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### BUSINESS APPLICATION OF INTRANET TECHNOLOGY - THE CASE OF „HYDROELECTRIC PLANTS DJERDAP“

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***Abstract:** Management of every organization has responsibility to identify information and knowledge needed in organization and according these needs to develop or improve appropriate information systems and tools. Intranet technology provides reach set of tools for creation of collaborative environment supporting users to communicate, exchange of ideas, share information and knowledge and work together on common projects and tasks. Increasing number of organizations implement and use intranet for internal communication, collaboration and information and knowledge sharing. In this research, case of Serbian public enterprise producing electric power that is implemented intranet portal is presented. The focus of case analysis is on how information is designed and organized on intranet portal and what services are offered to users. Also the research gives theoretical background considering features, applications, advantages and disadvantages of intranet technology.*

***Keywords:** Intranet technology, electronic business, web portal*

#### 1. Introduction

In everyday business activities, employees are faced with various data that can be processed and interpreted in order to be transformed in information and knowledge and useful for purpose of decision making. Data and information are dispersed on various locations in an organization, provided in various circumstances and so often unreachable for end-users. In modern business, management of organization search for way how right information and knowledge to be presented and distributed to users. Information and knowledge should be distributed on simple, fast and efficient way in order to meet users' needs. Use of information and communication technologies supports achievement of this aim. Intranet technology is particularly useful for presentation and distribution of information and knowledge to employees of organization as end-users. Presentation or publication of information on intranet enables knowledge management of organization and access to various contents. Employees have possibility for personal and professional development and improvement of abilities, knowledge and skills. (Pan, Hsieh, Chen 2001, 179–195)

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Intranet is private network of an organization that uses internet standard protocols enabling simple communication, collaboration and information access. Whereas that intranet is based on web technology, it is often called corporate web. Intranet is private network in ownership of some organization, while internet is public network that is not property of any organization and institution. Internet can be accessed by every person who has technical capabilities for access while intranet can be accessed only by persons who have authorization for access. (Molly et al. 2011, 645-652)

As we already mentioned, increasing number of organizations use intranet for internal communication, collaboration and information sharing (Kamel 2006). Also, software firms are focused on this technology, so that many contemporary business applications are based on it. Hardware and software support is more and more standardizing with aim to make possibility for rapid, simple and quality application of intranet technology. This standardized support facilitates development of intranet applications and the use of applications in every form of business communication as well. Obviously, this IT (information technology) is becoming more and more important and probably it will be dominant concept of information systems (IS) development in the future (Butler 2003, 209–231). Advantages of this approach to implementation of company local computer network and IS development are numerous and this paper considers some specific aspects of intranet implementation and use.

Main aim of this research is to analyze features, applications, advantages and disadvantages of intranet technology. Also application of this technology is presented on the example of Serbian public enterprise for producing hydroelectric power (Hydroelectric plants Djerdap). The enterprise has implemented intranet web portal in order to improve communication, collaboration and information sharing. Therefore, case study methodology is used to analyze design of this web portal and its possibilities and services.

The research is structured in seven sections. In next section, features of intranet technology is explained while third and fourth sections are dedicated to advantages and disadvantages of this technology respectively. Fifth section analyses applications of intranet technology and sixth section presents these applications on the example of mentioned Serbian public enterprise. In seventh section, concluding remarks on intranet applications are given.

## **2. Technical Features of Intranet**

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. 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. General illustration of an intranet is shown on figure 1. (Turban et al. 2006).

