



Information and Communication Technologies Supporting the Digital Transformation of Knowledge Work

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First generation KM was primarily IT driven Second generation KM was primarily people focused and looked to create processes based on Nonaka's SECI model- how knowledge is generated, made explicit and socialised in organizations. 3rd gen KM doesn't discard IT. On the contrary, it requires technology more than ever before. It requires new forms of knowledge management technology that understand, reason and learn helping people expand their knowledge, improve their productivity and deepen their expertise. These are changing the way KM is done.

Carlos, Favero August 12, 2016

Learning Outcomes

After completing this chapter

- You will know what the specific information and communication needs of knowledge workers are,
- You will be able to name the components and functionalities of a high performance workplace;
- You will know what needs to be considered to implement ICT successfully.
- You will be able to apply knowledge taxonomies and maps.

7.1 Changing Needs

The competitive necessities for companies today is to develop capabilities that are deeply embedded into functions, operations and decision making enabling quicker response to market demands and business decisions. Developments in information and communication technologies and applications support these needs (Gartner 2018).

In an organisation primarily there are two levels that use knowledge to achieve their goal- the managerial and the operational. The managerial activities are focused on decision making and require good analytics to support their decisions. There is a need to pull together information from multiple sources and draw conclusions as accurately as possible. It therefore becomes necessary to filter relevant information from a large pool of data from various sources.

The operational activities are characterised by capturing, processing and disseminating relevant information as fast as possible to enable the value chain to function efficiently and respond to customers, both internal and external, more effectively. Such activities require good process support and availability and accessibility of information through various ICT systems.

Productivity at workplace increases by using existing information rather than reinventing the wheel. Basically there is a need for systems that support the collaboration among the network of knowledge workers within the company and externally with customers, suppliers and partner companies. In day-to-day work we find a combination of several tasks which help in defining communication and information exchange among various stakeholders.

The challenge is getting relevant information from various processes and sources to the point of action. Therefore people, processes and technology form a closed system to create and utilize knowledge and enhance productivity and efficiency. Each of these components have an important role to play. ICT in the form of various systems therefore plays a significant role in bridging the gap between different levels of knowledge workers and the processes that support their work.

In early 2015, APQC surveyed more than 500 people about their firms' immediate KM priorities and the trends they see impacting KM. Nearly half the participants in APQC's 2015 KM Priorities survey agree that machine learning will be a big deal for managing knowledge (Trees 2015).

The responses to the survey were grouped into three broad categories:

- New technologies that impact how we work, learn, and interact with the world.
- Changes in the habits of the workforce that impact KM's purpose and how it's practiced.
- Structural forces related to globalization and complexity that may increase KM's relevance and strategic position in the enterprise.

John Bordeaux, associate partner in social knowledge management at IBM Global Business Services, thinks that augmented cognition—human cognition augmented by computers and smart technology—«will accelerate as a trend affecting the KM profession over the next three years and will continue to change how people and organizations incorporate technology into the decision-making process» (Trees 2015).

Howard Cohen, vice president in strategy and operations, senior knowledge management at Chubb Insurance, envisions a KM future with more integrated content management systems that deliver a more seamless user experience (Trees 2015).

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7.2 Challenges for Designing ICT Systems

This puts high demands on those designing ICT systems; the art lies in balancing individual user requirements and requirements from the perspective of an organisation in the context of an integrated and robust system. The first challenge is integrating various functions and making the organizational data shareable. This required various systems to interact with each other which resulted in an Enterprise Resource Planning system that focused on transactional data and a common data repository to facilitate data sharing. Data warehouse and mining supported the managerial level. But now we also need to recognize that individuals and companies are increasingly embracing social media for sharing. Particular emphasis is on systems that enable knowledge sharing and use among the community that works together using collaborative technology at anytime, anyplace and anywhere (Abdullah et al. 2005).

At this point, the enormous potential of interaction of people by means of digital platforms became clear (McAfee 2006). Given the greater focus on the individual more emphasis needs to be given to developing «personal knowledge management» skills of staff. Enterprise social networking applications are becoming increasingly popular (Turban et al. 2011) and along with the private use of facebook, Twitter and others changing communicative behaviours in firms, **Enterprise 2.0** emerged. The use of emergent social software platforms within companies, or between companies and their partners or customers became a necessity. The challenge was therefore to integrate this as part of the organizational fabric to enable fast and instantaneous interactions. Though social media allows a lot more diversity of thinking and ability to respond to needs dynamically it poses challenges for organizations as a lot of this is happening outside the control or even the view of the organization (Thorpe 2013).

Vuori (2011) characterises social media by considering the extent to which they support communication, collaboration, connecting, completing and combining (5C) (Jalonen 2014).

Communication social media provides new tools to share, store and publish contents, discuss and opinions and influence: Blogs, Twitter, YouTube, SlideShare, Skype.

Collaboration social media enables collective content creation and edition without location and time constraints: Wikipedia, GoogleDocs.

Connecting social media offers new ways of networking with other people, socialising oneself into the community: Social networking services (e.g. Facebook, LinkedIn).

Completing social media tools are used to complete content by describing, adding or filtering information, tagging contents, and showing a connection between contents: Visual bookmarking tool, News aggregator.

Combining social media tools are developed for mixing and matching contents. Combination of pre-existing web services that allow a certain user within a platform to use another application, in a specific window, without the need to get out of the initial website (Bonson and Flores 2011): Mash-ups, Google Maps.

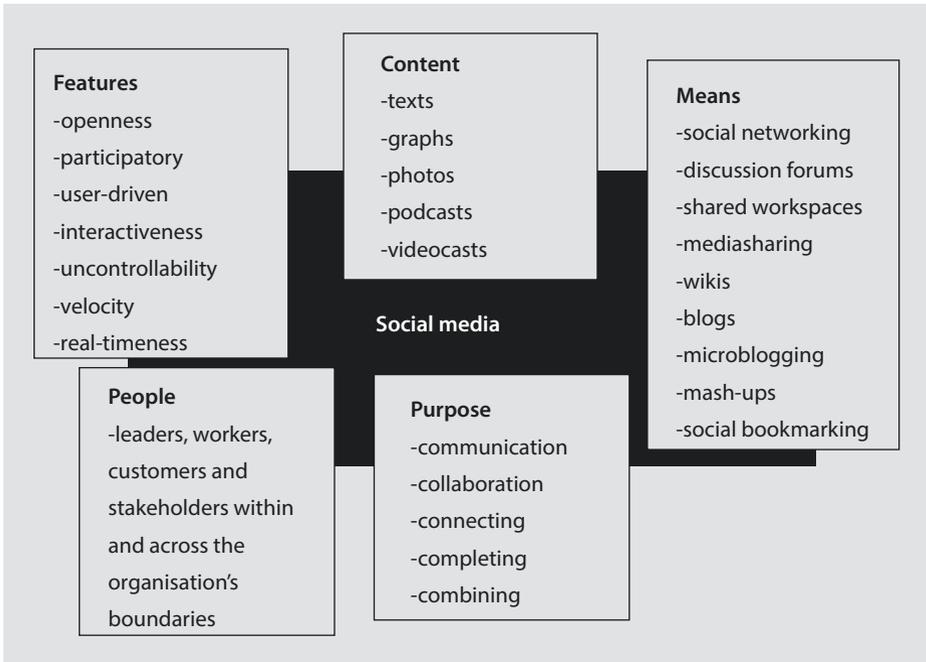
Social Media can also be viewed from the perspective of its purpose, the means, the content, various features required and the people who would be using it. This is depicted in  Fig. 7.1.

