Chapter 16
Technology in Work Organisations

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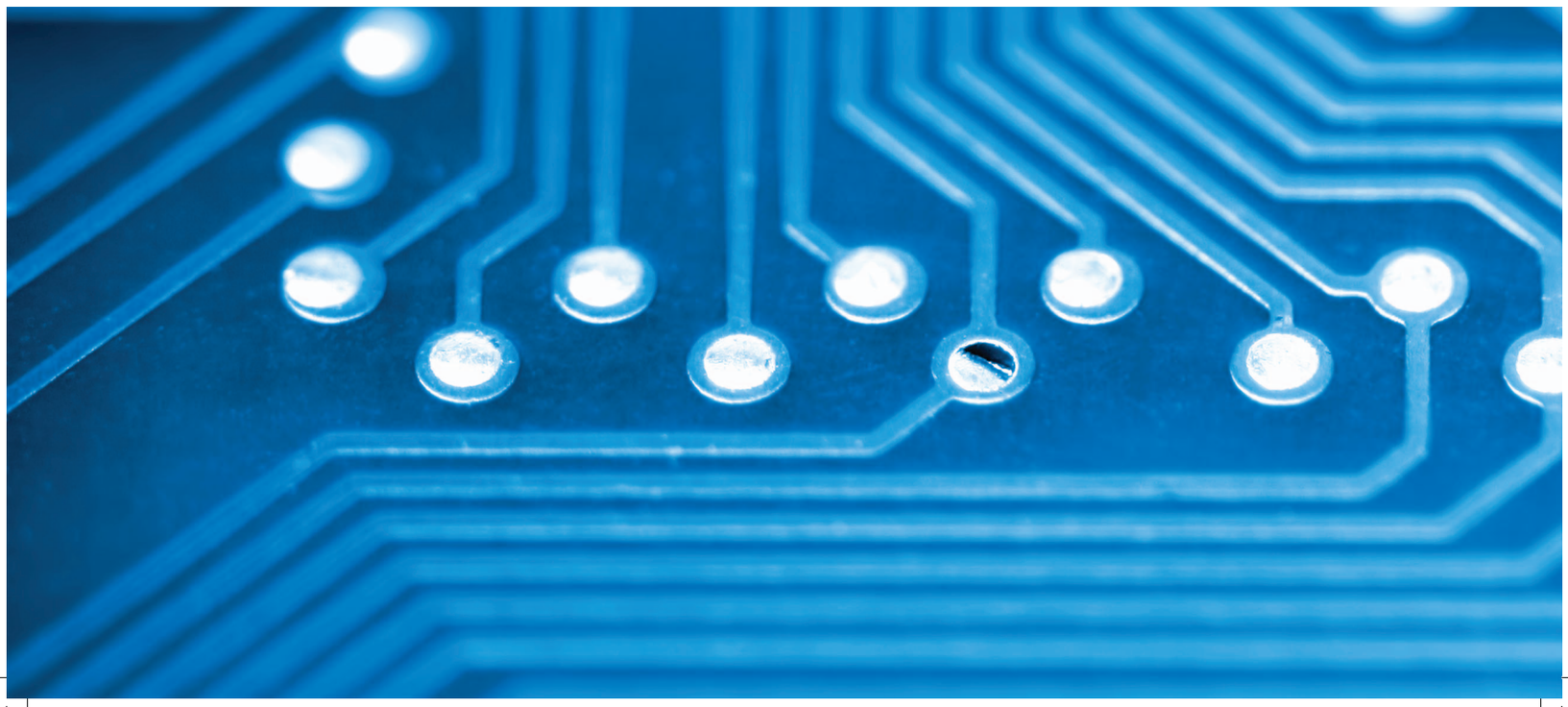


Contents

Key Learning Outcomes

By the end of this chapter you should be able to:

- describe different types of technologies used in work organisations
- identify and explain some of the ways technology shapes work organisation
- understand the impact of technology on collaboration within and across organisations
- understand what motivates employees to accept and use technology in the workplace
- understand which of various change roles can be combined when implementing technology
- describe technological developments that may have a large impact on the future organisation of work.

PRACTITIONER INSIGHT

Belgian Government Ministry

At the turn of the millennium the **Belgian Federal Government** initiated what was called the Copernicus Reform Programme. The main reason for this programme at that time was the poor level of service provided by governmental authorities, yet the results of the programme, in terms of improvements in both effectiveness and efficiency, themselves remained disappointing until 2008. In that year, the financial crisis hit hard and accordingly had an enormous effect on the Belgian Federal Government's budget. For the first time in decades, budgets for government spending – in particular, the payroll – were announced to be due to be cut the following year. This led to a high sense of urgency for reform and created a strong impetus to organise differently. In particular, large benefits were expected from the implementation of e-HRM: web-based applications for human resource management within the Ministry. We spoke to **Jan Samin, the head of HR at the Belgian Ministry of Public Health**, about the new e-HRM project that he initiated in 2005.

When Jan started in 2004 at the Ministry of Public Health, the personnel administration was a mess. For the HRM department to be considered an equal partner at top management level Jan was fully aware that HRM administration services would have to become and be seen to be excellent. Lessons had been learned the hard way, for previously the belief had prevailed that when e-HRM tools were made available, the employees would simply start to use them. But this turned out to not be the case in respect of the e-HRM tools that had been purchased and installed in the early 2000s.

So in 2005 Jan initiated a new e-HRM project in which this time there was a much stronger emphasis on change management in order to achieve a much high user adoption of the new e-HRM tools. With the prior bad experiences in mind, he had to prevent the provider of the IT services from inhibiting the commitment of users to the project. During the 'go live' stage – the stage in which the system became fully operational – the service-provider was pushing too hard and wanted to go too fast for users in an effort to meet budget and time pressures. At this point the HR director sensed that the e-HRM team and the wider organisation were just not ready for going live. He therefore boldly stepped in and caused some fairly severe disruption by putting the 'go live' on hold. A project like this, which was intended to evolve HRM from a paper-based function into a web-based function, needed clear and intensive communication. The HR director set up a new campaign aimed at increasing awareness among employees of the upcoming e-HRM implementation. It was of the utmost importance that the goals were clear and that commitment was built up for achieving them. By means of a marketing campaign with posters, mailings, screen pop-ups, and entertainment, the e-HRM initiative was 'sold' to managers and employees. The HR director also wanted top-down (management to employees) communication to be replaced by more bottom-up (employees to management) communication. Employees were supported in starting discussion groups on HRM issues and on how HRM might be improved by web-based HRM applications.

These initiatives of course took extra time, cost more, and led to delayed implementation of the system. However, this was largely compensated for by the eventual positive introduction and well-received implementation of e-HRM by managers and employees.

What would you have done if you were in Jan Samin's position?

Why do you think it is important to have employees involved in an e-HRM project?

Once you have read this chapter, return to these questions and think about how you could answer them.

Introduction

Most, if not all, work in contemporary organisations is entwined with all sorts of technologies. These technologies range from office technologies, such as email, to computer-aided design in engineering and robotics in production. In particular, over the recent decades, Information and Communication Technologies (ICT) have had far-reaching consequences for how we do our work. Primarily, ICT enabled both the shift from a production- to a knowledge-based economy and the opportunity for anytime-anywhere collaborations that made the world substantially smaller. This chapter focuses mainly on ICT because they are the predominant form of technology with which both contemporary employees and students work. First, we describe three different types of technologies to provide the reader with an overview of different types of ICT, after which we discuss from a number of perspectives how managers and employees deal with technology in their daily work.

We start our brief description of various types of technology in work organisations by distinguishing between a) **transactional** and operational information systems, b) management information systems, and c) **collaborative** and group work technology. Then we discuss how employees accept and use technology – in particular from the perspective of the dominant paradigm in this domain: the Unified Theory of Acceptance and Use of Technology (UTAUT). Next, we describe three possible approaches to implementing work-related technology. We explore the more traditional planned approach by which technology induces change by redesign; the advocate approach in which change is a process of negotiating interests and building coalitions; and the facilitator approach by which end-users find technology appropriate to them by attributing shared meaning. Finally, we provide an insight into two important developments that will have – if they have not already had – a profound impact on work organisations. These developments are **offshoring** and outsourcing in relation to globally distributed work, and **social media** in relation to collaborative work and interaction with customers.

