisations are:

➢ process-management of an enterprise and its ICT,

➢ endeavour for a unique and effective integration of ICT with entrepreneurial activities, company culture and business processes so that the enterprise can respond more quickly to important events, lower costs, increase quality and/or offer new products/services to customers,

➢ management of the relationship between business and ICT using ICT services,

➢ allocation of responsibilities for costs and benefits of ICT between business and ICT managers,

➢ utilisation of scalable ICT services,

➢ increasing proportion of externally supplied ICT services in the form of outsourcing or classical ASP.

A gradual development in the direction described here will have an impact on both the suppliers and users of ICT. These changes will be applicable to the core business of many companies, and thus the composition and qualifications of their workforce.

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