In other research user-friendliness, interactiveness, openness and uncontrollability, velocity, and real-timeness have been mentioned to be the main characteristics of social media (Kaplan and Haenlain 2010; Denyer et al. 2011; Kietzmann et al. 2011; Fournier and Avery 2011; Gaál et al. 2015).

Potential adopters of social networking sites within their organizations must carefully consider the benefits to be gained against the risks that are inherent. It is the imperative of the organization to facilitate efforts to increase the benefits while mitigating the risks, but first an understanding of why their employees are motivated to share is necessary (Harden 2015).

Digitization is now creating a second economy that's vast, automatic, and invisible. Something deep is going on with information technology, something that goes well beyond the use of computers, social media, and commerce on the Internet. Business processes that once took place among human beings are now being executed electronically (Brian 2011).

Physical labor and transactional tasks have been widely automated over the last three decades. Powerful productivity-enhancing technologies already are taking root. Developments in how machines process language and understand context are allowing computers to search for information and find patterns of meaning at superhuman speed. What would have taken a large team working several weeks takes only a few days. Machines also are becoming adept at structuring basic content for reports, automatically generating marketing and financial materials by scanning documents and data (Bughin et al. 2013).



■ Fig. 7.1 Social media – features, content, means, people and purpose (Jalonen 2014:1372)

The biggest challenge today is managing the convergence of various technologies that enable transaction processing, knowledge sharing, storage of large volumes of information and searching the right information at the right time for execution of the task.

The following criteria should be considered:

■ **Individualisation and demand-orientation : Does the system design suit the knowledge workers work/function requirements?**

In many companies, the information and communication processes of knowledge workers are geared towards technology (user requirements follow the system). However, a premise for successful productive knowledge work requires the ICT systems to be aimed completely at the requirements of knowledge workers (system follows user requirements). KM systems should be built around the way people work.

However, pronounced orientation towards demand involves a risk of emergence of numerous individual software islands and approaches to finding solutions. The heterogeneity of system and application landscapes creates loss of productivity of interfaces. Users require a high degree of individualisation. However, a company is often reluctant to use necessary resources for individualisation. It wishes to retain its system landscape in a standardised and supposedly cost-effective and efficient form. One of the examples of individualisation is providing information to knowledge workers. Productivity is increased not only by the optimum availability of information in the systems, but also

by filtering irrelevant information. However, systematic identification and evaluation of knowledge and its transformation in the systems is considered as increased resource expenditure for personalisation by the company.

■ **Integration: To what extent is the ICT system integrative in terms of practical use?**

Does the ICT system itself cause waiting times and productivity loss in interfaces to other systems or activities? In a company which has to execute a new project and the relevant data is spread across the company there will be a loss in productivity if the required data has to be fetched through different systems. Employees who may have to operate a whole variety of systems have to struggle to a certain extent with multiple logins, heterogeneous structures and possibly even system crashes in interfaces. The systems that are not used very often are neglected. Experience shows that maximum two to three core systems are imposed on an employee.

When it comes to the level of integration of ICT's working environment, a user wishes to be at maximum ease with fewer interfaces. For the company, this means considerable expenditure on integrating and bridging interfaces. If the integrative character of systems is not considered sufficiently, the users' flexible productivity factors such as acceptance, user know-how or motivation – that are controlled by the user himself – are affected more intensely. The human factor influences the overall productivity decisively in a direct interplay with the usability of the entire system landscape.

■ **Acceptance and use: How easy is it to use the ICT system?**

What are the barriers in application? What are the implementation barriers in changing processes during new installation of ICT systems?

Each of us has already heard of IT projects or has been closely associated with such projects wherein person years are spent in the development of individual software. In the end they were further developed for the user according to the requirements and important acceptance factors. Knowledge workers should be actively involved in all phases of development and implementation. A knowledge worker today has to use technology extensively. An objectively measured performance of the system can be a clear performance indicator. This application efficiency can be evaluated only through a definite result. It helps to consider acceptance factors and implement incentive systems beforehand. Training and coaching is neglected by the companies and even the employees demand fewer skills. An «error-culture» of identifying and admitting mistakes is not particularly popular.

■ **Performance: How well does the ICT-system perform?**

Performance and productivity of ICT systems is not an issue as long as everything functions well. Things become critical only in the event of a breakdown. Many IT managers should take this challenge. Often, clear goals and measurable results also fail in achieving goals of the entire IT department. As a result, in a «normal» working situation, information and communication systems are rarely considered as productivity factors for a knowledge worker. In the end, what exists is a latent conflict of interest (to be optimised) between the requirements of knowledge workers and use of resources for ICT systems.

Murray E. Jennex, professor at San Diego State University, thinks that in the future, KM teams will need to work with security and legal to create secure ways of sharing across the organization and across geographical boundaries. Tanya Houseman—consultant at Tanya Houseman Consulting—echoed Jennex’s sentiments, but notes that in the future, «Companies will have to balance security against collaboration—not just in the digital workspace, but who and what kinds of information we share with colleagues in face-to-face collaboration» (Trees 2015).

It’s not all about ICT, it’s about relationships. Arthur Shelley, founder and CEO at Intelligent Answers feels that «Knowledge and intellectual property are like cash—they need to flow to create value. This requires trusted relationships, a willingness to constructively engage, and preparedness to share the value created.» All of these aspects are «difficult things to define in a legal contract,» he added (Trees 2015).

Some of these have already been used by companies which has brought in a transformation in the way data is captured, stored and accessed. However there seems to be a continuous change in the way people work, learn and interact in an organisation.

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7.3 High Performance Workplace

How can an entire system be designed for supporting knowledge workers to optimise their performance and productivity?

Austin et al. (2005), analysts at Gartner Inc., coined the term «High Performance Workplace» (HPW) for this purpose. He described a productivity concept for knowledge workers. This concept sketched the integrative and knowledge-oriented character accurately in an optimised work environment:

High-performance workplaces augment the capabilities of their skilled staff for activities such as exploring data, developing innovative processes or products, and working with suppliers to respond to the requests for proposals. This support helps workers locate the right people, find the right content, support the right communication channels and focus on where to create maximum returns. In some cases, combining automation and augmentation may generate the highest returns – for example, adding expertise location to call centre applications.

Austin et al. (2008) supplemented this with an overview of components of a High Performance Workplace for supporting «non-routine work»; of work that cannot be standardised – the main criterion for knowledge work (See ■ Table 7.1).

