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**INTRANET AS A COMMUNICATION AND COLLABORATION
PLATFORM FOR SUPPORT TO ELECTRONIC BUSINESS**

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***Abstract:** Intranet is the generic term for a collection of private computer networks within an organization. An intranet uses web technologies as a tool to facilitate communication and collaboration between people or work groups and to improve the data sharing capability and overall knowledge base of an organization's employees. Many companies today are following the lead of major corporations and using intranet technology to support electronic business in domain of communication and collaboration. This paper treats intranet as a communication and collaboration platform and analyses the basic aspects of implementation and application of intranet technology in electronic business of an enterprise.*

***Keywords:** Intranet, electronic business, web technology, collaboration, communication*

1. Introduction

Intranet technology provide rich set of tools for creation of collaboration environment where members of an organization can exchange ideas, share information and work together on projects and tasks regardless of physical location. Business or corporative intranet very rapidly has been becoming replacement for classical modes of communication. The intranet improves internal communication in an organization, facilitates work of employees and makes workflows faster. (Duane, Finnegan 2003, 133–158)

Although organizations have used their internal local area networks for management and coordination of business processes, intranet is becoming basic technology of internal electronic business. Intranets are cheap, scalable according to changeable needs of organizations and accessible from the most computer platforms. Whereas the most companies, especially great ones, have to support many computer platforms which can be incompatible, intranet obtains connectivity uniting the all computers in one virtual network system. Web software represents uniform interface that can be used for integration of many various processes and systems across an organization. (Kim, Olfman 2010, 1-24)

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Presently, numerous organizations are planning implementation or implementing intranets. The organizations implement intranet in order to improve information distribution, communication and collaboration of project teams and reduce costs of distribution and sharing of information. Intranet supports organizations to create rich information environment that better responds to requirements of users. Internal applications based on model of web pages can be made interactive by using various media, such as text, audio and video. The basic use of intranet was creation of online information repository that is updated according to the needs. Product catalogues, manuals for employees, telephone directories or information on benefits can be revisited instantly when changes in the documents occur. This publishing that is event-driven enables organizations to respond to changeable conditions faster than classical paper publishing requiring rigid production deadlines. (Butler 2003, 209–231)

Main aim of the paper is to analyse possibilities of intranet technology implementation in very important domain of electronic business such as communication and collaboration. Expectation is that the research will support decision makers in many organizations in acquiring necessary information and knowledge on domains and benefits of intranet technology implementation with special emphasis on communication, collaboration and knowledge sharing. Taking into account mentioned aim of the research, the paper is organized in following sections: intranet from technological perspective, domains and benefits of intranet application, intranet from collaboration and communication perspective and conclusion.

2. Intranet from Technological Perspective

Organizations can use internet networking standards for developing private networks, called intranets which provide access to data of whole organizations. Intranet uses existing network infrastructure of an organization with internet connectivity standards and software developed for World Wide Web. Networked applications operating on various types of computers including mobile wireless handheld devices across the organization can be found on intranet.

On the other side, there is extranet (extended intranet) enabling access to authorized users outside the organization such as suppliers, buyers, business partners etc. Intranet applications and information can be accessed only by authorized users or employees inside the organization. Intranet can be connected to public internet, but it is not necessary. (Mahadevan, Kettinger 2011, 28-45)

Traditional systems for collaboration and document management are expensive and require licensed client-server networks, special client software and great data storage capacity. On the other hand, intranet technology provides inexpensive and universally available platforms for basic publishing of documents, so that many organizations use this solution. Employees of an organization can publish information by using web authoring tools and send it to intranet web server. In that way, information is becoming shareable resource that can be accessed through whole organization by standard web browser software. Web documents can be multimedia objects that combine text, graphics, audio and video, along with hyperlinks. When a document is sent on server, it can be indexed for fast access and connected to the other documents. (Guah 2006, 8-16)

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Organizations must pay attention to security and protection of data and resources from unauthorized persons who want to access to intranet without permission. Presently, many security methods are used and well known method is firewall. Firewall is hardware and software security system developed to limit communication between local intranet and internet. Purpose of firewall is prevention of malicious intrusions and stopping intranet users to access to forbidden and dangerous data on internet. It selectively passes packet data sent to some device inside intranet. Firewall is programmed to detect every packet of message going between public internet and private intranet, to examine its features and to reject unauthorized messages or accesses.