VARIOUS TYPES OF TECHNOLOGY IN WORK ORGANISATIONS

A basic knowledge of the various types of technologies available to work organisations is necessary in order to understand the effects of technology on employees. We therefore first provide an overview by classifying ICT into three different categories based on the purpose for which they are used. For example, **functional** and transactional **information systems** are used to assist employees in the execution of a specific demarcated task, whether in production, service or support. **Management information systems** on the other hand provide higher-level and integrated information – often called a managerial dashboard as it compares to a car dashboard with speed, oil temperature, and fuel meters – which can be used for managerial decision-making, often with the goal of improving performance. Additionally, we have distinguished a third category in the form of information systems that are used to improve collaboration and communication among professionals, often across organisational boundaries.

Functional and transactional information systems [1]

Traditionally, information technologies were designed within different functional areas – finance, marketing, logistics, HRM – to support and improve processes within these areas. However, in modern organisations many business processes have cross-functional areas and in many cases cross-organisational boundary implications – for example, purchasing through electronic exchanges with suppliers. Organisational structures have become flatter through the

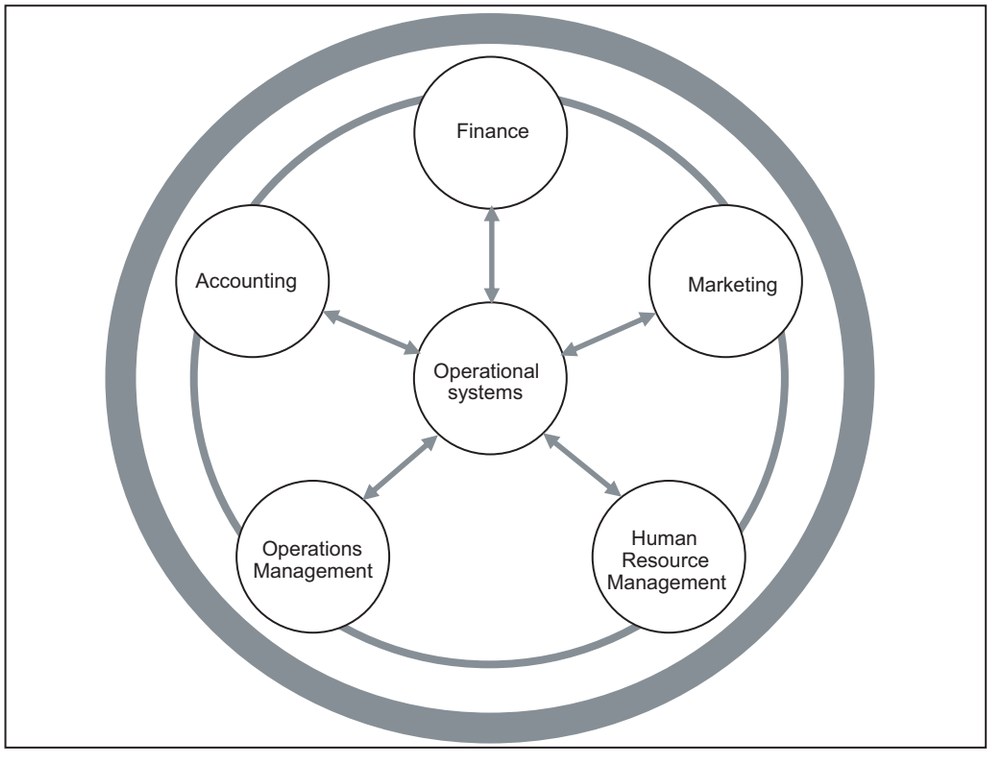
intensified use of information systems. All this can result in the integration of information systems to serve multiple purposes (communication, co-ordination, and control), and in the use of integrated information systems in all functional areas.

Basically we can distinguish four main characteristics of a functional information system:

- *it is composed of smaller systems* – A functional system consists of several smaller information systems that support activities performed in the functional area (eg performance management in HRM)
- *it is either integrated or independent* – The specific information system applications in any functional area can be integrated to form a coherent departmental functional system, or they can be completely independent. Alternatively, some of the applications within each area can be integrated across departmental lines to match a business process
- *it is interfacing* – Functional information systems may interface with each other to form an organisation-wide information system, sometimes forming an '**enterprise system**' (these are discussed more thoroughly in the next section). Some functional information systems may interface with the external environment. For example, recruitment information systems may collect data from external recruitment sites.
- *it is supportive of different levels* – Information systems may support the three levels within organisations: operational, managerial, and strategic (see Figure 16.1).

In all functional areas there are transactions that are handled by the **transaction processing system** (TPS). Some TPSs occur within one area, whereas others cross several areas (such as payroll). The primary goal of a TPS is to provide all the information needed in accordance with legislation and organisational policies to keep the business processes running. Specifically, TPSs are held responsible for avoiding errors, monitoring, collecting, storing, and processing information for all routine core business transactions. These data shape inputs to functional information systems in the form of 'data warehouses', customer relationship management, and other systems.

Figure 16.1 The functional information system areas and their integration



To meet the expectations and requirements of the business, TPSs have certain characteristics, which are listed below:

- the ability to process large amounts of data
- internality – the sources of data are internal; the output is aimed also at an internal audience, with a high level of detail
- the ability to process the data/information on a regular basis (daily, weekly, yearly)
- the ability to operate at a high speed with a high volume of information
- structured and standardised data
- the need for high security, accuracy, data protection, and attention to such sensitive issues as information privacy
- the core abilities of enquiry processing, seek options and report-generating functions.

Functional information systems can be built in-house, or they can be purchased from a few large vendors (SAP, Oracle, Microsoft, IBM, etc) or dozens of small vendors. In any case there is a need for their integration with other functional systems, and TPSs. As mentioned earlier, for many years most information systems applications were developed independently, within different functional areas. This created potential problems with sharing information and interfacing different applications, especially when the business processes were carried out in several departments. On top of that, many companies developed their own functional systems to fulfil processes. However, to build information systems for business processes but with cross-functional applications requires a special approach. Combining several packages from several vendors may not be practical or effective. One possible approach to integrating information systems is to use existing *enterprise resource planning* (ERP). However, ERP requires a company to accommodate its business processes to what the software can do. As an alternative to ERP, companies can choose the best available systems on the market and integrate them, or use some of the home-grown systems and integrate them. Whatever approach is chosen, integrating functional information systems helps to reduce uncertainty, minimise errors, share information, and improve efficiency.

Frequent cross-departmental integration is one of the ways to integrate information systems, and involves the creation of front-office and back-office systems. 'Front-office' refers to customers who face the system (such as marketing, recruitment, and advertising). 'Back-office' refers to activities related to order fulfilment, accounting, payroll, shipments and production. When a company is about to integrate its functional information systems, it should consider several issues:

- The integration of stand-alone functional information systems is a major problem for many companies, along with the issue of willingness to share information that may challenge existing rules and norms.
- Transaction processing deals with the core processes in an organisation. It must receive top priority from management in resource allocation, balanced against innovative applications, because the TPSs collect and order information for other applications.
- Many ethical issues are associated with the topic of information system integration. Professional organisations relating to different functional areas (finance, marketing, HRM, production) have their own codes of ethics. These codes should be taken into account in developing integrated functional systems.

Management information systems

Management information systems are intended to support managers in their decision-making (see Chapter 11 for more on decision-making). For this purpose, management information

systems usually synthesise information from operational and functional information systems. This integrated information can then be used to develop management reports or realtime managerial dashboards, in which managers can drill down into real-time information on organisational performance. Also, information from outside the organisation can be pulled together to provide managers with up-to-date information on markets and the wider environment. In this section we first focus on performance management and managerial information overload, and then discuss enterprise systems, which constitute the most prominent and comprehensive form of contemporary management information systems.

In Chapter 5 we learned about motivation and how managers try to motivate their staff to improve performance. An important aspect within motivation is the role of feedback given to both managers and employees. Management information systems fulfil an important role in providing feedback because it has the power to enable greater transparency and, additionally, the potential for greater control (Kohli and Kettinger, 2004). Also, the literature on performance management recommends that organisations do more than simply collect data concerning their performance. It suggests in addition that when they are confronted with their results, organisations may feel an impetus towards understanding and using data strategically to improve their performance. In this sense, a management information system is an important tool in following the Deming (1986) plan–do–check–act cycle. Managers are thus able to intervene in a production or service process, based on information synthesised in management information systems, and to track the consequences of their interventions. In 1964, management guru Peter Drucker had already used the concept of 'managing by results' to refer to such interventions as what lies at the core of what a manager should do. Specifically, managing by results can be defined (Ehrenhard, 2009: 48) as:

> managers' use of performance information – derived from measures related to managerial goal-setting – to support their decision-making for reaching desired outcomes and to give account to stakeholders.