Such productive environments for knowledge workers are designed individually on demand in the company and on demand of the users. Therefore, they cannot be described in 100% standardised form. For the benefit of knowledge workers, such environments supplement personal workplace with personalised information, knowledge components and communication tools. However, the system environment not only supports knowledge transfer and sharing of common documents and information but also supports flexible teamwork. The task is facilitated across distances using web conference solutions and integrating all available means of communication. This means knowledge

■ **Table 7.1** Components of high performance workplace for supporting non-standardised work (Austin et al. 2008)

Non-routine behaviour category	Example	Technology's role – augment, not automate
Discover	Threats and opportunities	Communications, search, predictive analytics, BI, business activity monitoring, modelling tools (Excel), 3-D visualisation tools, predictive markets
	Pattern recognition	
	Competitive intelligence	
Innovate	New processes, products, services, segments	Automatic contextual search, agents, professional communities, open innovation sites
Team	Find the right people, brainstorm, norm, bond, orchestrate	Expertise location, social network support, social network analysis, brainstorming, idea tracking, informal project management, communication and collaboration in general
Lead	Execute change plan, manage unstructured process, reward key behaviours	Web conferencing, group project management, soft corporate performance management
Learn	From experience	E-learning suites, communities of expertise (and related video, audio and other web technologies)
Relate	Establish a working relationship with other people	Explore interests, background, common activities to speed bonding, consensus building and trust

transfer and mutual learning is supplemented by a common work platform for synchronous teamwork.

The structure and the functioning of virtual supra-regional project teams, competence teams and innovation teams or units in topic-based networks and virtual project rooms can be enabled by the operative work instrument of «High Performance Workplace».

However the social media and disruptive KM technologies are making the workforce perform better by providing the required analysed information as and when required. One could now view a «High Performance Workplace» with the way machine learning is changing and enabling sharing of knowledge at a faster pace. This will change the role of the KM practitioner from being a facilitator to an interpreter or consultant. The newer technologies would merge people and IT systems to quickly understand, learn and analyse and pass on the experience across the organisation.

■ Goals and results of introducing such work environment

- Optimisation of productivity by improvement of information flow, communication and teamwork
- Increase in performance capability of employees
- Increase in efficiency of communication
- Extending workplace radius by enhancing mobile usage
- Reduction and substitution of travel activity with internal coordination
- Dynamic sampling of business processes (e.g. sales)
- Increase in productivity of employees
- Ideal effect and learning effect of best practices
- Efficient knowledge transfer and knowledge access through active participation of team members.
- Analysis of large amount of data
- Speedy access to relevant information from anywhere

Case Study

A Normal Research Day at a Global Business Software Development Company

Sven Kalberg is a project manager of a research project NextGenKM in a research department of the globally positioned business software developer, BusinessSoftware AG. BusinessSoftware AG is an international concern with a strong presence in Germany, USA and India. Its research department comprises of ten locations worldwide. Every location, also called as a lab, has a research centre which is assigned different relevant research projects.

For Sven, **teamwork goes beyond the boundaries and time zones**. Cooperation partners are located in other time zones and some even have different work culture. Sven's tasks as a project manager of NextGenKM comprise coordination and management of NextGenKM on behalf of BusinessSoftware AG.

The project wishes to build a new generation of knowledge-based systems that would be better at supporting knowledge workers in their work with daily flood of tasks. In this process, Sven coordinates four employees of BusinessSoftware AG in the NextGenKM project with regard to content and leads the team. A closing report is to be generated in the project. Below, we shall see how Sven managed to create the closing report of NextGenKM with his colleagues in Bangalore. Sven has some supporting tools to coordinate the teamwork effectively.

■ Shared calendar

Sven uses the shared calendar to organise the first discussion on the closing report with his colleagues Brian and Ian. The shared calendar helps him overcome the limitations posed by location and time. He has shared his calendar with his colleagues for them to check his availability for any discussion. Likewise, if Sven wants to initiate the discussion, he can check his colleagues' availability. While sending a discussion request he can automatically attach a calendar entry for the selected appointment.

■ Telephone conference and communication infrastructure

Sven has to communicate a lot to complete his regular project work. Regular phone calls are inevitable, especially to remain in sync with his colleagues in Bangalore. Sven has allotted fixed time slots for this purpose in the calendar of his colleagues. BusinessSoftware AG provides some technical facilities with its communication infrastructure. Thus, Sven has the option of either reserving a telephone conference service or making a phone call through Skype (Voice-over IP, calling *via* the internet).

■ Application sharing

Yet another important aspect for Sven while preparing a closing report is that he not only hears the voice of his colleagues but also sees the presentation or the object being discussed. For instance, there are some screenshots of the transferred prototypes. Here, Sven has the option to select from number of Application Sharing Services. Using this option, he can share the application on his desktop with the participants of a conference.

■ Collaboration rooms

Sven's team also has a collaboration room for exchanging documents, bookmarks and opinions on a particular topic. This enables the invited participants to exchange files and use the forum. Access to the collaboration room is integrated directly in the portal of every participant. Sven can comfortably share files using the collaboration room through his WebDAV browser, a tool that makes the file located in the collaboration room available in the file manager of his desktop. However, he generally finds it relatively cumbersome to upload the files in such closed system through a web interface.

■ Simultaneous creation of documents

Sven wishes to work closely with his colleague Brian in Bangalore in order to create a closing report. He has already developed the outline from the information of an old report and made suggestions for some chapters to which even Brian can contribute. Sven and Brian have different options to create the report together. One method that has been practiced by them very often is the chapter-wise creation of the document in a document format such as Microsoft Word or LaTeX and sharing of chapters through a file share or even a version control system. In the latter case, both can work simultaneously on the chapters and have open document format version at the same time. Sven has already tried creating collaborative documents with a Web 2.0 application such as Google Docs. This application helps several participants to work together on a document even in one section and the software synchronises the individual sections.

■ Wikis

Sven can use wikis as yet another practised alternative. Wikis are available not only in BusinessSoftware AG but also in NextGenKM. Wikis have become particularly popular in the last 1.5 years. Therefore, there are multiple relevant Wikis in Sven's working environment. He visits at least one of these wikis daily to get an update on different aspects. The research project alone has two wikis. One of them contains information of the developed components of the project and makes it freely accessible. The other wiki is not for general public and serves in coordination and knowledge exchange of members of the research project. For instance, the weekly conference calls are documented or examinations of components are discussed. At present new wikis are surfacing almost every week. Some research locations have their own wiki and other development groups operate their own respective wikis.

Many efforts were made to curtail the uncontrolled growth at least within BusinessSoftware AG by specifying wiki technology. In order to create the closing report on NextGenKM, Sven, Brian and Ian are working with wiki sites and chapter-wise distributed documents. At first, Sven and Brian created and discussed an outline of the content. After a week, they had a stable structure of the contents and are now in a position to create the actual content of the report. They create the actual content chapter-wise in Microsoft Word documents and store it in a folder in the version control system project.

For the participating researchers, the successful teamwork in this exciting working environment essentially depends on the support provided. With the help of an example of BusinessSoftware AG, the case study shows different options for supporting knowledge work in the research project, NextGenKM. Different problems pertaining to support – motivated by technology or organisation – were explained in this case study.

Author: Olaf Grebner (shortened version).

7.4 ICT Applications for Knowledge Workers: An Overview

The following is an overview of individual options for supporting a knowledge worker. A clear differentiation between operational systems and ICT for knowledge worker is not always possible or advisable because ICT manufacturers try consistently to enhance functionalities and position these in the overall company systems. Software vendors seized this opportunity to introduce new tools termed as «KM tools» which can be integrated with the existing systems to support the company's productivity.

