



Trends in the Delivery and Utilization of Enterprise ICT

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INTRODUCTION

Most organizations today are looking for more cost effective approaches to delivering enterprise applications to their user base. Among the alternatives that are becoming increasingly popular are various forms of outsourcing and in particular the use of ASPs (Application Service Providers) to deliver "software-as-a-service". We have analyzed these trends recently and concluded that the "software-as-a-service" model will become a dominant form of delivering enterprise applications in the near future [4] [5]. Increasing, the use of externally supplied information services will determine the shape of the IS/ICT market and management decisions about deployment of enterprise IS/ICT. Leading Czech IS/ICT professionals predict that IS/ICT will undergo even more dramatic changes this decade than towards the end of the last century [17]. These changes will affect both user organisations and organisations supplying IS/ICT products and services.

In this paper we analyse the above trends and discuss how the IS/ICT user and supplier organisations can prepare for these developments. In the next section, we discuss the key enterprise computing trends including the strategic importance of ICT. In the following sections we consider the impact of these trends on ICT user organizations and ICT suppliers.

Key Enterprise Computing trends

This section is a discussion of key trends that we consider as having substantial impact on future use of IS/ICT in organizations, and, consequently, on the composition of IS/ICT market.

Strategic Importance of ICT

Nicolas Carr in [1] argues that ICT is today accessible to most organizations and therefore is losing its strategic significance. We dispute this claim, and argue that ICT cannot be considered in isolation from entrepreneurial activities, business processes and company culture. It is the close integration between ICT and business processes that can provide competitive advantage to organizations. When this integration produces a product or service with higher utility value or lower costs, the company gains a strategic advantage [7] [8]. In general, there are two types of enterprise applications: applications that support business processes (e.g. logistics, CRM etc.) and applications that directly implement business processes (e.g. electronic banking, mobile telephony, digital airline ticket etc.). For the first type of enterprise applications, it is possible to gain competitive advantage by combining ICT with unique company culture and knowledge. This unique combination enables the company to function effectively and utilize company's assets such as organizational knowledge and culture. The second type of enterprise application provides a service or product to customers and its timely deployment and unique features can result in competitive advantage [17]. There are many recent examples of ICT providing competitive advantage to companies. For example, the courier service eKuryr (www.ekuryr.cz) that operates in the Czech and Slovak Republics has been highly successful principally because of its unique electronic system eKuryr. Similarly, while not every new technology is important,

there are situations where missing a new development can be fatal. For example, today most suppliers of accommodation services must provide web-based applications to allow worldwide access to booking and other services in order to avoid losing significant market share.

Another factor that supports the argument for the strategic importance of ICT is the unremitting growth in the demand for timeliness and quality of information for decision making from all levels of management. According to Gartner (2004), the required response time to important events has decreased from 2 months in 2002 to 1 month in 2004, and will further decrease to 1 day in 2010. While this forecast may not be entirely accurate, the requirement to react faster to important external events is evident.

Increasing Process Orientation of the Enterprise

Towards the end of the last century, it was becoming clear that managing enterprises based on business functions could lead to conflicts between the goals and interests of individual departments and organisational goals as a whole, resulting in numerous problems including the inability to predict response time to important events. Many organizations have adopted the process management approach in order to address such problems [15]. The importance of process-management is still growing. The principal aim of a process-managed enterprise is to achieve *real-time* response to important events. This requires that the organisation has active sensors (usually using IS/ICT) that indicate new events (e.g. arrival of an order, time to send VAT returns, production line failure, etc.). As soon as the event occurs, the correct process is activated as a response.

This trend also affects enterprise ICT management, with many enterprises adopting process-management of their IS/ICT. ITIL and COBIT methods are de facto standards in this area.

The 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 business processes in real-time. The Organization for the Advancement of Structured Information Standards (OASIS) has defined a number of standards in this area [9].

The success of process-management depends on a number of critical success factors. The most important of these are [14]:

- appropriately chosen detail of business process definition and its alignment with the knowledge of the employees undertaking the process [13]. A detailed definition of a business process enables the use of less-qualified but well-trained employees. On the other hand, it prevents utilisation of employees' creativity and reduces the flexibility of the process,
- 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 optimized 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 essential to use appropriate methods and standards (e.g. ITIL or COBIT). Recent experience indicates that applying these methods and standards mechanically can lead to problems and that methodologies must be tailored to the specific conditions of the enterprise.

Management of the Relationship between Business and ICT Using ICT Services

For over 50 years, computer professionals and end-users have been searching for an optimal way to communicate with one another and for an optimum division of responsibility for the costs and benefits of ICT projects. A new approach for managing the relationship between business and ICT is emerging based on the concept of ICT service, described using an SLA (Service Level Agreement). Service is a basic element that defines the boundary between business and ICT activities. Methodologies such as SPSPR [14] that define the responsibilities of different types of managers and the content of the communication between business and ICT managers without undue use of technological concepts are required to define services and their interfaces to business.

