ICT and cooperative work

ICT a možnosti spolupráce

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Abstract: This article deals with the possibilities of making usage of ICT (Information and communication technology) to support cooperation among teams. There are two main approaches: systems based on the www technologies (intranets), and specialised systems, which are dedicated to cooperation (these systems are designated as groupware). Web technologies are the main element of the Internet. They are becoming the most important technology in the presentation layer of current business information systems. The web environment penetrates into all currently used applications. Its integration with all existing systems makes the users locally independent and enables them to use a variety of hardware and software platforms, as well as the advantages of mobile communications. The results of the issues discussed in the article are outlined in specific examples.

Key words: www technology, groupware, web site, integration of IS, Novell Groupwise, intranet

Abstrakt: Příspěvek se zabývá možnostmi využití ICT (Informační a komunikační technologie) při podpoře týmové spolupráce. Existují dva základní přístupy: systémy založené na technologiích www (intranety) a specializované systémy určené pro podporu spolupráce (systémy označované jako groupware). Webové technologie jsou hlavním prvkem Internetu a stávají se i nejdůležitější technologií v prezentační vrstvě současných podnikových informačních systémů. Webové prostředí proniká do všech používaných aplikací. Jejich integrací se všemi stávajícími systémy se uživatel stává místně nezávislým a může využívat různé hardware i software platformy i výhody mobilní komunikace. Vlastní výsledky řešení uvedené problematiky jsou prezentovány na příkladech.

Klíčová slova: www technologie, groupware, webové sídlo, integrace IS, Novell Groupwise, intranet

INTRODUCTION

In the past, companies recognized that value lay in putting 'physical assets' to work. Gradually, more organizations began to recognize the value of 'human assets'. Today, the new challenge is to recognize the potential of 'content assets'. Increasingly, content assets are going to be a key source of value.

The dynamics of the development of modern information and communication technologies (ICT) has been very high in the recent years. These technologies are becoming an integral part of life in the large sections of the community as well as in business units. Organizations and companies must decide on how to harness these technologies for the development of their businesses effectively.

One of the phenomena in the innovation of the current information systems is the practical use of internet technologies (primarily www technologies), in which the personalised web approach is combined with the efficient management and administration of saved data. Furthermore, the mail system, together with an efficient use of all its options, is also expected to play a pivotal role in the company's information infrastructure.

AIMS AND METHODOLOGY

The key aim of this paper is to evaluate the ways of using www technology for innovation of information systems (IS) and to highlight the potentially available, but very little used, advanced functions of e-mail systems. At the same time, a critical evaluation is made of the contribution of new technologies from the viewpoint of the companies' competitiveness.

At first, we must analyse and compare different technologies used for improving cooperative work. Two examples will be presented. In the following chapters, we will focus our attention on the actual

impacts of the ICT for managing small and medium enterprises (SME).

RESULTS

Based on the literature survey and our own practical experience, it is possible to divide the results into four parts:
– current state of the usage of www technology
– cooperation support tools – Groupware
– integration of portal solutions in IS
– examples of solutions.

CURRENT STATE OF THE USAGE OF WWW TECHNOLOGY

The presentation website of a company is still quite often separated from the information system itself. However, integration of the two is gradually being introduced. Company information systems are progressively changing into so called Company Information Portals. This facility represents a group of www applications that enable its users to access internal (company) or external information in a personalised form (see Figure 1). Many examples of the advantages of different types of web sites have been presented (Havlíček 2004a).

Web interface, transaction services, security, administration and personalisation. Tools of this kind belong to the so-called portal core services the aim of which is to ensure correct access to other services in the required quality and according to the needs of individual users.

Publish and subscribe. Tools of this group ensure event-managed communications. After publishing a piece of information (i.e. saving it in the system), it is distributed to the people who have subscribed to this kind of information.

Search engines and filters implement the search in structured as well as unstructured data. These tools work with both the document model, and the data model, which is used for the description of structured data in a company.

Cooperation support tools, the so-called groupware systems, support mainly communications between individual employees and teams at both vertical and horizontal levels. They enable coordination in solving various tasks.

Content management. This group includes tools that support working with unstructured (internal or external) data saved in any electronic format. These tools manage saving and storage of data in a company data storage facility.

Decision support tools make it possible to obtain information from operational data and from other defined internal and external information and data sources. Information acquired in this way is further processed by analytical systems, which are designated as Business Intelligence. The range of tools for DSS is described by Havlíček et al. (2003).

Cooperation support tools – Groupware

The fundamental functions of Groupware include electronic mail, calendar, on-line instant messaging and document management (Vaněk, Jarolím 2004).