The SMAC (Social, Mobile, Analytics, Cloud) technologies play an important role in designing knowledge management systems; in fact the information systems and the KM systems converge as knowledge is created and used at the point of action. New ways of inspiring and exploiting knowledge sharing are forcing organizations to expand their knowledge sharing technologies and practices (Mentzas et al. 2007).

Gartner (an IT research agency) identified Information and Communication technology trends that can have a significant impact on organizations in the coming years. Some of these are discussed below.

- Computing everywhere: Gartner predicts an increased emphasis on serving the needs of the mobile user in diverse contexts and environments, as opposed to focusing on devices alone.
- There will be significant management challenges for organizations as they will lose control of endpoint user devices and hence more attention will have to be given to user experience design.
- The internet of things: The combination of data streams and services created by digitization creates four basic usage models – manage, monetize, operate and extend. This is not limited to only Internet of Things (IoT) (assets and machines) has the potential to leverage these four models. Organisations can leverage these four models through the pay-per-use model as applied to assets (industrial equipment), services (such as pay-as-you-use), people (who are on the move), places (such as parking spots) and systems (such as cloud services).

John McQuary—vice president in work process optimization at Fluor feels that the Internet of Things allows for greater connectivity among individuals and organizations, and thus presents opportunities to «leverage knowledge in new and innovative ways» (Trees 2015).

- 3D printing: 3D printing is a powerful tool for tacit knowledge transfer.

Virtual reality is also helping in this regard and with the recent advances in the field we might experience learning in a whole new manner. Microsoft combined virtual reality with hologram technology so that users can actually interact with the objects they see. (HoloLens website) In this sense, imagine what a knowledge transfer session would look like using this tech! (Carlos and Favero 2016a).

- Advanced, pervasive and invisible analytics: Organizations will have to find ways to manage how best to filter the huge amounts of data coming from various sources such as operational systems, IoT, social media and wearable devices, and deliver relevant information to the right person as and when required using Big data analytics.

- Context-rich systems: Context-aware applications will emerge which will understand the context of a user request and respond appropriately in terms of content and delivery.
- Smart machines: The smart machine era will enhance the combination of in-depth analytics with context and use advanced algorithms that will allow systems to understand their environment, learn for themselves, and act accordingly.
- Cloud Computing: the focus for cloud computing will be on synchronizing content and application across multiple devices with application portability across devices.
- Software-defined applications and infrastructure: Though networking, storage, data centers and security are defined and managed by software and have matured, the rapidly changing demands of digital business computing has to move away from static to dynamic models using software configurable applications.
- Web-scale IT: This would mean that development and operations are brought together in a coordinated way to drive continuous incremental development of applications and services.
- Risk-based security and self-protection: The trend is to build security directly into applications and therefore there will be no external security intervention required. Every application needs to be self-sufficient in terms of security features.

The systems for knowledge workers are considered from the following perspectives of productive knowledge work: individual efficiency, teamwork, information supply, active information search, collaborative use of knowledge and planning and control (cf.

■ Table 7.2).

7.4.1 Individual Efficiency

Individual efficiency of an employee can be increased particularly by enhancing his workplace radius in the work situation, communication network and teamwork environment. Blackberry or smart phones with Windows Mobile and push function for email and appointments enable independent asynchronous communication. Simultaneously, the marginal working time is extended and administrative activities such as setting up an appointment are made easy.

For knowledge workers, the work structures shift in such a manner that a full-fledged work environment that is independent of place always becomes critical for success (especially for sales, consultants, management or other specialised employees with high flexibility outside the company location). A decisive factor here is a possible complete access to company's core systems, possibly through a safe connection in the company network (virtual private network, VPN) and mobile internet access. A laptop comes first as an end device. However, mobile applications for PDA are a suitable productivity tool for selective groups in field work.

How do we support knowledge workers in conceptual activities? This purpose is served by some individual software solutions that help us get thoughts structured on paper or in a notebook (e.g. mind manager). Time management is always decisive for distinguishing «urgent» from «important» even for personal work organisation and

Table 7.2 Overview of system categories

Category	Problem	Solution
A. Individual efficiency	Poor accessibility, repetition of work, idle power and unused work time, loss by mobility	A1. Mobile devices for increasing communication ability
		A2. Mobile solutions for extending the workplace radius
		A3. PAT systems (personal working techniques)
		A4. Adaptive communication solutions
		A5. Unified messaging services
		A6. Natural language analysis
		A7. Robotics
B. Teamwork	Inadequate teamwork, too long planning times, too long coordination periods, integration gaps, vulnerability to errors	B1. Shared workspaces
		B2. Conference solutions
		B3. Groupware functionalities
		B4. Teleworker
		B5. Presence information /instant messaging
		B6. Workflow support (ECM, ticketing, ...)
		B7. Cognitive technologies
		B8. Social networks
C. Information supply	No information about caller, lack of availability of information with competitive advantages, quality assurance	C1. Customer information system
		C2. Enterprise resource planning systems
		C3. Portals (intranet, extranet)
		C4. Context information on communication partner (Xing)
		C5. 3D printing
		C6. Analytics
D. Active info search	The wheel is reinvented. Knowledge from experience and expert know-how is not used efficiently	D1. Corporate directory
		D2. List of experts
		D3. Desktop and enterprise search
		D4. Archiving
		D5. Cloud applications
E. Use of cooperative knowledge	Knowledge of employees as the biggest capital of the company is not available explicitly and cannot be strengthened collectively	E1. E-learning
		E2. Company's info channel (TV, MA magazine, newsletter)
		E3. Business community (WIKI, forum, ...)
		E4. Company's blog
		E5. Community knowledge games
		E6. Artificial intelligence

■ **Table 7.2** (continued)

Category	Problem	Solution
F. Planning and control	Inadequate planning and control (incl. knowledge controlling)	F1. Management information system (MIS)
		F2. Business intelligence (data-warehouse)
		F3. System knowledge controlling

personal working techniques. Systems based on personal working techniques support individual work by coordinating, handling and completing the tasks in a team.

Efficiency can also be increased by ensuring that knowledge workers do not have to act in accordance with their communication tools. Efforts must be taken to ensure that the communication environment is structured to be «adaptive» to individual changing work situations. Thus, in the age of IP telephony with complete integration option of mobile telephones, it has become easier to regulate appointment status in the calendar as basic information for changing the defined availability profiles (forwarding, representing, putting on silent mode or prioritising a call from a fixed group of persons). Many random policies are predefined and the behaviour of the communication environment in situations such as meeting in house, appointment while travelling, travelling time, absence, vacation, illness, «busy», «do not disturb», and many more, are embedded. There are many possibilities. Considering the individual requirement situation of the concerned work group, it is necessary to decide what can be used sensibly and usefully.

Another challenge is integrating different medium/channels of receiving messages. Unified Messaging is a method of bringing incoming or outgoing messages of any form (e.g. voice-mail, email, fax, SMS, MMS, etc.) into a single form and allowing the user to access them through different access-clients (landline or mobile phone, email client, etc.).