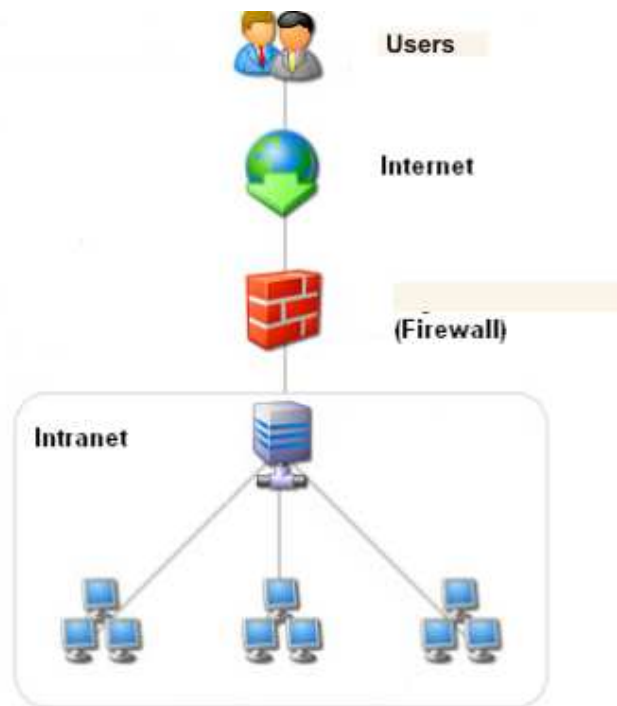
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Main problem related to intranet technology is security and protection of data and resources from unauthorized persons who want to access to intranet without permission. Presently, many security methods are used and well known are firewall and IP tunneling.

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.

Tunneling is technique that is used when employees access to intranet from home or trip. In fact, it is protocol that enables connection to local network of organization through internet with data protection. (Yoo, Choudhary, Mukhopadhyay 2011, 145-170)

**Figure 1. Configuration of a typical intranet**



*Source: Turban et al. 2006*

Although organizations use internal local computer networks for management and coordination of internal business processes for years, intranet is rapidly becoming basic technology of electronic business. Intranet is inexpensive and appropriate for extension or reduction that depends on changeable needs of organization. In addition, it can be accessed from mostly computer platforms. Whereas the most big organizations have many incompatible and heterogeneous computer platforms, intranet technology obtains instantaneous connectivity uniting all computers in one virtual network system. (Guaah 2006, 8-16)

### **3. Advantages of Intranet Technology**

Use of intranet in everyday business activities has many advantages and benefits. One of the most important benefit is improved communication. Intranet is used as significant tool in vertical and horizontal business communication. Chat, e-mail, forums and blogs serve in making agreements, exchange of attitudes and collaboration of employees. Employees can collaborate online, plan, project and develop business activities in real-time no matter that members of business team can be in different geographic locations. (Duane, Finnegan 2003, 133–158)

Intranet technology supports improvement of productivity enabling users to access to applications relevant for their role in organization, to access rapidly to information of great importance for their responsibilities and tasks. Applications and information can be accessed from any workplace regardless of physical location of users.

Organizations can publish documents on intranet so most updated version of documents are available to employees. By web browser, users can access to information anytime and from everywhere according security procedures. The access is possible to every database to which users have authorization for access. Thereby capability of employees to achieve working tasks more precisely, rapidly and with reliable and verified information increases. In addition, trust in management of organization increases because employees have right on information.

By web browser, it is possible to view documents (many users can view same document) so printing and mimeographing costs are reduced and in the same time environment is protected. Intranet facilitates making of important decisions, saves time and increases productivity. By publishing data on local network, maintenance and retention of organizational knowledge and access to this knowledge is enabled. Employees can view manuals, guides and standards and attend on-line education programs by web technology.

### **4. Disadvantages of Intranet Technology**

In many organizations, there are workplaces where employees have not computer and so they can not access to intranet. Some managers still do not recognize potentials of intranet technology as a tool for promotion and making success of their organizations.

Some intranet portals are designed that have too much content so it is very confused for users. Intranet web pages are not visited so much because of following reasons: outdated content, over secured web pages, frequently changed web addresses etc.

Negative influence of intranet use is also related to information overload because amount of data stored in intranet servers have been increasing. Intranet can endanger privacy of users and cause manipulation and abuse. For example, when an user logs in intranet, he is instantly identified and administrators can detect his activities on network.

Communication through intranet without direct contacts between employees results in isolation and alienation of individuals. Problem is how to motivate and encourage employees to actively participate in exchanging of information and ideas and give their knowledge and how to prevent unproductive use of intranet and internet.

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Publication of information has to be controlled so that only precise and appropriate information is published. Also, there must be rigorous security requirements so that unauthorized use of intranet is prevented.