However, a substantial part of the modern-day workforce consists of professionals who need a wide degree of autonomy to do their work. Successful performance management therefore holds that managers need to strike a fine balance between control and autonomy. Otherwise, too much interference with professional work will lead to resistance and power plays (see Chapter 13 for more on power issues). On the other hand, too little attention could also have a detrimental effect in that employees could feel that their efforts were going unacknowledged (see also Chapter 10 on leadership). Additionally, knowledge workers usually have an advantage over their supervisors because their performance is difficult to gauge in concrete measures of output. For this purpose, Ehrenhard (2009) has defined one persuasive and one enabling variant of managing by results. The former, persuasive variant focuses on setting a specific, measurable and time-bound target for employees' output – e.g. the number of chairs assembled in an hour or the amount of mail delivered in a day. The latter, enabling variant focuses on an employee's ability to undertake certain behavioural and associated learning, and leaves room for open constructive discussion about obtaining outcomes. Note that the choice of either of the two variants depends on the context, but also on the developmental orientation of the manager. For instance, in the case of football, whereas one might be happy to win matches and perhaps even a championship by playing poorly, sooner or later teams that genuinely focus on learning and improving will overtake and beat one's own team (see Chapter 6 for more on learning).

However, it is not only employees who might have issues with performance measurement. Often, system engineers believe that the more information is provided, the better for the organisation. Yet Nobel Prize-winner Herbert Simon (1997: 242) has pointed out that

> in designing systems there was a tendency to give top management access to all this information [. . .] The question was not asked whether top or middle management either wanted or needed such information, nor whether the information could in fact be derived.

So information collection can simply be yet another burden in organisational life. We must therefore consider that 'the key to the successful design of information systems lies in matching the technology to the limits of the attentional resources' (Simon 1997: 248). Information technology thus provides a number of ways to support managerial decision-making, although we should be careful not to overload managers with information. For most managers today, however, having performance information readily accessible is the exception rather than the rule. This development was especially driven by enterprise resource planning systems and was further encouraged by the arrival of *enterprise systems*.

Enterprise systems appear to be a dream come true because they promise seamless integration of all the information flowing through an organisation – financial and accounting information, human resource information, supply chain information, and customer information (Davenport, 1998). The market for enterprise systems grew enormously during the 1990s. Most of the Fortune 500 companies have already installed enterprise systems (Kumar and Van Hillegersberg, 2000). Enterprise systems can be distinguished from other types of (large) information systems by four main traits:

- they integrate the information flows within the organisation
- they are commercial packages (ie vendors put them on sale)
- they consist of best practices, and
- because every organisation is in essence unique, some customisation is always required.

However, due to the sheer size and reach of enterprise system packages, complications during implementation tend quickly to arise. Most notorious is the impact on the organisation as a whole. Davenport (1998) points out that enterprise systems have profound business implications, and that offloading responsibility to technologists is particularly dangerous because technical challenges are not the main reason that enterprise systems fail. Companies often neglect to reconcile the technological imperatives of the enterprise system with the business needs of the enterprise itself. Also, the business often has to be modified to suit the system (Davenport, 1998). This means that the organisation's business processes have to be re-engineered to fit the best practices that comprise the system, which considerably adds to the expense and risk of introducing an enterprise system (Kumar and Van Hillegersberg, 2000; Markus and Tanis, 2000). Moreover, vendors try to structure their systems to reflect best practices, but it is the vendor, not the costumer, who defines how 'best' is interpreted (Davenport, 1998). This means that the adopting organisation is dependent on the vendor for updates of the package (Markus and Tanis, 2000). Furthermore, achieving full integration depends a lot on the configuration of the system and the choice for installing just one system instead of modules from multiple vendors (Markus and Tanis, 2000).

Besides these organisational impacts of enterprise systems, organisations also have good reasons to avoid adopting or even to abandon enterprise system implementation. Two reasons often mentioned are that the packages on the market lack fit with the specific needs of an organisation, and that enterprise systems have the tendency to inhibit flexibility, growth and decentralized decision-making. Also important are the available alternatives – for instance, sophisticated data warehousing or using middleware to change a system's architecture (Markus and Tanis, 2000). Furthermore, enterprise systems also have a direct and paradoxical impact on an organisation's formal structure and culture. On the one hand organisations by using them are capable of streamlining their management structures, creating flatter, more flexible, and more democratic organisations. On the other hand, they also involve the centralisation of control over information and the standardisation of processes, which are qualities more consistent with hierarchical command-and-control organisations with uniform cultures (Davenport, 1998). To sum up, the main reasons for not adopting an information system also hold for enterprise systems: high cost, no competitive advantage, stifling of innovation and of bottom-up initiatives, and resistance to change.

Collaborative and group work technology [2]

Collaboration occurs throughout modern organisations. It can be defined as the interaction, communication, and collective accomplishing of tasks by people within or across organisations. In today's world where the Internet is all around, collaboration has come into its own as time and place have pretty well evaporated as barriers to it.

In many collaborative situations, technology is a facilitator, providing the platform, applications and functionalities to effectively collaborate. In its most basic form – for example, in decision-making processes – the people involved may all be invited to express their opinions on the issue at stake by email. Thereafter, decision-making may be assisted by a summary of ideas and opinions sent to all involved, resulting in a final decision supported by all team members. A more advanced example of technology-facilitated collaboration is the combined development of new product ideas via video-conferencing – having video and audio for the widely (perhaps even globally) dispersed team members at their disposal. Both examples, simple and advanced, are common in modern organisations of which most are international businesses as well.

Technology-facilitated collaboration can be seen in various work situations ranging from email correspondence between employees linked by a given task, online document-sharing, to online cross functional, cross-departmental and cross-organisational projects. Organisations use technology-facilitated collaboration to save costs, to improve organisational communication, to remove hierarchical layers, and to enhance product development (Bajwa, 2008). Furthermore, networked structures to impose more decentralised decision-making and teamwork have been introduced that were facilitated by technology. Besides internal collaboration, the Internet and web-enabled applications have spurred collaboration between organisations – for example, in inter-organizational product development and service delivery. Outsourcing and offshoring have made a huge leap due to the availability of web-enabled technologies. On top of this collaboration with customers in products and services design has become more common through the availability of technology-facilitated collaboration. Adoption of this technology came hand in hand with the rise of the knowledge economy.

Technologies to facilitate collaboration are called collaborative technologies or groupware technologies. We define them as information-technology-based applications or built-in functionalities that facilitate and/or induce collaboration between end-users.

There are many variations in collaborative technologies available in the marketplace. The traditional type of collaborative technologies was designed to enhance group performance through the support of communications, interactions, and the flow of information and expertise. But nowadays collaborative technologies are aimed at enabling team work or project work in different time/place scenarios. Moreover, many new technologies have built-in sharing and collaborative functionalities, and with more and more technologies being web-based and being sourced through, for example, Google, collaborative and sharing behaviour is in serious demand. It remains, however, a matter for organisation-wide implementation requiring change management and an effort to create a shift in the mind-set of managers and employees to share and collaborate easily.

Because collaboration is considered critical in modern organisations in order to be and to stay competitive, collaborative technologies have become attractive tools in recent years years. For example, the World Bank uses these tools extensively. Already by the early 2000s it was using 50 advanced video-conference systems every day to communicate with up to 150 sites across the globe; it was using more than 30 distance-learning centres, more than 800 distance-learning conferences, and more than 100 communities of practice to facilitate global virtual teamwork. Along with this, the organisation was by then already successfully using intranets (an online network within the organisation) for real-time in-house collaboration, and extranets (an online network between selected organisations) to support communication with clients and other stakeholders. With the deployment of collaborative technologies the World Bank aimed to obtain a competitive advantage, to cut costs, to flatten the organisational structure, to become more flexible, and to be thoroughly networked.