Big data and advanced analytics have swiftly moved from the frontier of our trends to a set of capabilities that need to be deeply embedded across functions and operations, enabling managers to have a better basis for understanding markets and making business decisions. Meanwhile, social technologies are becoming a powerful social matrix—a key piece of organizational infrastructure that links and engages employees, customers, and suppliers as never before (Bughin et al. 2013).

As companies continue to grow and turn borderless, a wise decision is to provide workers with online tools where they can search for information, collect and advise from other members and even carry out their work completely online. Strunga's (Strunga 2015) affirmation suggests that leveraging virtual communities will help achieve greater levels of efficiency in terms of learning so it seems that companies around the globe are taking a wise and natural decision when they opt to develop virtual learning spaces (Carlos and Favero 2015).

A study by Sigalaa and Chalkiti 2015 investigates the relation between social media use and employee creativity by adopting a knowledge management approach in

order to consider the influence of social networks and interactions on individuals' creativity. Their findings highlight the need to shift focus from identifying and managing creative individuals (micro level) and/or organisational contexts (macro level) to creating and managing creative social networks (meso level). The use of social media for externalising, disseminating and discussing information with others within various social networks as well as for combining and generating shared (new) knowledge can further trigger, enrich and expand the employees' individual cognitive abilities and provide them with stimuli for generating and (co)-creating more and newer ideas/knowledge.

Machne Learning is a powerful tool for knowledge management. Watson is a system created by IBM that integrates natural language processing and machine learning in order to reveal insights from various data sources. In short, it is able to learn and provide solutions.

7

Case Study

Mini Case: Watson in Jeopardy

If you are fond of Jeopardy, a very popular American quiz show, then you will probably remember the episode when Watson competed with human participants and won! In order to win, Watson combined two separate areas of artificial intelligence research with winning results. Natural language understanding was merged with statistical analysis of vast, unstructured piles of text to find the likely answers to cryptic Jeopardy clues. How did supercomputer Watson beat Jeopardy champion Ken Jennings? So Watson in some way is able to replicate the human thought process in order to give meaning to the information it analyses. Powerful stuff for KM. But Watson is like an artificial brain. But a brain won't function unless it has a body and this is where advanced robotics comes in (Carlos and Favero 2016a).

Watson is being used in medicine in order to provide expert advice to doctors who would have to otherwise undertake many hours or weeks of learning in order to correctly process information. For example there is a specific Watson solution for oncology in which doctors get the assistance they need to make more informed treatment decisions. Watson for Oncology analyses a patient's medical information against a vast array of data and expertise to provide evidence-based treatment options (Carlos and Favero 2016a).

Traditional IT applications in the form of Intranets, databases, wikis and even social networks are being swept away and KM is moving into an exciting phase with these new developments in what is called the cognitive technologies. However Technology should not replace human processes, intuition and experience, but rather, find a suitable source of exploitation so that human judgment is multiplied (Carlos and Favero 2016a).

7.4.2 Teamwork

Supporting communication and teamwork is a topic that was developed by well-known software and system houses under the key term «collaboration». Burton (2005) defines Collaboration «as people working together on non-routine cognitive work». Effective

collaboration requires the convergence of traditional communication tools like telephones, email, fax, etc.

Groupware solutions with common mail-management, schedule-management and task-management are constantly extended by platforms or portals for cooperation. For example, Share Point Portal Services of Microsoft, Quicktime of IBM or Oracle Collaboration Suite.

An important starting point is the type of filing structure. In reality, filing structure ranges from «controlled chaos» to a common structure (possibly with archiving) wherein knowledge is systematically evaluated in documents and emails at the same time.

If a team uses a common workspace in the intranet or internet, it can go a step further using common data filing and data organisation. This enables the knowledge worker to even process the documents together. The criteria for this are version control during asynchronous processing and synchronous access to one and the same application or document. In this process, a second processor – who might be sitting in some other location – is invited to share a monitor screen with the document owner and discuss simultaneously.

In most cases, the web conference solutions are compatible with shared workspace and groupware solution can be combined for the purpose of convergent and integrative development. There are many special providers of services ranging from web conference to virtual meeting rooms wherein camera, microphone and monitor are completely integrated. By now, development and supply of collaboration tools is affected significantly by Voice over IP internet services for private customers. These services are also growing continuously in the business market. That is how Skype offers a presence overview and simultaneous processing of documents for its users. Google developed itself from being a search engine to becoming a platform for communication and teamwork.

From many practical discussions, we notice that the subject of availability gains importance to the extent of change in the workplace radius of the knowledge worker. Maintaining «presence information» in a company is a possible way of closing this information gap and giving information quickly about «when is my business partner available for me again?» Thus, one can avoid unnecessary and futile attempts to call or call-back. An important point to be considered while using presence information is to opt for a leading system in the entire company. Another success factor is at the behavioural level; semi-automatic adjustment for availability of suggested information should be possible. The knowledge worker can choose when he wants to work undisturbed even if the system suggests something else.

If one focuses on a process while considering communication and teamwork, one can define not only the information flow and use of diverse communication systems in every business process but also the document flow. Systems that enable systematic relaying and automation of business process reproduce workflows for processing and decisions in the company. We notice that the higher the knowledge intensity in a process, the more difficult the standardised implementation of a workflow. Yet structuring in the form of a workflow system is a good parameter for knowledge work processes and contributes significantly to safety and quality of process as well as reduction and measurability of processing time.

In the organization, employees – especially those working in virtual teams – that utilize social media technologies are changing the corporate landscape by being able to engage in more dynamic and flexible interactions than traditional face-to-face teams (Peters and Manz 2007). One cannot ignore the power of social media that is being used by everyone for their daily work. As people are familiar with social media, usage will not be an issue in intergration and implementaion of a knowledge management system.

Use of social media tools in Knowledge Mangement Systems will support communication between employees to seek help in solving problems and expert sdvice. As social media supports sharing, it is possible to convert individual knowledge to organisational learning much faster than the traditional method of meetings. Creation of communities of practices – CoP to discuss professional issues is easier as one can discuss from any location. Integrating social media in the office work flow will help in reducing time and cost.

Case Study

The MITRE Social Business Platform

The MITRE Corporation is a not-for-profit organization chartered to work in the public interest. MITRE manages six Federally Funded Research and Development Centers in addition to its own independent technology research and development. MITRE's 7000+ employees are distributed worldwide to support their sponsors' needs in systems engineering, information technology, operational concepts, and enterprise modernization. Most of MITRE's staff members are considered to be «knowledge workers:» individuals who engage in «non-routine» problem solving requiring convergent, divergent, and creative thinking (Reinhardt et al. 2011).

As part of normal business processes, staff members are expected to seek out the expertise of technical and domain experts distributed across the company. As a result, the corporation places a high value on sharing knowledge across individuals, projects, and business units. Prior to 2009, information was typically shared internally and persistently through email and Listservs, internal wikis, internal blogs, communal disk space, and Microsoft SharePoint– the corporate standard for information sharing. Internal, non-persistent information sharing took the form of face-to-face and video teleconference meetings, telephone, chat, and a screen-sharing application. To collaborate with external partners, MITRE employees traditionally relied on email, telephone, face-to-face meetings, a screen-sharing application with password-protected sessions, and a separate external instance of Microsoft SharePoint site.