All these issues explained here should be resolved in the future. Some of problems are technical and technical improvements in domain of implementation and use of intranet are continuously taking place. However, issues related to human factors require more attention. The issues are going to be solved by advances in domain of training and learning of users. (Zhenhui et al. 2010, 34-59).

### **5. Basic Applications of Intranet Technology**

Applications designed for intranet usually use same technologies which are used for development of web pages. Common technologies and standards facilitate migration of all intranet applications on internet or only some applications dedicated to wide publicity.

Data transfer through local network is faster than transfer through internet, so intranet applications are executed more faster than internet web applications. This situation makes possibility for use of more various technologies and data formats which are not acceptable on internet where bandwidth is lower. Internal applications based on web pages can be made interactive by use of various media, such as text, audio and video. Intranet applications take priority in comparison to desktop applications because the applications enable data access from every computer inside local network and from the other environments through internet as well. For example, an user can finish started work by connecting to intranet application through internet from home. Intranets are extended to all main business functions allowing organizations to manage more and more business processes electronically. (Turban et al. 2006)

Therefore, basic applications of intranet technology are:

- **Exchange of information between employees.** Traditional forms of communication in organizations (bulletin boards, circular letters, etc.) are replaced by electronic mail. It is simpler and less expensive to send message or report to all who need it by e-mail and without use of paper. Various memorandums, invitations for meetings and documents in progress that should be finished also can be sent on this way. There is record of every contact that is not case when employees use telephone. Team or group of people working on same project can discuss easily, send materials and accelerate work on the project.
- **Support to collaboration, decision making and management.** Through intranet, employees can send their proposals on consideration, suggestions for technological and business processes improvement, notices on work organization and inappropriate behavior of colleagues and managers. Thereby management of organization is informed about ideas and attitudes of employees and ready for timely reaction to occurring problems. Also the management can adjust business plans to proposals and suggestions of employees.
- **Generation and distribution of business documentation.** Electronic exchange of documents is based on messages which are standardized so that have form of business documents (for example, working orders, bills of lading, delivery notes, invoices, etc.). If software application that creates these documents in electronic

form connected to e-mail application than electronic exchange of these documents is enabled through internet. This solution significantly reduces costs of documents manipulation and accelerate work.

- **Electronic publishing.** By application of intranet, all documents in updated state can be available to all employees of organization regardless of their location. Thereby, documents and the other written materials must not be printed and distributed in paper form that reduces costs. These electronic documents and materials can be printed on demand in certain number of copies that is required. All kinds of documents such as annual reports, product and service catalogues, manuals, information on new products, laboratory results, internal journals, etc., can be published on intranet.

## **6. Application of Intranet Technology in „Hydroelectric Plants Djerdap“**

HE Djerdap (the full name of enterprise is Hydroelectric plants Djerdap d.o.o.) from Kladovo is public enterprise for production of hydroelectric power and it is part of larger public enterprise „Electricity power industry of Serbia“ (Elektroprivreda Srbije). Except production of hydroelectric power, the enterprise gives services in river and lake traffic (support of ships movement through canal locks). HE Djerdap (<http://www.djerdap.rs>) produces hydroelectric power in four locations in Serbia: Kladovo, Negotin, Pirot and Surdulica.

Main mission of the enterprise is to obtain technical and economic unity of electric power system and its efficient and effective operation. In that sense, internal organization of HE Djerdap is based on following principles: functional divide of work, coordination of basic business activities, grouping of similar and related activities in appropriate organizational parts, efficient management of work processes and optimal use of knowledge and skills of employees. (Informator o radu 2011)

According these principles, the enterprise have implemented organizational structure and created following organizational units: manufacturing unit; unit for economic, financial and commercial activities; unit for juridical and administrative activities; unit for modernization and revitalization, unit for coastal maintenance and unit for corporate support. Inside unit for corporate support there is center for informatics that is responsible for development, implementation and maintenance of the enterprise information systems.