Three main benefits of collaborative technologies have been described by Bondarouk (2004). Firstly, collaborative technologies are assumed to give better support to data exchange, project management, and document retrieval, and to promote better co-ordination between personnel. Better and quicker decision-making is considered a crucial benefit in adopting collaborative technologies. Quicker response times and quicker problem-solving information on ideas, questions, and comments presented by all involved should certainly improve a company's productivity (Ellis and Wainer, 1994) and in turn result in cost savings.

The second most acclaimed benefit of collaborative technologies is that they improve the communication among the users (ie employees, team members) of the technologies. Communication is assumed to become richer, easier, and more frequent. However, it is also acknowledged that although communication, in whatever form, can be helpful, it can also be a distraction or even be unhelpful (Mark and Wulf, 1999). This is actually well known to many email users. Good work may often demand freedom from interruption, and teamwork is sometimes enhanced by less communication rather than more. Collaborative technologies may therefore produce unwanted negative results (Dale, 1994).

Finally, by extensive sharing of resources and data, collaborative technologies are assumed to decrease individual and unnecessary hardware and software needs (Yen *et al*, 1999).

These assumed advantages, or possible benefits, ascribed to the use of collaborative technologies often become the main forces behind the implementation of them in organisations.

ACCEPTANCE AND USE OF TECHNOLOGY

Technology cannot work without the intervention of human beings – this holds true for all technologies, not just for information technology. Stressing only the technical aspects is very likely to result in failure. Research has shown that overlooking the user side is a highly significant reason why technology may not bring the expected outcomes or may even bring about the opposite of what is expected – eg higher costs rather than cost savings.

Social scientists have developed models that identify the factors explaining why users are willing to adopt or reject a particular technology – known as user-acceptance models. Research on the issue continues. As Kukafka *et al* (p218) put it:

> Designing an effective approach for increasing end-user acceptance and subsequent use of information technology (IT) continues to be a fundamental challenge that has not always provided straightforward solutions.

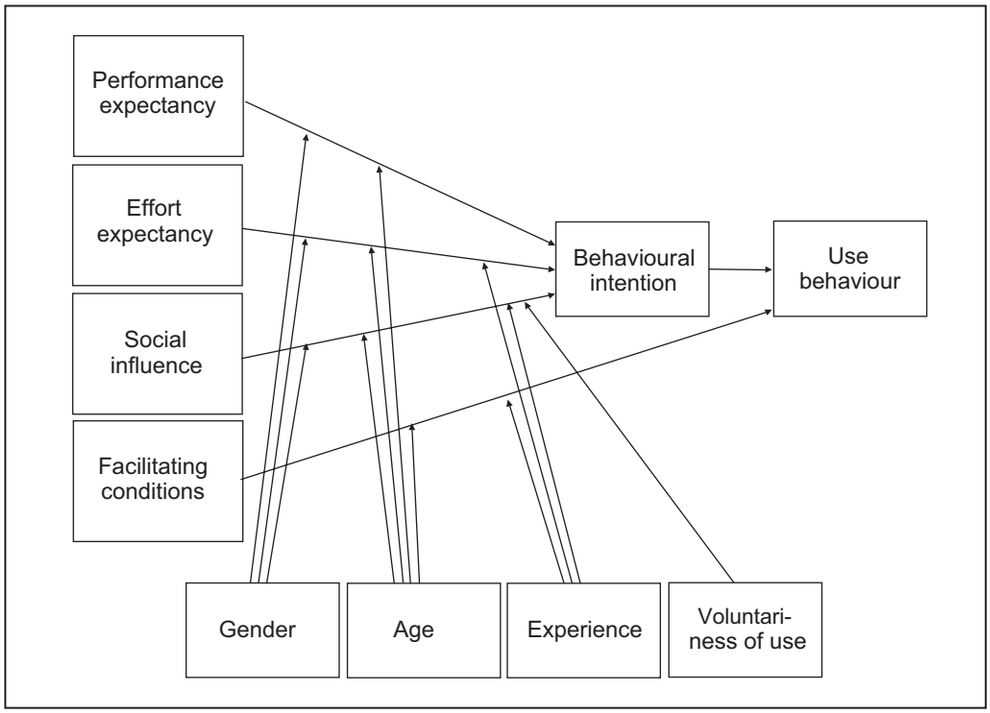
Existing user-acceptance models suggest that various factors have a significant influence on users' acceptance and use of information technologies. Users' perceptions and expectations of the system are assumed to be the key factors (Li and Kishore, 2006). Venkatesh *et al* (2003) have integrated eight prominent user-acceptance models into a unified theoretical model (UTAUT) that captures the core elements of those models. They concluded that the UTAUT model outperformed the existing models in explaining user acceptance and adoption of technology. Let us therefore look at the UTAUT model in more detail (see Figure 16.2).

The UTAUT model assumes three determinants of behavioural intentions (to use some technical terms) – performance expectancy, effort expectancy, and social influence – and two direct determinants of use behaviour – intention and facilitating conditions. UTAUT also includes four moderators – age, gender, experience and voluntariness of use – which are assumed to influence the direct relationships between determinants and behavioural intention and use behaviour. The UTAUT model is presented by its developers (p467) as 'a definitive model that synthesises what is known and provides a foundation to guide future research in this area'.

According to Venkatesh *et al* (2003: 447):

> Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance.

Figure 16.2 The unified theory of acceptance and use of technology (UTAUT)



Source: adapted from Venkatesh, Morris, Davis and Davis (2003) 'User acceptance of information technology: toward a unified view', *MIS Quarterly*, Vol. 27, No. 3: 447

It is the strongest predictor of intention in both voluntary and mandatory settings. Venkatesh *et al* (2003) assume that the influence of performance expectancy will be moderated by both gender and age.

And on effort expectancy (p450):

> Effort expectancy is defined as the degree of ease associated with the use of the system.

Venkatesh *et al* (2003) assume gender, age and experience to work in concert. They therefore hypothesise that effort expectancy will be more salient for women – particularly those who are older and who have relatively little experience with the system.

And on social influence (p451):

> Social influence is defined as the degree to which an individual perceives that other important people believe he or she should use the new system.

In mandatory settings, social influence has shown to be important only in early stages of individual experience with the technology, its role eroding over time and eventually becoming irrelevant the longer the stage is sustained. The role of social influence in technology acceptance decisions is complex and subject to a wide range of other contingent influences. Venkatesh *et al* (2003) assumed a complex interaction that involved the moderating variables (gender, age, voluntariness of use, and experience) simultaneously affecting the social influence–behavourial intention relationship.

And on the facilitating conditions (p453):

> Facilitating conditions are defined as the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system.

However (p.454),

> When both performance expectancy constructs and effort expectancy constructs are present, facilitating conditions become insignifcant in predicting intention.

Venkatesh *et al*'s (2003) study indicated that beyond what is explained by behavioural intentions alone, facilitating conditions do have a direct influence on use. So when moderated by experience and age, facilitating conditions will have a significant influence on use behaviour.

Consistent with all of the intention models that were reviewed by Venkatesh *et al* (2003), they hypothesised that in the end it is behavioural intention that determines technology use.

As stated above, the UTAUT model represents a fusion of the most prominent user-acceptance and user-adoption theories, and would seem the best model to explain user acceptance of technology. However, we must remain conscious of the fact that the model was developed and tested in a Western cultural context. In today's global economy, in which Asian countries are emerging as economic powerhouses, it is important to be cautious about the model's predictive power in non-Western cultures. Further research into factors that explain why users will or will not accept and use a new technology is still needed.

IMPLEMENTATION OF TECHNOLOGY

Chapter 15 examined the management of change in general, and the relationship between culture and change in particular. In this section we more specifically focus on the management of technological change, in particular the implementation of new technologies in an organisation. The previous chapter explained how difficult change can be. Implementing technological change is not that different. The introduction of new technologies in work organisations can be a distinctly arduous task.

Usually, new technology is introduced with the stated objective of performance improvement in terms of achieving greater efficiency or effectiveness. Nonetheless, new technologies in practice often conflict with vested interests, deviate from understood ideas and intentions, or are simply badly designed. Even when a technology is up and running, problems may arise due to changes in the environment or merely to a lack of maintenance. For these reasons, Markus and Benjamin (1996) in their seminal paper describe three **change agent roles** in technology-enabled change processes: the traditional role, the advocate role and the facilitator role. These roles focus respectively on designing and planning the change, building a coalition for change, and creating shared meaning. In addition, Markus and Benjamin (1996) emphasise that playing a single, fixed role as implementer or change agent has negative consequences for organisations as well as for the credibility of change agents themselves (see the *Applying theory to practice box* below). Indeed, in practice a change agent should combine a number of these roles to implement the change. The design role is most suitable for moderate to fast improvements in (economic) performance, whereas the other two roles are more suitable for learning and building organisational capabilities (Beer and Nohria, 2000).