Intranet software technology is the same as web software. Intranet do not require special hardware and software and it can operate through anyone network infrastructure. HTML is used for web pages programming and establishing dynamic point-and-click hypertext links to the other pages. Web browser and web server software used for intranet is the same as for public internet. Simple intranet can be implemented by connection of client computer having web browser with software web server through TCP/IP protocol. Firewall prevents intrusion of unwanted visitors to intranet. (Molly et al. 2011, 645-652)

By using TCP/IP standard internet protocol, intranet is made easy for connection to various computer systems inside or even though outside one organization. By using hypertext language and web browser for searching web documents, intranet provides to users easy to use graphical tools.

As we mentioned previously, intranet technology is based on TCP/IP protocol that is mostly used and most significant. Transmission Control Protocol/Internet Protocol (TCP/IP) is wide accepted standard for communication in heterogeneous environment of various computers. It is well known because it is appropriate for operation in internet environment connecting many local networks in one international network. TCP/IP divides communication transfer in five layers. Two different computers communicate each other through TCP/IP even though they are based on different hardware and software platforms. TCP/IP became generally accepted standard and supported by almost all computers networks (local area networks and wide area networks). In addition, TCP/IP is supplemented by following protocols:

- SMTP (Simple Mail Transfer Protocol) for electronic mail;
- FTP (File Transfer Protocol) for exchange of files between computers;
- SNMP (Simple Network Management Protocol) for network management.

Although TCP/IP is widely accepted standard for intranet connectivity, there is another protocol that enables transfer of hypermedia documents through network. This protocol is HTTP (Hypertext Transport Protocol) which is just popularized intranet as a new technology for network connectivity inside an organization.

Protocol for wireless communication that can be used for access to hardware, software and data resources of intranet is Wireless Application Protocol (WAP). Employees do not have to be on fixed workplaces in order to be connected to Internet, receive and send information. Instead they can use mobile wireless devices (smart phones, tablets etc.) to access company intranet and communicate with their colleagues wherever they are. Mobile internet forces companies to change old attitude on static workplace. In near future, workplace will be in the place where an employee is at that moment. (Kamel 2006)

In comparison to conventional access to internet from desktop, wireless technology gives opportunity to employees to have internet access no matter where they are. This new technology can be used to connect mobile users and company intranet through wireless channels. The access is achieved from a mobile device instead from desktop enabling anytime-anywhere communication.

New business with using mobile technology and new applications can be achieved on two ways: externally and internally. Externally oriented mobile applications gather data and information and enable users and customers to use it by their mobile devices. Internally oriented mobile applications are used inside an organization for communication and collaboration between intranet users. The organizations that use mobile internet for internal purposes are more efficient and productive. They make possible for their employees to access information whenever they need it and wherever they are in this moment.

At the end of this section, development of intranet is briefly explained through following phases:

- Formulation of web strategy (what information, data, and transactions will be available for employees on intranet; what are priorities for application development; what features, functions and competences are most important for organizations; how various groups, such as employees and managers will work online).
- Evaluation of information technology infrastructure (what is state of existing infrastructure, what improvements and new solutions are needed).
- Identification of business processes which should be changed (what business processes have to be transformed and improved through Business Process Reengineering and Total Quality Management in order to achieve requirements related to security, digital signatures, procedures, approvals etc.).
- Adjustment of culture to new methods of business based on intranet technology (how employees can be included in the new methods of business, how to reduce resistance to use of new information technologies).

3. Domains and Benefits of Intranet Application

Principle of intranet operation is based on creation of online information repository that can be used and updated as needed with reduction of great quantity of paper documents and costs of document printing and distribution. Intranet mainly represents portal as a universal single point of access to internal systems and documents through web interface. These corporate portals provide one consolidated view to information resources on intranet. These resources can be adjusted in order to respond to appropriate information needs of specific groups or individual users. (Levermore, Babin, Cheng 2010, 367-393)

Initial technical installation of intranet is relatively simple because it is based on existing infrastructure of computer networks and widely accepted universal TCP/IP standard. However advanced forms of intranet use such as transactions with legacy systems are technically more complex and demanding. Intranet is viewed as interactive and reflective medium. As more people are adopting intranet, it is becoming more useful and more content is becoming accessible. Therefore critical mass of early users is needed. However in comparison with many interactive media where critical mass of users is only condition, intranet requires not only this condition but critical mass of content that can be

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global. In addition, intranet technology blurs difference between developers and users. Users in intranet context can be developers at the same time.