Integrated management system of HE Djerdap complies with three international standards: OHSAS 18001:2007, ISO 14001:2004 and ISO 9001:2008. OHSAS 18001 is the internationally recognized standard for occupational health and safety management systems. ISO 14001:2004 is international standard for environmental management system (EMS) and refers to the management of the enterprise's environmental programs in a comprehensive, systematic, planned and documented manner. Finally, HE Djerdap is adopted quality management system (QMS) complying with ISO 9001:2008 standard. For all these systems, the enterprise has received certificates from SGS, Zurich, Switzerland. (Politika kvaliteta)

Considering QMS, HE Djerdap enforce quality policy that provides high quality in all domain of business. One of primary focus of this policy is costs optimization. Therefore, contribution to costs optimization can give intranet technology supporting reduction of communication costs. Consequently, HE Djerdap has implemented intranet in order to facilitate exchange and distribution of information.

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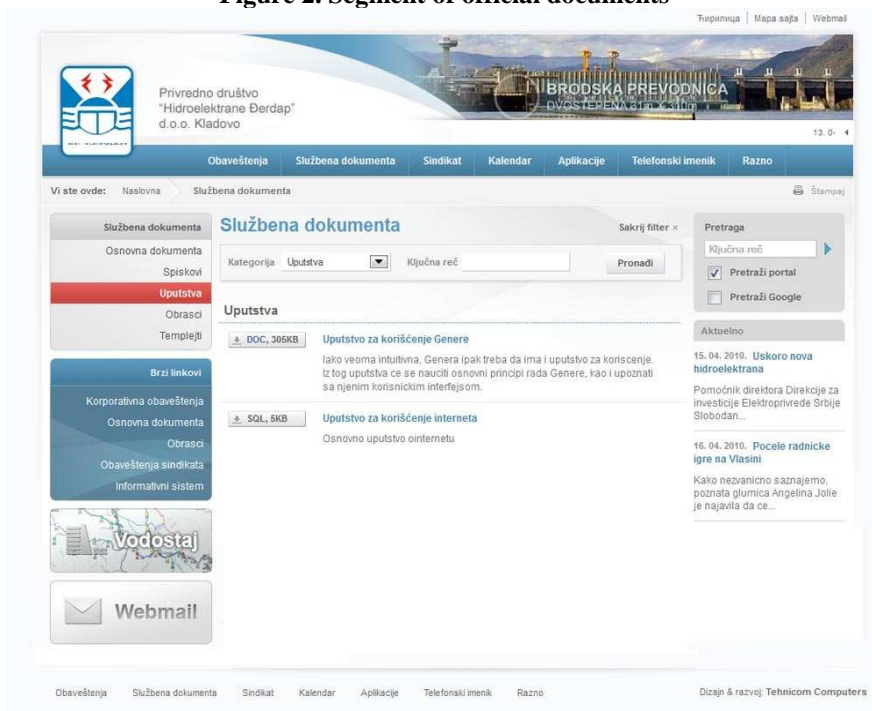
Krojac d.o.o (firm for web design) in collaboration with center for informatics of HE Djerdap has developed intranet supporting internal communication needs of this public enterprise. Business of Krojac (<http://www.krojac.com>) is directed to development and improvement of internet business models of Serbian most significant organizations. The software firm gives consulting and training services and offers various solutions for web projects. Also, the firm is official Apple Regional training center.

Intranet services of HE Djerdap is based on internal web portal that is designed for improvement of internal informing of employees. This portal unites all communication channels which are used by more of 1000 employees in 7 organizational units. The intranet services enable sharing and exchange of common information resources and facilitation of business activities by system of electronic scheduling. .

Content of the portal is designed and organized in seven segments: notices (Obaveštenja), official documents (Službena dokumenta), trade union (Sindikata), calendar (Kalendar), applications (Aplikacije), phone directory (Telefonski imenik) and various information (Razno). Content of the intranet portal can be searched by search engine where user can enter keywords for searching. (Hidroelektrane Djerdap)