Applying theory to practice: The roles of the technological change agent

Markus and Benjamin's (1996) framework may be used to identify the separate roles that can be played by those who want to implement technology-related – in particular, information-systems-related – change in organisations. Markus and Benjamin propose that implementation is most effective when a change manager is able to combine a number of roles instead of sticking to one approach. However, in practice those particularly involved in technology implementation tend to stay in an 'engineering' role and pay too little attention to the social processes of power and meaning that surround technology implementation. Also, depending on the specific context and technology, more emphasis could be given to one role over the other. In the case of office technology, perhaps an off-the-shelf training programme would suffice, whereas the implementation of an enterprise system would have much more far-reaching implications for (almost) everyone in the organisation and would therefore require a combination of all three roles.

Applying theory to practice: Change agent roles in technology-enabled change processes

For managers of technology-enabled change processes or change agents, the three change agent roles can be very useful. Being aware of the meaning and implications of the three different roles – traditional, advocate, and facilitator – allows a change agent to switch between them during a change process. In different stages of a change process, applying the most effective role will make a change process proceed more smoothly. For example, the traditional role, designing and planning the change, may work best when subordinates involved may express feelings of uncertainty and goal ambiguity. The advocate role may work well when the change agent needs support for the change. She or he will try to get relevant influential players 'on board'. The facilitator role may work well in the stage where the change process needs to create enthusiasm and involvement on the part of as many people targeted by the change as possible.

Applying the change agent roles is not easy because a person can have a natural preference for one of the roles and can therefore find it hard to apply other roles. This may take training. Another risk of the change agent roles approach is that it demands a good assessment by the change agent of what the situation at hand requires, and to know exactly when and how to switch between roles.

Designing and planning the change [3]

As noted earlier, when we examined the benefits and downsides of collaborative technologies, the users of technology in organisations do not just voluntarily use new forms of technology because these technologies may impose new and very different ways of carrying out the targeted uses. Information technologies available in the marketplace tend to 'promise' to bring benefits but then 'forget' that the benefits only emerge once the technology is actually in use.

According to the 'traditional' plan-based view of implementation, new information technologies in the workplace only yield the assumed benefits if the organisation is analysed for a specified 'technical problem' and solutions to it are presented in the form of proposed changes to organisational structures, work processes and technologies. This usually implies that the existing ways of working and collaborating are to be regarded as insufficient: redundancies and inefficiencies in work processes may be cut away, processes may be standardised, and the organisational workforce may be downsized. The focus is thus mostly on quantifiable improvements in efficiency and effectiveness. Most of the work in this domain is done by process engineers and technological experts. Employees, team members and managers will have to adopt a new methodology in carrying out their work and achieving their team or department goals. The redesigned method is from that point based on the support of an information system and only then can the desired benefits of the new system be obtained.

This process of implementing new information technology may be described as deterministic, in the sense that an information-system-based redesign of the work processes is determining the expected output of a team of users. Following this view, users are not considered stakeholders or people who may give meaning to an information system and who, on that basis, may decide for themselves how to use the information system.

Building a coalition [4]

In addition to the (re)designing and planning of the technology and the accompanying changes in organisational structures and processes, it is also necessary to make genuine changes in the behaviour of the people of the organisation. We referred earlier to Kohli and Kettinger's (2004) description of how information technology has the potential for greater control. Besides being able to steer the organisation in a certain direction, control also implies that the management of existing technology – and even more the implementation of new technology – is an inherently political process. The level of politicking will particularly depend on the vested interests in an organisation (Pfeffer and Salancik, 1974). An obvious example of a potential conflict of interests occurs when new technology will enable service workers to deal with customers directly instead of having to refer them to account managers. Both Fligstein (1991) and Greenwood and Hinings (1996) have emphasised that significant organisational changes can only be fully realised either when those in power are in favour of them or a new group of people gain control.

In this context, power is often defined negatively as constraining. When power is exercised top-down, (top) management constrains the choices employees have. When power is exercised bottom-up, employees resist change. Let us go beyond either of these one-sided views and follow the British sociologist Anthony Giddens (1986), who defines power as 'the capacity to make a difference'. In other words, power can both be enabling and constraining. Specifically, Giddens perceives power as the capacity to allocate human and material resources. Command over people is then labelled authoritive power, whereas command over the distribution of objects or goods is labelled allocative power. This view does not, however, imply that people will always follow commands: people always have a choice, even if some options come at high cost, such as the loss of the job.

In particular, for those aiming to implement technology, the question arises as to how power can be an enabler for the desired changes. Most importantly, following Greenwood and Hinings (1996), a coalition must be set up in support of the changes. Building such a coalition is easier said than done because the aforementioned interests are not always aligned. Contradictions in interests may in turn lead to conflict which will be detrimental to successful implementation. But what is often overlooked in the power literature, with its focus on protagonists and antagonists of change, is the role of the silent majority. In other words, when interests are at stake, people might actively resist – but there is usually a silent majority who passively resist. Passive resistance implies that people are not against the change *per se* but have a tendency either to fall back into previously routine behaviour or to simply give other projects a higher priority and so withhold effort (Ehrenhard, 2009). Successful change managers therefore direct a substantial amount of their efforts towards winning over the silent majority and then investing in sustaining their commitment to the desired change. That way a tipping point can be reached for the desired changes to diffuse through the organisation.

Change managers in the role of advocates (see Markus and Benjamin, 1996) usually try to change the attitudes or behaviour of a person by means of argument, reasoning, or, in certain cases, active listening. 'Selling' the issue also plays a particularly important role (Dutton, Ashford, O'Neill and Lawrence, 2001). Important factors to consider when selling an issue are the packaging or framing of the issue, who to involve and who not to, and the timing. Likewise, but with reference to both inside and outside the organisation, Rao (2009) describes how people he calls activists construct 'hot causes' that arouse emotions and exploit 'cool mobilisation' which together through improvisation strengthen a shared identity as the basis for collective action. In other words, members of a defined group 'join hands' in a coalition to achieve sustainable change in relation to technology implementation. For example, use of the Internet only peaked long after the technology had first become available precisely because users could experiment – for instance, by building web pages which in turn created a need for better search engines to find one's way through the chaos. Similarly, text messaging peaked with programs such as ICQ, and later MSN, which are now being replaced for example by Facebook and Twitter. (The implications of social media are discussed in greater detail later in this chapter.)

Creating shared meaning [5]

In recent years there has been a growing recognition in managerial literature that, ultimately, it is the actors' perceptions of organisational processes, filtered through existing mental frames, which form the basis of the formulation and interpretation of organisational issues (Hodgkinson, 1997: 626). Further, social cognitive research shows that people act on the basis of their interpretations of the world, and in doing so they enact particular social realities through giving them meaning (Bartunek and Moch, 1994). Mental frames (representations) of reality are seen to preclude and challenge the processing of information through sense-making and sense-giving processes, when people face new actions, and interpret and communicate their thoughts about them. (For an overview, see Hodgkinson and Sparrow, 2002.)

An understanding of the users' interpretations of information and communication technologies (ICT) is critical to an understanding of their interactions with the systems. To interact with the

ICT, people have to make sense of them, and in this sense-making process they develop particular *assumptions*, *expectations*, *and knowledge* of ICT, which then shape subsequent interpretations. Even if these assumptions, interpretations and frames of reference are taken for granted and rarely studied or reflected upon, they nevertheless play an important role in influencing and structuring how people think and act towards ICT. Cognitive frames have been related to managers' performance (Goodhew *et al*, 2004; Jenkins and Johnson, 1997; Laukkanen, 1994), decision-making (Axelrod, 1976), performance appraisal (Gioia *et al*, 1989), strategic behaviour (Dutton and Jackson, 1987), strategy formulation (Hodgkinson and Johnson, 1994), the exercise of power (Bartunek and Ringuest, 1989), leadership (Lord and Maher, 1991) and organisational performance (Thomas *et al*, 1993).