As we already mentioned intranet technology is multimedia and integrates text, graphics, audio and video. In contrast with traditional intraorganizational information systems (for example, inventory system, payroll etc.), intranet technology is highly flexible and do not satisfy only specific, clearly defined requirement. Intranet does not have clearly defined boundaries, functionalities or period of duration and very often is initiated by stakeholders outside IT department. In contrast with many other technologies, intranet does not exclude existence of the other IT systems. Instead intranet technology unites and integrates existing IT systems and obtains new graphical interfaces to legacy systems.

Intranet is evolving during time and becoming sophisticated. Initially, it is used primarily for publication of static information. This situation is caused by process of learning in implementation and use of intranet technology. As organization is acquiring experience in use of the technology, it can be applied in enhanced manner. Five different domains of intranet application are presented in table 1.

Table 1. Domains of intranet technology application

Domains of application	Description
Publishing	Application of the technology for information publishing (for example, home pages, manuals, technical documents, product catalogues, etc.)
Transactions	Use of the technology for achieving transactions through web pages and with support of the other information systems in an organization
Interaction	Use of intranet for interaction with the other individuals and groups inside organization (e.g. discussion groups, collaborative applications etc.)
Searching	Application of intranet technology for searching organization information (e.g. search engine, indexing, search agents)
Scanning	Use of intranet for creation of organization memory (e.g. best practices, business cases, frequently asked questions etc.)

Source: Butler, T. (2003) An Institutional Perspective on Developing and Implementing Intranet- and Internet-based Information Systems. *Information Systems Journal* 13: 209–231.

There are many business cases of intranet technology use analysed in literature (Blaskovich 2008, 27-46). Following examples illustrate how intranet technology can be used in mentioned fields of application.

Employees working in claim department can instantly fill electronic form of received claim and distribute it to intranet server so they save time and increase precision.

Business professionals can avoid manual updating their contact lists on mobile and smart phones, so they will automatically download this data from company intranet server. Consultants can access to information on specific project when they are with client anywhere. Employees that work on this way, can not only receive and view some data but also can collect data and transfer it to central intranet server so the other employees can access it. Mobile collection of data means that it will be entered in a system only ones and became part of company database. This increases precision and rapidness in entering data and reduces errors that can be made due to multiple entering data.

Many organizations implement services for employees, such as automated, self-service systems for managers and employees based on web. This approach enables employees to solve administrative problems without support of professional staff and to receive services of just-in-time training and distance learning.

Implementation of intranet technology in described fields gives to organizations many benefits. Benefits of well implemented intranet emerge early, primarily through increasing productivity and reduction of business costs. Some organizations are compensated costs of intranet building for less than three months and rate of return on invested assets could be 1000%. (Kim, Olfman 2010, 1-24)

Documents available on intranet are always updated that eliminates costs of paper, printing and distribution. For example, Sun Healthcare, chain of outlets for face and body care in Albuquerque, New Mexico saved \$400,000 because avoid costs of printing and postal distribution of materials. This organization has implemented intranet and put its bulletin on it. The bulletin are distributed to 69,000 employees in 49 United States. (Mahadevan, Kettinger 2011, 28-45)

Also, intranet technology obtains saving in many other organizations. For example, U.S. West saves \$300,000 per year by use of intranet applications that automatically identify customers which contracts are overdue. Development of the intranet costs only \$17,000. Conservative studies of Return On Investment (ROI) shows ROI of 23%-85%, and some companies reported that are achieved ROI more than 1000%. (Yoo, Choudhary, Mukhopadhyay 2011, 145-170)

Finally, benefits of intranet technology can be summarized on following way:

- achieving connectivity (intranet is accessible from the most computer platforms),
- intranet can be connected to internal systems of an organization,
- intranet supports interactive applications with text, audio and video,
- intranet is scalable according to computing needs of an organization,
- intranet is easy to use with universal web interface,
- low cost of installation,
- intranet provides rich information environment that meets requirements of users,
- low costs of information distribution,
- reduction of paper costs (classical letters, forms, printed materials are eliminated),
- specialised software is not required,
- reduction of time for work tasks,
- great quantity of information in form of interesting content,
- data is updated and timely; and feedback between employees is improved.