MITRE has a knowledge management (KM) strategy and has adopted SharePoint as an official repository of record. However, many employees have found that SharePoint did not meet their needs. To improve collaboration and knowledge management, a research team embarked upon building a trusted environment for MITRE and its partners to connect, collaborate, and share new information in a more integrated and social fashion. The goals were to facilitate establishing and maintaining relationships across organizational boundaries, to form communities and facilitate multi-organizational collaboration around key topics, to leverage expertise across MITRE and MITRE's partners, and to bring broader segments of the world to bear on important sponsor problems.

At the time the research team embarked upon this effort, there were no commercially available systems satisfying all of these goals within a single system; hence an in-house solution was implemented. An advantage of building a «homegrown» system is that the team was able to instrument it extensively for fine-grained data collection in order to study usage patterns and assess what was working and what could be improved. In August 2009, MITRE launched

its social business platform called Handshake. Based on the Elgg (2011) open source platform, Handshake was designed to enable employees and their trusted partners from outside the company to form connections and create their own profiles. The platform was designed to span MITRE's firewall, allowing MITRE employees to engage with each other internally and also interact with external partners – all within a single system. MITRE users could establish groups and facilitate multi-organizational collaboration around topics, projects, or communities of interest. Group tools included a discussion forum, basic file repository, wiki, blog, message board, activity feed, and tag clouds. Handshake was also implemented to promote awareness of relationships, activities, topics, and communities through the use of email notifications and both group and individual activity streams. By June 2012, the Handshake user base had grown to almost 8000 members who belonged to one or more of the 850 Handshake groups. It is worth noting that the use of Handshake was purely optional to MITRE employees. Even after its transition from a research prototype to a corporately-supported tool in September 2012, its use was not mandated.

(Source: Holtzblatt et al. (2013)).

7.4.3 Information Supply

What is required for the success of a knowledge worker who interacts with and responds to his customers and participates in partner networks?

He requires the minutest details about the activities of «his» customers. In most cases, they are not just «his» customers. Many employees communicate with these customers or render services to them. The success of the work and the result depend directly on how well they are connected and co-ordinated. This necessarily implies that they share the common up to date information.

Restricting customer information to a limited sales area or allowing it to flow along the customer contact points in the company is a challenge. Directing the right information to the relevant people is a key to enhancing efficiency. The Customer Relationship Management systems are used for this purpose. In a sales cycle, the sales approach in campaign management compiles plenty of customer information through lead management, supply chain management, contract management and service management. This information needs to get integrated with the business process so as to have a decisive effect on the success of the campaign.

Apart from the information in company's internal systems, even context information in Web 2.0 platforms, such as Xing etc., is being resorted to increasingly. The key question here is not «what is technically possible?» but «what can be implemented at a behavioural level and adopted by employees or users».

The requirement of a common base of customer information necessitated the integration of various functions which hitherto worked in silos. This led to the emergence of ERP – Enterprise Resource Planning systems. At this point many will wonder, «How is ERP associated to knowledge work? Isn't ERP primarily process and function oriented?»

Today, ERP enjoys such a crucial place in a company that the knowledge workers have to work with it. Supporting knowledge work should be incorporated in core business and core functions of an employee. Knowledge and relevant information should be systematically evaluated and identified wherever there is action and not in newly devised separate systems. In short, we incorporate requirements and specific work situations of

a knowledge worker in integrated company systems such as ERP along the knowledge work process.

Last but not least, it is necessary to mention «portals» while talking about systems for supplying information to knowledge workers. The term «portal» has gone through many ups and downs in the last 10 years. In different definitions, it was very difficult to distinguish whether a website could be called a portal for external or internal use. From the perspective of knowledge work, the following core capabilities are our concern:

1. The ability of processing content efficiently by decentralised use of content management system and passing the processed content further by categorising and evaluating it systematically.
2. A user administration with authorisation system for write and read access rights based on a central directory (Directory, e.g. LDAP)
3. The technological ability to establish interfaces through portal components (cf. portlet or webpart) for integrating external applications, services and databank contents.
4. The ability of supporting searching and finding information on internet/intranet through personalisation.

7

7.4.4 Active Information Search

Knowledge workers like to control active information searches through experts or other knowledge bearers. Tacit knowledge and knowledge from experience is transferred in personal discussions. A business partner gets his information quickly and in a processed form. But how do I identify and reach a desired contact person and expert?

A common directory of employees not only enables display of contact data right in the telephone book but also shows its availability status. What counts against it is adding an overview of the contact information along with competencies, experiences, personal publication and capabilities of the mentioned person. Thus, networking of experts in a company not only takes place in an informal way but also in a structured and systematic way. If the already maintained employee information is available, it is easily possible to link it with employees' master data and authorisation data (LDAP directory). The effect gets bigger when the directory also turns into a contact network outside the company and employees share their personal networks with their colleagues. However, even in this case it is true that technical solution alone does not mean that half the battle is won. A lot depends on inducing the employees to start an in-house network and give away something to get something from others. This change in culture turns out to be more difficult than what it sounds because knowledge or even «my own» contacts supposedly represent job guarantee or desired power for a lot of employees.

A common search: A search field wherein I enter the desired term and the search finds the desired document – be it on the same PC, fileservers, in the intranet or even in a document archive. In many companies, this vision makes a few employees sweat. The very presence of information on the availability of a document (e.g. with the name «staff reduction list») is cited as an argument against the introduction of an intelligent company search. Obviously, an authorisation system considers which results should be shown on demand in an archive.

7.4.5 Cooperative Knowledge Use

With its pioneering changes pertaining to who produces content for whom, Web 2.0 has initiated a radical upheaval of communication and teamwork for knowledge workers.

This development has taken root in the internet and multiplied to a large extent by now. However, the number of active users in a business community has to be much higher because the user group is innately much smaller. Presently, the demographic composition differs fundamentally thus posing further challenges in implementing business community projects.

The real challenge in establishing knowledge systems for cooperative use of knowledge does not lie in its technical implementation. It lies in editing of the content. Content editing is counted among the most resource-intensive activities and is generated optimally by number of individuals of a community, i.e. by the users. ICT systems that focus on procurement of learning content are increasingly moving together with the sections «collaboration» and «social networks in Internet and Intranet».

E-Learning comprises all forms of learning that involve use of digital media for presenting and distributing learning material and/or for supporting interpersonal communication. E-learning is also synonymous to online learning, tele-learning, computer-based training, multimedia-based learning, open and distance e-learning, computer-aided learning etc. The course and learning environment are organised using a separate LMS (Learning Management Systems) that has been developed as Content Management Systems for e-education.

Newspaper, TV and newsletter are used increasingly as convergent media for getting targeted employee information. These information and learning courses are tailored exactly for a target group. Furthermore, business TV presents a very effective method of motivating a group (employee, suppliers and customers) to learn.

Another form of knowledge-oriented Web 2.0 applications are weblogs (blogs) that have take root since the beginning of 2002 as an indispensable information and communication medium for knowledge workers.