Orlikowski and Gash (1994) outline the core tenets of an analytical approach centred on the concept of technological frames to study interpretive processes related to the use and roles of information systems in organisations. Their central idea was to explore how people – users of the technology – make sense of information systems and how their interpretations impact on their actions involving information systems. From sociological studies of technology innovation, they drew out the concept of relevant social groups that include individuals who have similar experiences with technology. The main conclusion of their study was that differences in frames of understanding among relevant social groups ('technologists' and 'users') related quantifiably to problems such as misunderstandings, scepticism, resistance and poor use of technology. The implications of this for future practice therefore included 'early articulation, reflection, discussion, negotiation, and possibly change' of inconsistencies in those frames of understanding in order to reduce the incidence of unwitting misinterpretations and errors caused by incomprehension around the work with IT (Orlikowski and Gash, 1994: 202).

Frames related to the organisational applications of information systems concern the knowledge and expectations of contextual organisational data like business values (Davidson, 2002), motivation and criteria for success (Iivari and Abrahamsson, 2002), technological change and strategy (Barrett, 1999; Orlikowski and Gash, 1994). Frames related to incorporating information systems into organisational practice focus on how change occurs due to technological innovation (Davidson, 2002). Communities of actors engaged in similar tasks might work to similar (congruent) information systems frames if, through training sessions or storytelling, shared socialisation, comparable job experience and mutual co-ordination, people come to understand rules in similar ways.

Many authors suggest that it is well worth while examining the cultural contexts of the IT-related assumptions of key relevant groups: managers, employees, and information systems specialists. 'Culture' here is understood as an emergent process of reality-creation through shared knowledge and cognition (Geertz, 1973; Walsham, 1993). Such a perspective on culture shifts our understanding towards how individuals interpret and understand their experiences. Culture is conceived as derived from the commonalities and interactions among the *subcultures* (Barret, 1999). Subcultures may be distinguished on the basis of their sets of understandings, assumptions and interpretations of information systems. In some studies language is identified as one of the key characteristics: subcultures define themselves and set boundaries by developing a specialised (professional) language. Use of it expresses membership and status, and may provide a basis for identification (Iivari and Abrahamsson, 2002). It is important that subcultures include socially transmitted patterns of behaviour characteristic of particular groups, and therefore denote collective social identity, mutual engagement, shared experiences, and common frames of reference for interpreting and negotiating meanings.

It is to be assumed that information systems frames are unlikely to be shared across all different subcultures. Following Orlikowski and Gash (1994), we articulate the notion of *congruence* in information systems frames as referring to the alignment of frames across subcultures. By 'congruence' we do not refer to identical but to related content, values, and categories. A variety of terms has been used to express the idea of the congruence of cognitive frames, addressing in parallel ideas of collective cognitive maps (Axelrod, 1976), collective cause maps (Bougon *et al*, 1977) and strategic and organisational consensus (Fiol, 1993; Floyd and Wooldridge, 1992).

Incongruence, on the other hand, would mean crucially different, or even opposite, assumptions about the key aspects of information systems management. To the extent that frames differ across subcultures, problems such as misaligned expectations, contradictory actions, resistance, and scepticism may occur (Orlikowski and Gash, 1994). Researchers stress the importance of the social context and power exercise in shaping congruent or incongruent frames. Barrett (1999) thus observed that appropriate leadership in the adoption of an IT system was needed to ensure congruent frames among the project groups. Further, empirical studies suggest that in cases where the power asymmetry favours those proposing an organisational change, they affect the frames of key relevant groups by drawing on expert power (Barrett, 1999; Davidson, 2002).

TECHNOLOGY AND THE FUTURE OF WORK

Knowledge work constitutes a large part of Western economies, but is still on the rise especially in the emerging economies. In this section we focus our attention on two important developments for the future of work. First of all, we discuss how work is becoming more and more globally distributed. Products can be produced in locations thousands of miles away from where they are assembled and sold. Customers in Great Britian may be attended to by people in call centres in Pakistan. Second, we discuss a development that is very much of increasing significance: social media. Companies are still experimenting in how social media may be used to enhance collaborative work or improve service to customers.

Offshoring and outsourcing [6]

Over the past decade, low-wage countries have developed vibrant, export-oriented software and IT service industries. Attracted by available talent, good-quality work and, most of all, low cost, companies in high-wage countries are increasingly offshoring software and service work to these low-wage countries. Trade (together with automation) has caused many jobs in the manufacturing sector to be lost from the West, and many developing nations in East Asia to increase their wealth and industrial prowess since 1970. Changes in technology, work organisation, educational systems, and many other factors have caused service work –previously regarded as immune to these forces – also to become tradable. This rapid shift to a global software-systems-services industry in which offshoring is a reality has been driven by advances and changes in four major areas:

- *technology* – including the wide availability of low-cost high-bandwidth telecommunications and the standardisation of software platforms and business software applications
- *work processes* – including the digitalisation of work and the reorganisation of work processes so that routine or commodity components can be outsourced
- *business models* – including early-adopter champions of offshoring, venture capital companies that insist the companies they finance use offshoring strategies to reduce capital burn rate, and the rise of intermediary companies that help firms to offshore their work
- *other drivers* – including worldwide improvements in technical education, the increased movement of students and workers across national borders, the lowering of national trade barriers, and the end of the Cold War and the concomitant increase in the number of countries participating in the world market.

'Offshoring' is the term used here. It is a term that applies best to high-wage countries that outsource work overseas – that outsource for instance to India, China, Malaysia, the Philippines and many other places. Cross-cultural issues discussed in Chapter 15 also have a most profound effect on offshoring due to the cultural distance between Western and Eastern countries. Germany, for example, also sends work across its borders, including to Eastern Europe, but there is no water – no shore – to cross. Some of the work that is offshored is sent to entrepreneurial firms established in these low-wage countries. In other cases, multinational corporations (MNCs) headquartered in high-wage countries open subsidiaries in the low-wage countries to work on products and services for their world market.

There are at least six kinds of work sent offshore that are related to software and information technology:

- programming, software testing and software maintenance
- IT research and development
- high-end jobs such as software architecture, product design, project management, IT consulting, and business strategy
- physical product manufacturing: semiconductors, computer components, computers
- business process outsourcing/IT-enabled services: insurance claim processing, medical billing, accounting, bookkeeping, medical transcription, digitisation of engineering drawings, desktop publishing and high-end IT-enabled services such as financial analysis and reading of X-rays, and
- call centres and telemarketing.

The United States followed by the United Kingdom are to date the largest offshorers, but other countries in Western Europe, Japan, Korea, Australia, and even India send work offshore. The countries that receive the work fall into four categories:

- those that have available a large workforce of highly educated workers with a comparatively low wage-scale (eg India and China)
- those that have special language skills (eg the Philippines can serve the English and Spanish customer service needs of the United States by being bilingual in these languages)
- those that have geographical proximity ('nearsourcing'), familiarity with the work language and customs, and relatively low wages compared to the country sending the work (eg Canada accepting work from the United States, the Czech Republic accepting work from Germany), and
- those that have special high-end skills (eg Israel's strength in security and anti-virus software).

There are many drivers and enablers of offshoring. These include:

- The dot-com boom years witnessed a rapid expansion of the worldwide telecommunications system, making ample low-cost broadband available in many countries at attractive rates. This made it possible to readily transfer the data and work products of software offshoring.
- Software platforms were stabilised, with most large companies using a few standard choices: IBM or Oracle for database management, SAP for supply chain management, and so on. This enabled offshoring suppliers to focus on acquiring only these few technologies and the people who were knowledgeable in them.
- Companies are able to use inexpensive commodity software packages instead of customised software, leading to some of the same standardisation advantages as with software platforms.
- The pace of technological change was sufficiently rapid and software investments became obsolescent so quickly that many companies chose to outsource IT rather than invest in technology and people that would soon have to be replaced or retrained.
- Companies felt a competitive need to offshore as their rivals began to do so.
- Influential members from industry, such as Jack Welch from General Electric, became champions of offshoring.
- Venture capitalists proclaimed the benefits of entrepreneurial start-ups in using offshoring as a means to reduce the 'burn rate' of capital.