4. Intranet from Collaboration and Communication Perspective

Collaborative software known as groupware, workgroup support systems or simply group support systems is technology designed for support to people participating in some common tasks and projects in order to achieve their aims. Collaborative software transforms way of documents sharing to enable efficient collaboration of some team members. It supports interaction between team members in process of decision making. The teams can include members from all over the world and that brings cultural and

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language challenges for every software supporting collaborative interactions. (Blaskovich 2008, 27-46)

Collaborative software, such as groupware is based on concept of Computer Supported Cooperative Work (CSCW). CSCW explains how common activities and tasks and its coordination can be supported by computer systems. Software applications such as email, calendaring, chats, wiki and bookmarking belongs to this category of applications.

Social software is used outside workplace and there are many social applications and networks such as Facebook, Twitter, Friendster, LinkedIn etc. In comparison with social software, collaborative software creates Collaborative Working Environment (CWE) facilitating cooperative work of eProfessionals that is new class of professionals who must work together no matter where they are geographically. CWE supports collaboration and coordination of people no matter the collaboration is formal or informal, intentional or unintentional.

First commercial products of collaborative software are emerged two decades ago. Great companies, such as Boing or IBM use electronic systems for meetings improving management of internal projects. Lotus Notes as collaborative software and groupware belongs to this category enabling collaboration of remote workgroup. Lotus Notes is emerged when internet is in early phase of evolution. Presently, collaborative software is incorporated in internet and collaboration on internet is based on Web 2.0 technology. Web 2.0 is trend in world wide web technology that is based on socialisation enabling users to participate in creation of web contents and collaboration. Many functions of Web 2.0 technology are originally developed for use inside corporative networks. Some of these functions are document sharing, group calendaring, instant messaging and web conferencing.

Collaborative intranet platforms support synchronous and asynchronous communication through various devices and channels. The platforms offer set of software components and services enabling users to find each other and information they needed, communicate and work together on achieving common business aims as well. Basic elements of collaborative intranet platforms are messages (email, calendaring and scheduling and contacts), team collaboration (synchronisation of files, ideas and notes, task management, text searching), real time communication and collaboration (presence, instant messaging, web conferencing, application/desktop sharing, audio and video conferences) and social computing tools (blogs, wikis, tagging, Really Simple Syndication and common markers).

Collaboration platforms and tools can be designed for various kinds of users: Business-To-Business (B2B) users, Small to Medium-sized Businesses (SMB) and consumers. B2B users implement the collaboration platforms for high scale of using, many simultaneous sessions and big groups. The platforms have high requirements for storing great number of huge files, such as video, simultaneous use of several tools and accessibility of broadband lines.

SMB users implements the collaboration platforms for lower scale of use, small number of simultaneous sessions and lower number of participants per session. Finally, consumers can be small enterprises, the other groups and individuals. The users implement collaboration platforms for business purposes or for the other uses.

Some common features of the most collaboration platforms and tools are:

1. Short communication in real-time, such as Instant Messaging (IM) and Text Messaging (SMS).
2. No textual interactions in real time, such as audio and video conferences and telepresence
3. Long textual communications such as email, wiki or blog
4. Desktop or application sharing in form of white boarding
5. Vertical collaboration with functions adjusted to specific purposes, such as coordination of steering boards (Board Vantage) that includes strong authentication, control of versions etc.

In order to take all advantages of intranet, organizations implement this technology for support to team collaboration including file sharing, document publishing and group discussion. However, these applications compete directly with conventional groupware products, such as Lotus Notes. Recent integration of groupware functions into webware (and vice versa) suggests that webware and groupware technologies are beginning to join.

Therefore employees who work on intranet get effective support for team collaboration and efficient access to databases in corporate distributed environment increasing their individual and organizational performance. Some studies (Norzaidi et al. 2008, 37-47) with regression analysis are achieved to approve effects of intranet collaboration platform on factors of performance. Results of the studies have showed that organizations with high degree of collaboration based on intranet have achieved participation of employees and increase of performance. Finally intranet collaborative system is useful only if enables employees to adopt work approach contributing to business performance.