Electronic mail is becoming more and more significant today, as confirmed, for example, by Gartner or META Group surveys, which show that electronic mail undoubtedly belongs to technologies the implementation of which brings the greatest efficiency to companies.

<table>
<tr><td colspan="3">Web Interface</td></tr>
<tr><td colspan="2">Transaction Services</td><td>Security</td></tr>
<tr><td>Administration and Personalisation</td><td>Publish and Subscribe</td><td>Search engines and filters</td></tr>
<tr><td>Cooperation Support Tools</td><td>Content Management</td><td>Decision Support Tools</td></tr>
<tr><td colspan="2">Unstructured data</td><td>Structured data</td></tr>
</table>

Figure 1. General scheme of a Company Information Portal

Calendar is also a widely used function, which supports contacts administration, and a centralized calendar of clients with a possibility of mutual sharing of information so that they can plan deadlines, meetings, use of facilities and so forth. The significance of its use in the modern society is so great, that it is proving to be irreplaceable. Nevertheless, the actual level of its use has been relatively small so far – due to the insufficient appreciation of its functional possibilities by the management and to difficulties with its widespread implementation, etc.

On-line communication – Instant Messaging provides another, very efficient, tool for communications by users and user groups – primarily within the company. Implementation of this function is increasingly becoming more frequent. However, there is a problem posed by the general popularity of informal implementations of the ICQ type (security, communication control, etc), which tend to contradict with the company policy, provided that such policy exists in the first place. It can then be understood why this function is inevitably and justly diverted to closed user groups in the intranet environment.

Document management supports efficient creation and management of documents in combination with sharing and remote access. Its implementation is still the least used basic function of the groupware products. Where the functions within document management are concerned, there are practically no existing barriers such as those mentioned in the examples above. By contrast, the problem here lies in the approach of the company management, which has an inadequate concept in the field of ICT (i.e. lack of appreciation of the benefits of implementation).

Other important characteristics concerning the level of information infrastructure in relation to groupware are as follows:

Integration with the Directory Facility – this is a very important link between the central storage facility of all information (central administration of net services, security, users, contacts etc.) and the possibility of its management – this is primarily important for eDirectory, and Active Directory.

Mobile appliances support – an important function that does not only represent an increase in the widespread use of appliances of the PDA type (Palm, Pocket PC) but also of modern mobile phones. This naturally includes Smartphone appliances as well.

Native client – this now represents an integrated product with an intuitive and user-friendly interface. Its design and function significantly influence its acceptance by users and its overall implementation functionality. It contains a comprehensive menu of the functions of a particular system.

Localisation – a full localisation of the product (nowadays this is quite common for all products) is a prerequisite for its successful implementation in Czech environment.

Web client – together with the development of internet applications, the web interface support, representing a possibility of remote access without having to use a client application, has become an indispensable function of all systems. It generally comprises a subgroup of client application functions, which is quite sufficient for basic work. This function is being continuously improved.

Supported platforms – depending on the company, these range from the Windows environment to a multiplatform – such as Windows, Unix and Linux).

Integration of Portal Solutions within IS

The technological evolution of portal applications is very fast. In the course of their practical implementation within a company information system, it is possible to distinguish four logically interconnected phases (Havlíček 2004b):

1. Content aggregation (1998–2001)
2. Application aggregation – Access to applications and services (2000–2003)
3. Content & Services Integration (2002–2005)
4. Smart Enterprise Suite (SES) (2005+)

Phase No. 1 – Content aggregation

Self-maintenance and personalisation are typical features of these applications:

- self-maintenance means that portal users manage their personal information themselves (contact address, interest area, etc)
- personalisation is a process in which the users themselves define what information they want to see on the main page of the portal.

Web applications of the first commercial portals such as "My Atlas", can serve as an example. However, we have to emphasise that while on the Internet it is the provider who inserts advertisements and links to commercial information, on the Intranet, it is the employer who can force upon us important information on company events etc, while we have no option to intervene in it.

Phase No. 2 – Application aggregation – Access to applications and services

More and more commercial applications (e.g. ERP, CRM systems) offer a possibility of a dialogue via

internet browsers (thin client). Thus, we can easily include these applications in an intranet portal (such an application has been given a name – Web Application Server – WAS). The advantage of WAS is an opportunity to work with company applications from any part of the world (for instance, when in the Internet Café).

Phase No. 3 – Content and services integration

Together with an increasing number of web applications, it is possible, and even quite convenient, to place on the portal some additional company services, such as applications for a holiday or business trip, as well as services which are connected to the net operation (Helpdesk, requests for access to a specific data source, etc.).