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 individual departments,
- 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 lasting since 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 risky long-lasting ICT projects.

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 a CIO can fulfil such expectations.

The first requirement is a scalable ICT infrastructure and scalable ICT processes [5]. 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 load 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.

Another requirement is improvement in the enterprise performance, and that cannot be achieved by the deployment of ICT solution alone. This requirement can be only met by an appropriate distribution of responsibilities of ICT and business managers, for example using the SPSPR model. Using 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 costs of other (non-ICT) processes 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.

Purchasing External ICT Services Instead of Purchasing ICT Products

The desire to concentrate enterprise activities on core business leads enterprises to the outsourcing of support business processes and to

considerations of ICT outsourcing in order to achieve scalability in ICT services based on the “pay as you use” principle [15].

Making decisions about what to own and what to buy as an external service presents a number of challenges. An enterprise must 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 need to be considered [4]. The latest analysis [16] and predictions [2] show that the dominant forms of outsourcing will be Business Process Outsourcing, complex outsourcing of IS/ICT, and Application Service Providing.

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 include 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 good monitoring it is not possible to find out what provides a better value - internal or external provider,
- 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.

IMPACT ON END-USER ORGANISATIONS

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

- Increasingly 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 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 [11].
- Employees of an ICT department will need to demonstrate the value of ICT for the business and offer new ways of utilising ICT by the business.
- 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 will increase. Not all of these employees will be working in the ICT department. In 2004, Gartner predicted that in North American and European companies the fraction of employees working in ICT will reach 8% in 2006 and in the “ICT driven industries” it will be as high 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 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 sourced from external providers, the number of employees concerned with the utilisation of ICT is not expected to decrease significantly. However, the structure of their qualifications will need to change in order for the enterprise to safeguard the following skills and knowledge:

- how to gain a competitive advantage using ICT,
- 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 of ICT services and measurement of the benefits of ICT for business processes.

IMPACT ON SUPPLIER ORGANISATIONS

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

- The sale of new software licences to end-user organisations will decrease. Tables 1-3, compiled using annual reports of several large software companies confirm this trend, and indicate that while the income from new licenses decreased, income from maintenance and related services grew. Furthermore, according to Haber [6], 80% of software cost can be attributed to maintenance of applications and related activities. The increasing cost of maintenance could be another factor that will contribute to the greater focus of end-user organisations on outsourcing of their applications.
- Because of the decrease in the sales of new licences and the growth in outsourcing, the software industry is likely to undergo further rationalization, with some software vendors who do not adapt their businesses to this new environment failing.

Table 1. Oracle

Oracle	1999	2000	2001	2002	2003
License					
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

Table 2. SAP

SAP	1999	2000	2001	2002	2003
License					
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%

Table 3. Siebel

Siebel	1999	2000	2001	2002	2003
License					
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%

Table 4. Revenue composition - IBM

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

Table 5. Revenue composition - HP

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

Table 6. Revenue composition - SUN

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

- Instead of software and hardware products, the vendors will need to focus on providing scalable ICT services. In effect, hardware and software products will be managed and deployed by their suppliers in order to provide scalable services to clients. The gradual transition of large ICT suppliers from products to services is illustrated in the tables Table 4, 5, and 6.
- There will be changes in the structure and company culture of ICT vendor companies, reflecting the fact that supplying ICT services requires a different type of enterprise than the supply products and licences.

Outsourcing of services is often 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 change the *volume* of the service as required and pay only for the actual number of users or supported servers in a given time period (e.g. one month). The migration to ASP-provided software services will not happen very quickly as there is an inherent distrust of external suppliers, and unwillingness to relinquish control of data and key ICT infrastructure.

The increase in the required number of specialists who integrate business processes with ICT services will not affect only end-user organisations. It will provide an opportunity for new consulting firms that specialise in this area. There are specific considerations that apply to different countries and geographical regions (e.g. India, China, Czech Republic, etc.).

There is a general agreement that the impending ICT market changes will affect the organisational structure and company culture of large ICT suppliers. The key factors in the future development of ICT will include:

- labour costs – where large global companies such as HP or IBM will need to compete for market share with smaller, locally active companies that typically have lower labour costs and more extensive knowledge of the customer base. This will be most apparent in the SME market.
- ability of start-up companies to enter new untried market segments and to offer more innovative as well as more risky types of services.

CONCLUSIONS

Strategic advantage cannot be achieved simply by deploying new technology, but requires effective integration of ICT with entrepreneurial activities and enterprise business processes. Such integration enables the company to speed up its responses to important events, reduces cost and increases the quality of information used for decision making. It is therefore essential that ICT projects focus on integration and customization of enterprise applications to closely reflect important business processes.

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

Well-managed enterprises must be able to control their ICT costs, and align the investment in ICT 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.

Notwithstanding these challenges, it is highly probable that by the end of this decade outsourcing and particularly ASP outsourcing will be the dominant form of acquiring ICT services.

A gradual development in the direction described in this paper 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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