Discussed different perspectives of weblogs:

- Weblogs as primarily private journals that give information about personal sensitivities and activities of its author
- Weblogs as a new journalistic form of expression that perform control function against established media
- Weblogs as marketing and communication instruments that enable the company to enter new dealings with their customers and employees
- Weblogs as a new learning medium using which people can deal with a certain topic systematically and thus make this process transparent to themselves and others

7.4.6 Management Systems for Planning and Control

Management Information Systems (MIS) are information systems for managerial planning and control of a company. In most cases, the database for this model comes from a data warehouse.

Business Intelligence (BI) systems use the same database with an additional focus on reporting. Thus, supporting tools that help the company to optimise the business results or ensure the quality of results are also the tools for knowledge workers. They make the following contributions to achievement of defined company goals:

- Establishing a contextual basis for making decisions
- Structuring the decision-making processes
- Contributing to quality assurance of work results
- Even knowledge management itself is a management discipline that has to be planned and controlled.

According to Deming's PDCA-cycle (PDCA: Plan, Do, Check, Act), it is possible to set knowledge controlling in a cycle oriented by key figures. For knowledge goals operationalised by key figures, it is recommended to incorporate quantifiable usage parameters of knowledge management systems and contents in addition to structural, human and relation key figures of an intellectual capital statement. How intensively is the ad hoc communication used in teamwork? What is the level of integrity of systematically classified storage of documents as knowledge sources? Which proportion of users work can be incorporated into a company's wiki? All these questions can be answered only by a continuous evaluation and accessing statistics in the ICT systems for knowledge workers.

7

7.5 Success Factors for ICT Implementation

Optimum interplay of user, structure (operational and organisational structure) and ICT systems is a basic requirement for increasing the efficiency of the knowledge worker. In the following presentation of utilisation effects, quantitative usage dimensions are highlighted even if it is not always possible to quantify the usage dimension effectively.

The following principles should be considered for productive and user-friendly conception of ICT systems:

- **Orientation to productivity:** In knowledge work, we have to deal with new, productivity-enhancing influential factors that should be organised. In particular this includes the daily work environment of knowledge workers with all the accompanying and supporting tools, knowing the right knowledge sources, facilities to access knowledge of colleagues and their readiness to share it, right equilibrium between concentrated individual work and common work and last but not least, productive use of knowledge (and knowledge-bearers in his working hours).
- **Incorporation in business processes, working processes and operational procedures:** We have to deal with processes and systems that are to be implemented permanently. Accordingly, it is possible to create, store, distribute and use knowledge for the company. This is accompanied by balanced organisational structures and working environments. A one-time technology-oriented solution would go well in this structure. These processes and operations cannot be planned and simulated for individual persons as in case of productive work. Accordingly, it is necessary to design them in such a way that a knowledge worker follows them

gladly because he knows the utility of his work. He can provide knowledge in a simplified form and become more capable of accessing experts and their knowledge based on optimised communication processes.

- **Strengths of knowledge culture and readiness of an individual:** This determines the inner satisfaction of the participants, their interest and their motivation, and a company culture that stimulates and rewards the corresponding behaviour positively. Setting of incentives will become necessary here but not effective. However, knowledge management will become a part of life when the knowledge workers recognise the direct benefits of knowledge sharing and play a part in the system, for instance, by providing their own knowledge. An individual should be ready to share his knowledge and he should have the trust to rely on and use the already available information in a productive way. The company culture necessary for this has to be built for the long-term. This begins with developing the readiness of knowledge-bearers by implementing dedicated/ focused measures. This readiness has to be developed alongside the process of implementation.
- **Establishing circular dependencies in implementation:** Knowledge management lives and get its benefits from knowledge that can be shared and used. On the other hand, creation and storage can begin only when it is present technically and organisationally. Thus, in knowledge management processes it is necessary to overcome a «dry spell». This raises technical, organisational and cultural challenges. But the dry spell can be overcome only with the help of spearheads. Again, spearheads are not just the management and seniors with specialisations. Even experts have a lot of decisive knowledge. For implementation, it is necessary to identify potential spearheads and plan measures beforehand.
- **Management attention for knowledge objectives:** Knowledge objectives should be in tune with the overall strategy of the company or should be derived from it. They primarily present the stakeholders' perspective of the company. This process should not be performed once but should also be implemented permanently in order to build a learning organisation.
- **Identification and creation of analogies:** A significant factor for success and acceptance of collaborative systems for knowledge workers is the ability of the employees to develop analogies between themselves and others. This step from anonymisation, a trustful behaviour of knowledge workers among themselves, should be supported clearly by ICT systems in units and cells of personal communication and teamwork. As the user of the system, a knowledge worker depends to a great extent on his motivation that is boosted by personal grading of his work.

For a successful ICT system usage, it is necessary to manage user expectations from IT projects. The belief that a problem is solved by installing a comprehensive and expensive ICT solution is detrimental to the success of the knowledge management initiative. Part of the journey is taking a proactive view of information and technology risk—particularly as it relates to strategic business initiatives. Projects that are important from a growth and performance perspective may also subject the organization to high levels of cyber risk. As businesses integrate business and IT, it is necessary to make the chief information security officer and his or her team active participants throughout the project life cycle—from planning and design through implementation, testing, and deployment (Deloitte, Jan 2015).

Case Study

KM at eClerx – an Example of Knowledge Process Outsourcing

eClerx in India is a specialist Knowledge Process Outsourcing (KPO) company that provides data analytics and customised process solutions to global enterprise clients across a wide range of industry sectors from its offshore delivery centres in India. Incorporated in 2000, the company has four delivery centres across Mumbai and Pune and onshore support and client engagement operations in Austin (Texas), New York, Dublin and London.

With each passing year since its inception, eClerx has entered into more short-term and higher-complexity engagements; concurrently, the collective knowledge base and organisational capabilities of the company have continued to grow. By late 2003, it was clear that one-on-one apprenticeship and nurturing of the transfer of tacit knowledge needed to be supplemented with a broader framework of KM.

In the absence of such a framework, new staff were tossed into a whirlpool of process execution and expected to perform without any substantial introduction to the firm's history, culture, processes and lessons learned. Senior management thus proposed KM as a solution for moving ahead, acknowledging constraints and remodelling to a world where cutting-edge technology and intelligent processes must partially displace approaches used in the start-up years at eClerx.

It was also felt that KM would address concerns about the company's ability to retain knowledge when staff moved on. In line with others companies in the knowledge-intensive professional services space, the firm's annual employee attrition averages about 30%. Without KM, an employee's departure could mean that strategic advantage might be depleted, not only through loss of human capital, but also accumulated experiential knowledge.

Today, the KM team at eClerx has a decentralised and «cellular» structure. Each operations unit has dedicated knowledge anchors (KAs) to provide localised support. The premise is that learning is more than «vanilla» classroom training. It's not always possible or optimal for staff to abandon core work duties every time they require support. Also, the dynamic nature of eClerx's business means that waiting for explicit knowledge (to be documented) before acting is inadequate. Instead, spontaneous learning opportunities are created by leveraging Web 2.0 technologies to connect consumers with creators of knowledge.