Phase No. 4 – Smart Enterprise Suite (SES)

Based on the current conceptions, the fourth phase represents a complex integration of people (or more precisely, of their activities) with company processes and applications. According to the Gartner consultancy firm, when planning a full integration solution, it is necessary to consider these factors:

– *Content management*. SES makes it possible to publish all relevant information (such as documents or tasks) on the portal. At the same time, the published content is classified for various user roles.
– *Collaboration and community support*. A possibility to create virtual jobs for teams of people working on specific projects, business tenders or marketing campaigns, etc.
– *Process management*. It is possible to create a random workflow according to either stable (processing orders) or immediate needs (the so called *ad-hoc* workflow). There is an option to monitor the processes.
– *Business intelligence and data analytics functionality*. Generating various analytical views of relevant data supports primarily strategic management and decision-making. These views provide answers to questions such as: Which product made the highest profit in a particular region?
– *Multichannel access*. Access to data and processes in any part of the world and to any facility (ranging from desktop computers, laptops and internet kiosks to mobile phones).
– *Portal framework – Integration with application portals*. An easy integration with web application servers from different manufacturers allows interconnection of individual economic applications (financial, human resources, business, etc) into one unit without any effort. Gradually, standards providing for interoperability of applications such as XML, SOAP and web services are being established.
– *Identity management, information rights management*. The employees have access only to information which is relevant to their task. However, their "computer" identity changes within the individual economic systems. Management of uniform identity across all applications and systems is very demanding financially and, for the time being, it is therefore bypassed by simpler and cheaper means.

Example of solution – Novell GroupWise system implementation

An example of a solution for a very extensive network environment is the current implementation of the electronic mail system at the Faculty of Economics and Management (FEM), Czech University of Agriculture Prague (CUA), Czech Republic. The GroupWise system was installed there at the beginning of 2004. Its simpler version, NetMail, is used for the student mail system. At present, all university students are using this system actively, the total of 12 000 users.

GroupWise supports the process of secure messaging and a range of services, such as system calendar, planning (of business meetings, tasks, sources and facilities), contact and document management, online communications and other productive tools for the support of work teams. Users can access the GroupWise system services from their personal computers connected to the local network, through the web browser using any Internet connection, and also via wireless applications such as mobile phones. Security is a crucial feature of the system. All data are saved in databases and encrypted by the means of randomly generated encrypt keys. In order to secure data transmission through the network the GroupWise system utilizes the following security standards: Secure Socket Layer (SSL), Secure Multipurpose Internet Mail Extension (S/MIME), Public Key Infrastructure (PKI), and Transport Security Layer (TSL). Several anti-spam applications are available, and third party antivirus programs are also supported.

At the FEM alone, the network environment represents over 400 workstations, with 300 employees and nearly 6 000 students using its services. The management of all users and network facilities takes place via the Novell NetWare 6.5 version network operational system, thus using advanced services of eDirectory. This results in an easy access to mail by means of a friendly web interface, which can be modi-

Table 1. Settings for the user environment system

Size of mail box	500 MB
Full mail box alert (upper limit)	80%
Maximum size of sent message	30 MB
Address format (e-mail)	user_name@pef.czu.cz
Path to mail box files	C:/GWarchiv
Sending group messages	Yes – only within the mail authority (Restricted to the Dean's office only)
Incoming mail alert	Yes

fied according to user needs (graphic modification, or automatic synchronization with other systems, such as alternative mail accounts, on-line help, etc). Mail functions linked to the calendar (messages, tasks, notes, reminders) in combination with the directory (users, organizations, search, connection to mail, etc), are also available. The user environment was set up in such a way that individual users are minimally restricted, while being provided with a high level of security.

Table 1 outlines the settings for the user environment system.

Automatic maintenance of mail boxes is set up to empty the trash boxes after 30 days, archives of meetings, tasks and notes after 14 days, and archives of mail boxes after 30 days. In addition, the PEF users have access to applications of files sharing, mail box addresses sharing, POP3, IMAP4 and NNTP (all secured), search in LDAP database and they can work within three modes: on-line, cache and remote.