- New firms emerged to serve as intermediaries, to make it easier for small and medium-sized firms to send their work offshore.
- Work processes were digitalised, made routine, and broken into separable tasks by skill set – some of which were easy to outsource.
- Education became more globally available with model curricula provided by the professional computing societies, low capital barriers to establishing computer laboratories in the era of personal computers and package software, national plans to build up undergraduate education as a competitive advantage, and access to Western graduate education as immigration restrictions were eased.
- Citizens of India and China, who had gone to the United States or Western Europe for their graduate education and remained there to work, began to return home in larger numbers, creating a reverse Diaspora that provided both countries with highly educated and experienced workers and managers.
- India has a large population familiar with the English language, the language of global business and law.
- India has accounting and legal systems that were similar to those in the United Kingdom and the United States.
- Global trade is becoming more prevalent, with individual countries such as India and China liberalising their economies, the fall of Communism lowering trade barriers, and many more countries participating in international trade organisations.

There are also a number of reasons why a company might not wish to offshore work:

- The process of the job cannot be made routine.
- The job cannot be done at a distance.
- The infrastructure is too weak in the vendor country.
- The offshoring impacts too negatively on the client firm, such that the client firm may lose control over an important work element, may lose all its in-house expertise in an area, or may suffer too great a loss of worker morale.
- The risks to privacy, data security or intellectual property are too high.
- There are not enough workers in the supplier firm with the requisite knowledge to do the job. This is what happens, for example, when the job requires application domain knowledge as well as IT knowledge.
- The costs of opening or maintaining the offshore operation are too high.
- There are cultural issues that stand between the client and vendor.
- The company can achieve its goal in another way, such as outsourcing within its home country or consolidating business operations.

Globalisation of, and offshoring within, the software industry will continue and without doubt increase. This increase will be fuelled by information technology itself as well as government action and economic factors, and will result in more global competition in both lower-end software skills and higher-end endeavours. The business imperatives – profits, shareholder value, and inter-company competitiveness – will continue to play a dominant role. Current data and economic theory suggest that despite offshoring, career opportunities in IT will remain strong in the countries where they have been strong in the past, even as they grow in the countries that are targets of offshoring. The future is, however, one in which the individual will be situated in wider global competition. The brightness of the future for individuals, companies, or countries is centred on their ability to invest in building the foundations that foster innovation and invention.

Social media [7]

Social media are another important development, additional to the global distribution of work in the form of offshoring and outsourcing. Substantial improvements in the technological infrastructure for communication have caused a shift towards online service delivery – a development of which we are just at the beginning. Already, considerable attention has been drawn to a specific group of technological developments known as Web 2.0. Web 2.0 has enabled user-driven online services, such as Wikipedia, Twitter and LinkedIn. Essential for these technologies is that they rely on user interaction and collaboration – which is why the term *social media* is commonly used for these types of social-behaviour-enabling technological channels or platform.

In particular, a number of different Web 2.0 technologies can be identified. For instance McKinsey (2007) has identified blogs, podcasts, collective intelligence, Wikis, mash-ups, Really Simple Syndication (RSS), social networking, peer-to-peer networking (P2P), and web services. Blogs are web logs in which one or more people write an online journal or keep a diary, and which might attract millions of followers. Twitter is an example of micro-blogging, which means that only short messages ('tweets') can be posted. Podcasts are similar to blogs, except that they are audio- or video-recorded instead of text-based. Collective intelligence relies on the expertise of a group to support decision-making – for instance, by rating ideas, tagging interesting articles, or in the form of collaborative publishing. Wikis are a specific form of collaborative publishing, where a large number of users can contribute and review each other's work. Interestingly, the highly-regarded scientific journal *Nature* found that of the Internet encyclopaedias the English-language Wikipedia came very close to the *Encyclopedia Britannica*, perceived as the worldwide standard, in terms of the accuracy of its science entries (Giles, 2005). Mash-ups collect content from a number of different online sources to generate a new service – for instance, a website that offers tickets from a number of airlines. As opposed to mash-ups, RSS enables users themselves to aggregate information by subscribing to distributions of news, blogs, podcasts, etc. Well-known to the public is social networking, which refers to systems in which users can share information about their background, skills, preferences, and the like. Additionally, users can decide which information is public and which information they share only with their network. Celebrated examples of social networks are LinkedIn and Plaxo for business relations, Facebook and MySpace for family and friends, and Flickr and again MySpace for specific interest groups: photographers and musicians respectively. Furthermore, P2P is one of the oldest forms of social media and simply entails the sharing of data openly over the Internet or within a closed user group. Core to P2P is that data is shared over a large number of machines instead of one. Finally, web services enable different systems to share information or conduct transactions with one another.

Obviously, these technologies can serve a large variety of purposes. What, though, are the benefits specifically for companies? In a McKinsey (2009) survey among 1,700 executives from around the world, 69% indicated that their companies gained measurable benefits, such as more innovative products and services, more effective marketing, better access to knowledge, lower cost of doing business, and higher revenues. Basically, social media can bring more employees into daily contact at lower cost. Furthermore, they can increase knowledge integration by encouraging participation in projects and idea-sharing. Also, they can be used to strengthen relations with customers, suppliers and other parties outside the organisations. No wonder that according to Forrester Research (2009) investments in social media are expected to grow more than 15% annually over the next five years despite the economic turmoil. The McKinsey (2009) survey also found that the three most important practices for successfully using Web 2.0 for internal purposes are: integrating the use of Web 2.0 technologies into employees' day-to-day activities, senior leaders' role-modelling/championing the use of technology, and providing informal incentives.

Naturally, social media do not provide only benefits. For example, Constantinides (2010) points out some of the drawbacks that are mentioned in the literature. First of all, since essentially

many people can equally contribute, there is a risk that large amounts of low-quality information will lead to research becoming like looking for a needle in a haystack. Also, intellectual property rights could easily be threatened. Moreover, the boundary between advertorials (advertisements and publicity statements presented as if articles printed in independent journals) and less-biased contributions might be difficult to discern. One way to prevent this kind of threat would be to add some means of rating content and/or contributors. Secondly, there is the risk of sharing too much information. Both companies and individuals could have their privacy or data-protected information severely compromised. For example, if an organisation fired an employee, this person could put documents online that are damaging to the reputation of the company or that provide market competitors with commercially useful information. The major problem is that when information is put online, it is almost impossible to remove. Information quickly spreads over the network and might be stored in an enormous amount of different systems. Thirdly, based on what was mentioned in the previous paragraph, employees need to be encouraged to use social media for the benefit of the company. In practice, however, companies are more ambiguous on the use of social media during working hours. A clear demarcation between private and company interest is often difficult to make – for instance, in the case of business-oriented social networking sites or contributions to wikis. Social media, like all technologies, can be used for many different purposes in many different ways.

Conclusion

Technology plays an important role in work organisation. This chapter has provided insight into a number of technologies for work in and between organisations and individuals. Since information and communication technologies are by far the dominant forms of technology in work organisations, we focused on them specifically. We distinguished between traditional functional and transactional information technologies, management information systems, and collaborative and group work technology. Next, we discussed the acceptance and use of technology, mostly by explaining the central concepts of the Unified Theory of Acceptance and Use of Technology model. The authors of the UTAUT model synthesised various texts on technology acceptance and use and, based on a meta-analysis, derived the central concepts of their model. Precisely because of this rigorous synthesis, the UTAUT model is the primary contemporary model for technology acceptance and use.

Thereafter, we discussed three perspectives on the implementation and management of information systems. Based on these three perspectives, three roles can be fulfilled by those implementing and managing information systems. First of all, information systems and accompanying changes to organisational structures and processes must be designed and planned. But when the plan or design is complete, the changes do not occur automatically. Change managers have to consider both conflicting interests and contradicting frames of meaning. A strong coalition for change must be built to overcome vested interests, for which a number of approaches have been discussed. Likewise, a number of ways to create shared meaning have been elaborated upon. Readers who would like to go into the different paradigms on technology and change in more depth might consider reading the paper described in the box below.

Taking your learning further: Paradigms on technology and change

Liker, J. K., Haddad, C. J. and Karlin, J. (1999) 'Perspectives on technology and work organization', *Annual Review of Sociology*, Vol.25: 575–96. This paper takes you one step further by summarising and synthesising a variety of theoretical paradigms that look at the relationship between technology and the nature of work.

Finally, we discussed two important developments for the future of work. Offshoring and outsourcing are already having a powerful effect on the distribution of work. Companies always look for an optimal mix between skilled and cheap labour and supportive economic regimes. On another dimension, social media provide numerous opportunities for individuals and organisations to connect with others both within and outside their organisations.

End notes

[1] See also Chapter 5.

[2] See also Chapter 7.

[3] See also Chapter 15.