All offline and online learning programs are consolidated under a single umbrella – a «virtual university» that offers over 3000 courses. This in-house university supports:

- Domain-specific knowledge on areas such as derivatives, risk management, trade processing, key regulations and so on for financial services clients, and online retail and analytics.
- Functional knowledge that is core to the eClerx business, programs on data mining and warehousing, advanced business statistics, Business Objects, SQL Server 2008.
- Business process training that delivers process execution know-how. The emphasis here is on application rather than mere acquisition of knowledge of processes.
- Training on supporting competencies, including analytical thinking and problem solving, six sigma, team management, interpersonal communication, strategic orientation, leadership, time management, quality management, and project management.

Since documented knowledge must typically be reviewed and quality assured, the cycle of publishing documented knowledge may not be quick enough to take action for gaining competitive advantage. Instead, taxonomies, shared platforms, an ask-an-expert system, blogs and wikis, discussion forums and simple contact lists act as smart «push» options that code knowledge and learning into the work of each knowledge worker at eClerx.

eClerx has deployed Microsoft Office SharePoint Server 2007 (MOSS 2007). The MOSS 2007 implementation enables:

- Content Management: Document management, version control, check-in/check-out document locking, auditing, and role-based-access controls at the document library, folder, and individual document levels.
- Enterprise Search: Efficient search and retrieval of relevant content saves time.

- Team Portals: Multiple portals that mirror the organisational structure and facilitate collaboration at team level.
- Collaboration: With offices in the US, UK and India, the Web 2.0 capabilities of MOSS 2007 enable eClerx employees to leverage workspaces, tasks, surveys, forums, blogs, wikis and RSS.
- Wikis and blogs: Wikis provide eClerx employees with a forum where they can contribute and build on the existing knowledge base of the firm. Blogs, on the other hand, catalyze the socialisation process by trapping experiences and lessons learned as they happen.

Source: Makhija (2009)

7.6 Key Insights of Chapter 7

- In order to carry out analytical activities, a knowledge worker has a distinct need for an optimum access to company's «knowledge and information bases». There is no need to reinvent the wheel for efficient results. Good teamwork in expert network is one of the success factors. In such cases, the systems should encourage know-how pool and networking of experts.
- The systems for knowledge workers are considered from the following perspectives of productive knowledge work: individual efficiency, teamwork, information supply, and active information search, cooperative use of knowledge and planning and control.
- Users, business processes and ICT settings build a close system. All three influential factors are necessary for productivity and efficient working. Massive weaknesses in users, organisations of business processes or system settings can rarely be compensated by the remaining two factors.
- High-performance workplaces augment the capabilities of their skilled staff for activities such as exploring data, developing innovative processes or products, and working with suppliers to respond to the requests for proposals. This support helps workers locate the right people, find the right content, support the right communication channels and focus on where to create maximum return.
- A knowledge-oriented company is unimaginable without efficient information management. Providing, storing and distributing information is a basic requirement for creation and transfer of knowledge in phase 1 where explicit knowledge has to be made sharable.
- The art of designing ICT systems lies in balancing individual user requirements and requirements of a coherent and robust system landscape from the perspective of an organisation. The human factor influences the overall productivity decisively in direct interplay with usability of the entire system landscape. New disruptive technologies which can change the KM landscape in an organisation can also subject the organization to high levels of cyber risk which needs to be managed.
- A knowledge-oriented company should protect its knowledge from outside but allow employees a free access to most of the information. Distrust towards one's own employees and the restricted information access thereof, hinder the process of knowledge transfer.
- Technology should not replace human processes, intuition and experience, but rather, find a suitable source of exploitation so that human judgment is multiplied and not just replaced by expert systems (Carlos and Favero 2016b).

7.7 Questions

1. Discuss why Knowledge Management initiatives inspired by Information Technology alone do not result in successful Knowledge Management.
2. What are the characteristics of an «enterprise 2.0»? What does this mean for the ICT system and what are the implication for users/contributors?
3. «Information empowerment is a full equation for information sharing. One half of the equation is getting the right information to the right people at the right time. The other half of the equation is making sure that people can do something with the information when they get it». Discuss.
4. Which ICT tools can enhance teamwork?
5. As a student you are a knowledge worker: Draw a mindmap of your information and communication systems.
6. «Deploying the social platform to improve the corporate KM strategy points towards a completely different KM approach as compared to the deployment of SharePoint». Discuss.
7. Discuss the impact of machine learning and Robot on the operational framework of an organisation.
8. Intergrating Social Media in Knowledge Management Systems will result in more unwanted material. Discuss.

7.8 Assignments

1. **An information junkyard** A large consumer products company decided to restructure the organisation so as to be able to improve professional work. The professional staff was instructed to document their key work processes in an electronic database. It was a despised task. Most staff felt their work was too varied to capture in a set of procedures. After much debate and motivation the task was completed. Within a year the database was populated but it resulted in creating an expensive and useless information junkyard.

Discuss the lacunae in designing the knowledge management system and suggest a framework that would help the organisation in improving professional work.

2. **The challenge to find high quality information** «People in large corporations face the same challenges finding information on their organisations» intranets as they do finding it on the Internet: there is too much to search from and searches can yield as much nonsense as helpful material.

Discuss this in the framework of Knowledge Management processes highlighting the imperatives and the challenges.

3. **Integrating social media in the organizational work place** Empowering individuals by giving them tools to connect and share on their own terms to meet their needs and not through channels and formats that are imposed upon them, will result in resolving problems and identifying solutions faster.

Discuss the pros and cons of using social media in functional systems. What would be the organizational challenges?

7.9 KM-Tool: Knowledge Taxonomy and Knowledge Map

? What is a taxonomy and knowledge map?

A taxonomy is a technique that provides the structure to organise information, and documents in a consistent way. Information and knowledge is put in hierarchical or contextual order (like a folder structure in your windows explorer or a mind map).

? Why use taxonomies and knowledge maps?

This structure assists people to efficiently navigate, store, and retrieve needed data and information across the organisation. It builds a natural workflow and knowledge needs in an intuitive structure.

? How to develop a taxonomy or knowledge map?

Developing a taxonomy involves finding an appropriate breakdown for the diverse forms of information contained and used by different actors within an organisation.

1. Start with a general category for the area of work being addressed, e.g. «processes» or competences
2. Establish the subcategories for this category. These can be developed by answering the question «what types of, for example, processes or competences are there?» Repeat the process of division, based on the planned application of the taxonomy, and the users concerned. The division used should be consistent with the expectations of the users, otherwise it becomes hard for them to navigate the system intuitively. Decide on standard terms and naming of documents. These should follow the same logic and consistency across different types of item, following the same pattern for similar situations so that, once learned, the user can reasonably predict how it will apply in a new situation.
3. Decide on the kind of visualisation of the taxonomy. (e.g. folder hierarchy, Mind map, knowledge tree, etc)
4. Optional: Assess the maturity and depth of information/knowledge in each «branch» of the structure.

Type of knowledge	Reference "Lighthouse"	Maturity 1–5 (low to high)	Where is the knowledge documented, who is responsible for the topic?

Sources and links:

A useful video on Taxonomy is available on YouTube at ► www.youtube.com/watch?v=qGymV0ZCme4&feature=player_embedded

Useful Links

- <http://drupal.org/project/modules>
- www.apqc.org

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