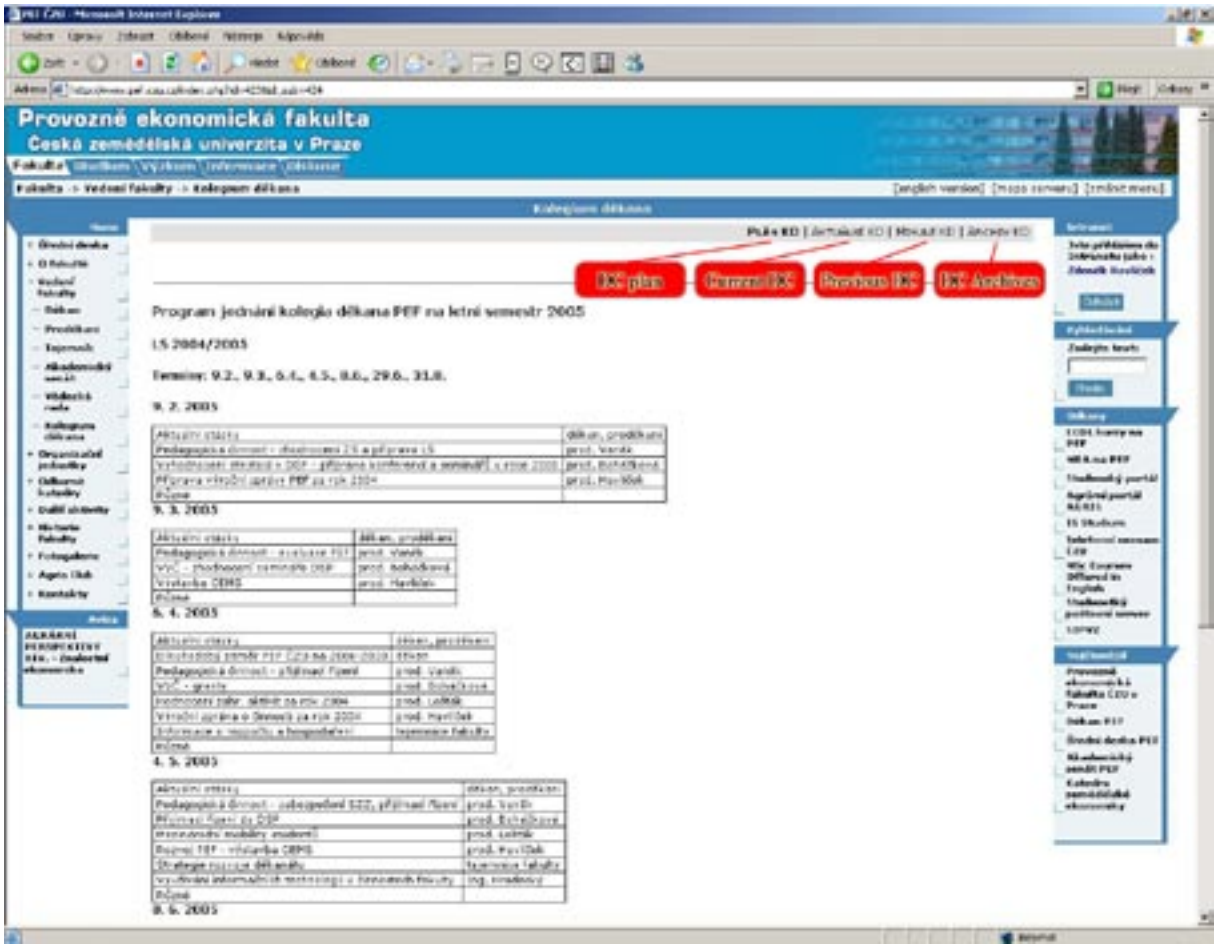

Figure 2. Example of document management

Example of solution – Document Management for the Dean's Council

The Dean's Council (DC) at FEM, CUA Prague, meets once a month. All written documents prepared for the DC meeting were sent few days before the event via electronic mail to all members of the Council. Archiving of written material was managed by the Dean's Secretariat, as well as by each DC member according to his or her needs.

In January 2004, a specific intranet selection for the *"Dean´s Council"* Menu was placed on the faculty server www.pef.czu.cz. It consisted of four navigation panes:

DC plan Current DC Previous DC DC Archives

Explanation of the content of the individual panes:

– *DC plan* – contains a plan of the DC activities for one semester. It is inserted before the beginning of the semester.
– *Current DC* – contains materials prepared for the DC meeting in a particular month, within the structure which is based on the program of the meeting being prepared.
– *Previous DC* – contains discussed and approved versions of materials of the previous DC meeting plus verified minutes from the DC meeting.
– *DC Archives* – contains discussed and approved materials in the Division according to the individual DCs.

The Dean´s Secretariat using a special editorial system operates the content management itself. Comprehensive and suitably arranged documentation is available to users (DC members) – see Figure 2.

CONCLUSION

It is cleat that internet technologies significantly contribute to the overall integration of company activities. By using facilities of the Web Content Management, it is possible to control and manage the web site content easily. However, it is necessary to approach the practical use of these technologies in companies gradually. Depending on the company goal, it is crucial to gain some experience and make a decision at the right time in order to design a website which is linked to the existing information system, while using operationally undemanding solutions such as editorial systems. An efficient Groupware and, especially, the use of all its integrated functions, also have a great impact on the quality of communication and the company's competitiveness.

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