[4] See also Chapters 13.

[5] See also Chapter 2.

[6] See also Chapters 13 and 14.

[7] See also Chapter 14.

REVIEW AND DISCUSSION QUESTIONS

REVIEW QUESTIONS

1 How can management information systems be used to motivate employees?

2 What is the main reason that enterprise systems have such an enormous impact on organisations?

3 Why is it logical to organise ICT applications by functional areas?

4 Why are transaction processing systems a major target for restructuring?

5 What are the drawbacks of collaborative technologies?

DISCUSSION QUESTIONS

1 How would you go about building a coalition for change when implementing a management information system, in particular an enterprise system, which primarily serves the interest of management?

2 Which of the three approaches described in the section on the management and implementation of technology would you emphasise as a change manager responsible for implementing social media such as wikis into an organisation?

3 Explain how Web applications can make the customer king/queen.

4 Discuss the need for application integration and the difficulties of doing it.

5 If you analyse the financial crisis of 2008, what role in it would you give to information and communication technologies (ICT) and offshoring processes? Also, how did ICT accelerate or rectify some of the problems?

FURTHER READING

Bondarouk, T. V., Ruël, H., Guiderdoni-Jourdain, K. and Oiry, E. (2009) *Handbook of Research on E-Transformation and Human Resources Management Technologies: Organizational outcomes and challenges*. Hershey, PA: Idea Group. This book provides practical, situational, and unique knowledge on innovative electronic HRM technologies that add competitive advantage to organisations.

Burgelman, R. A., Christensen, C. M. and Wheelwright, S. C. (2009) *Strategic Management of Technology and Innovation*, 5th edition. New York: McGraw-Hill/Irwin. This edition continues to take the perspective of the general manager. The book examines the interaction between different levels of general management in application to the management of information technologies in the workplace.

Koot, W., Leisink, P. and Verweel, P. (2003) *Organizational Relationships in the Networking Age. The dynamics of identity formation and bonding*. Cheltenham: Edward Elgar. The volume puts an emphasis on the emergence of a feeling of social discontinuities and transformations, and the role in these processes of information technologies.

Torres-Coronas, T. and Arias-Oliva, M. (2005) *E-Human Resources Management: Managing knowledge people*. Hershey, PA: Idea Group. The volume provides a unique view on managing workforce in the new global and digital environment.

Turban, E. and Volonino, L. (2010) *Information Technology for Management. Transforming organizations in the digital economy*, 7th edition. New York: John Wiley & Sons, Inc. This edition addresses the tactical and strategic principles of management information systems in light of the new developments such as Web 2.0, mobile devices, on-demand computing, and real-time data alerts.

KEY SKILLS

TIME MANAGEMENT

Time management is essential in technology implementation because a longer-than-planned project duration will almost automatically lead to higher costs and potentially substantial budget overruns. Especially in the case of enterprise systems, project teams may be as large as 200 people: because of the number of interdependencies, a minor delay in small sub-parts of the project can have major effects on the implementation project as a whole. Additionally, the longer it takes to get the system up and running, the shorter the time a new system might provide a competitive advantage. On the other hand, when deadlines are set too tight, short cuts might be taken in the implementation under time pressure – for instance, by spending less time on testing and fine-tuning. This could lead to real problems, if not a total halt of the system, in the up-and-running phase.

DEVELOPING CRITICAL THINKING SKILLS AND REFLECTIVE LEARNING

These skills are especially important when implementing change. The Liker, Haddad and Karlin paper described in the *Taking learning further* box goes into more depth on a theoretical level and should thus contribute to the reader's critical thinking skills. However, which approach works best will depend not only on a sound knowledge of a number of paradigms and approaches, nor on an in-depth mapping of the vested interests and dominant frames of understanding in the project situation, but also on the personal preferences of the change manager. Most learning therefore takes place when reflecting on experiences in technology management and implementation practice. For this purpose one must continuously sharpen one's critical thinking skills. This implies among other things that one has constantly to consider if the chosen means are genuinely contributing to realising the programme objectives and the broader organisational strategy.

TEAMWORKING

Most technology is both implemented and maintained by teams. In respect of time management, we have already emphasised how interdependencies will influence the progress of technology implementation. The same holds true for technology maintenance. Nonetheless, teams are known to be better at both ideas generation and responding flexibly to developing solutions. Problems that arise may thus be identified and tackled early on – that is, when the team has enough diversity. A team consisting solely of technologists will have difficulties understanding users that are less familiar with the system. In relation to users of technology, we have already described how collaborative technologies support teams in their work. Furthermore, we have outlined how important continuing technological development will affect teamwork, if it is not doing so already – for instance, in the case of offshoring, where global teams may collaborate over large distances. Obviously, social media provide a whole new dimension to working in teams and to collaboration in cross-organisational networks.

CREATIVE SKILLS

This chapter has outlined three broad approaches to technology management and implementation. However, technology implementation is at least as much an art as it is a science. Because of the constantly changing circumstances that are inherent to the social processes surrounding technology implementation, one has to be able to improvise one's way around contingencies that arise due to the abundance of unforeseen conditions in technology implementation practice. As we have outlined before, cognitive frames have an important role in technology implementation, so the ability to think out-of-the-box will strongly improve the chances of successfully implementing technology. Also, although often neglected, creative skills are important in technology maintenance. For example, a printer-producing company attempted to document their repair workers' knowledge so they could draw from this database in the case of problems. What they found in practice was that the repair workers' practices were actually impossible to document due to their great reliance on improvisation in problem-solving.

EMOTIONAL INTELLIGENCE, EMPATHY, SYMPATHY AND LISTENING

Of course professional judgement, decision-making, problem-solving and responsibility are all key skills that are essential to managing and implementing technology. Yet these skills in relation to technology implementation are not particularly different from other organisational issues. However, we have already stressed how, during technology implementation, a change manager attempts to change attitudes, cognitive frames and behaviours – for example, by means of argument, reasoning, structured listening, and 'selling'. We therefore focus here on emotional intelligence, empathy, sympathy and listening. Above all, being able to understand others through emotional intelligence and empathy are key to building coalitions and creating shared meaning. Also, early concern for others in the form of sympathy and listening to their issues *and* genuinely giving attention to these issues will prevent problematic choices early on and mitigate most resistance to technology implementation.

NEGOTIATION, ARBITRATION AND CONFLICT RESOLUTION SKILLS

Negotiation, arbitration, and conflict resolution skills are essential skills for those attempting to implement new technologies in work organisations. First of all, employees and managers have to find an optimal solution for their organisation which also serves both their interests. Yet most importantly, implementers, change agents, project managers, or whatever, need to able to negotiate, arbitrate and resolve conflicts with top management for resources, with users to improve their transition process, and with suppliers not only for a good price but especially for good after-sales services. Usually, top management's attention and resources decrease rapidly when a new technology gets to the up and running phase, even though it is only then that the full impact of the new technology is felt by the entire organisation.

Ethical implications: ICT management and ethics

Imagine that we are looking for a policy that protects a piece of intellectual property that is the result of customisation within an ERP package. A number of questions that do not have obvious answers then emerge. Is it really intellectual property which can be owned, or is it more like a derived formula, an algorithm, which is not owned by anybody? If a computer program is intellectual property, is it the expression of an idea that is owned (traditionally protectable by copyright), or is it a process that is owned (traditionally protectable by patent)? Clearly, we need a proper conceptualisation of the nature of a computer program in order to answer such questions.

And if it is a policy we are after, a typical problem in ICT ethics arises simply because there is quite often a policy vacuum in respect of how computer technology should be used. Often, either no policies for conduct in these situations exist or the policies that do exist seem inadequate. ICT ethics includes consideration of both personal and social policies for the ethical use of technology. Sometimes it is necessary to go right back to basics. For instance, assuming software *is* intellectual property, why should intellectual property be protected? In general, the consideration of alternative policies forces us to discover and make explicit what our own value preferences are.

BEST AND WORST PRACTICE

Best practice

- A multi-perspective system of ICT management
- The adoption of selection practices with a high level of reliability, validity and sensitivity
- Involving different stakeholders in the implementation of ICT
- Following up feedback with coaching, training and development
- Adhering to fair and balanced procedures
- Organising focus group discussions
- Enjoying top management commitment

Worst practice

- A lack of ICT planning
- A lack of top management commitment
- No user involvement
- Not providing individuals with the feedback