For information technology such as intranet basic advantage is set of standardized communication capabilities for accomplishment of daily collaborative business activities with lower costs. Intranet is network technology so that advantages can be achieved only when critical mass of users and connected devices are reached. In organizations with higher degree of intranet implementation, number of intranet users is nearer to this critical mass than in organizations with lower degree of intranet implementation. In other words first kind of organizations more rapidly identify promised appropriatenesses of intranet in improving work performance of individual employees and overall organizational business performance as well.

Intranet can be used as a collaborative and communication platform for knowledge management in an organization. It improves knowledge exchange among employees and becomes organizational memory. There is strong correlation between collective intelligence of organization (dynamic balance of all its dimensions) and its performances on markets. Ideally, intranet is platform for knowledge management that increases productivity, supports decision making and helps the organization in case of loss of its key employees or teams. Successful knowledge management depends on contribution of all organization members. In order to intranet serves as a environment for knowledge management, degree of participation of the members should be high. (Ridings, Wasko 2010, 95-120)

Great difficulty is to record knowledge and to enable the knowledge to be available and accessible on intranet. Usually knowledge is exchanged without technology (on the meeting tables, near coffee machines etc.) but when the technology is involved possibility

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of scanning, archiving and distributing knowledge is made. Databases, documents like reports, email messages or web pages represent knowledge. However, there is following challenge: How to scan more knowledge and how to make the knowledge widely accessible on intranet? Key factors of success in solving the challenges are: high degree of participation and collaboration, involvement of users, trust and autonomy.

For members of an business organization, intranet is platform for archiving, sharing and searching information and knowledge and tool for better collaboration. Consequently, ideal intranet from users' point of view has following features:

- it saves on one place all information needed for projects, anyone can easily find the information and contribute to existing information,
- exchange of ideas and discussions are made by using computers,
- work can be done on asynchronous manner even remotely from home, on trip etc.
- participants in a project has available memory of the project that is accessible,
- business activities can be monitored by access to history of changes related to concrete activity,
- participation in this shareable knowledge space improves social skills,
- collaborative tools have to be simple and to pursue readers to become writers.

5. Conclusion

Intranet is local and private computer network of some institution, firm or organization. Intranet is based on web technology, particularly communication standards such as internet protocols. Protocols are rules that two sides in communication have to accept and use in order to establish and realize communication. TCP/IP (Transmission Control Protocol/Internet Protocol) protocol is most often used due to it enables easy and simple definition of addresses and connection to internet. Access to intranet is limited on users inside an organization.

Collaborative intranet platforms support communication through various devices and channels. The platforms offer set of software components and services enabling users to find each other and information they needed, communicate and work together on achieving common aims. Basic elements of collaborative intranet platforms are: messages, team collaboration, real time communication and collaboration and social computing. Therefore, intranet can be used as a collaborative and communication platform for knowledge management in an organization. It improves knowledge exchange among employees and becomes organizational memory. Great challenge is to record knowledge and to enable the knowledge to be available and accessible on intranet. Thus, for members of an business organization, intranet is the best platform for recording, archiving, sharing and searching information and knowledge and tool for better collaboration.

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INTRANET KAO KOMUNIKACIONA I KOLABORATIVNA PLATFORMA ZA PODRŠKU ELEKTRONSKOM POSLOVANJU

Rezime: *Intranet je generički pojam koji znači skup privatnih računarskih mreža unutar jedne organizacije. Intranet koristi web tehnologije kao alat koji omogućava i olakšava komunikaciju i saradnju između ljudi ili radnih grupa i unapređuje deljenje informacija i znanja između zaposlenih u organizaciji. Danas mnoga preduzeća slede iskustva vodećih korporacija u korišćenju intranet tehnologije za podršku elektronskom poslovanju u domenu komunikacije i saradnje. Ovaj rad tretira intranet kao komunikacionu i kolaboracionu platformu i analizira osnovne aspekte implementacije i korišćenja intranet tehnologije u elektronskom poslovanju preduzeća.*

Ključne reči: *Intranet, elektronsko poslovanje, web tehnologija, kolaboracija, komunikacija*