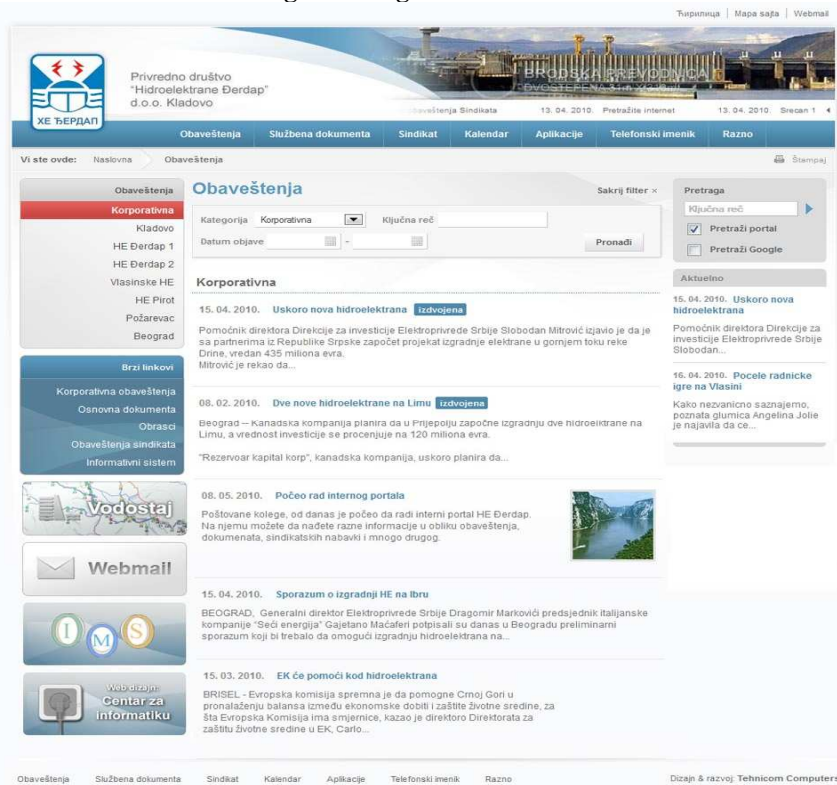
Segment of official documents, presented on figure 2 encompasses the all most important documents, such as lists, manuals, forms, document templates, etc.

Figure 2. Segment of official documents



Segment of notices shown in figure 3 enables synthetic review of all information and news from the all organizational units of enterprise.

Figure 3. Segment of notices



Intranet portal is connected to IS of HE Džerdap so users can access to databases and some business applications, such as e-mail, evidence of working time, report to shift supervisor, as we can see on figure 4.

Figure 4. Connection of web portal to business applications





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Intranet portal of HE Djerdap contains several additional services for employees such as weather forecast (presented on figure 5), water level and currency list.

Figure 5. Web page of portal presenting weather forecast



Finally, except these presented segments of intranet portal of HE Djerdap, there are following useful segments:

- **Trade union.** This segment of services supports operation of trade union and communication with members of union. It enables exchange of documents, records from meetings, requests of members, official decisions of union, etc.
- **Telephone directory.** This web page of intranet portal presents contact information on all employees in the enterprise. Service of searching this information according organizational units and sectors is offered on the page.
- **Calendar of events.** This service enables rapid and simple review of various events in the enterprise.

## 7. Conclusion

Intranet is private network of an organization based on internet standard protocols enabling communication, collaboration and information access. Organizations can publish documents on intranet portals so the most updated version of documents are available to employees. Employees can access to the documents anytime and from everywhere by ordinary web browser. Also intranet makes collaborative environment that enables exchange of information and knowledge and coordination of activities related to common projects of employees. Therefore, use of intranet has many advantages such as improved

communication and collaboration, increased productivity of employees, efficient and effective use of organizational knowledge and reduced cost. Although security problem in using of intranet still exists, many organizations have implemented intranet portals in order to achieve these benefits. This was case with Serbian public enterprise „HE Djerdap“ that produces hydroelectric power. The enterprise has adopted integrated management system that is based on international quality standards. Important part of this system is intranet infrastructure which can be used for access to web portal containing significant information and applications for employees. Thereby, the enterprise has improved communication, collaboration, information access and reduced printing and mimeographing costs.

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**POSLOVNA PRIMENA INTRANET TEHNOLOGIJE – PRIMER  
„HIDROELEKTRANE ĐERDAP“**

**Rezime:** Rukovodstvo svake organizacije je odgovorno za identifikovanje potreba za informacijama i znanjem i za razvoj ili unapredjenje informacionih sistema i alata koji će zadovoljiti te potrebe. Intranet tehnologija obezbeđuje bogat skup alata za kreiranje okruženja koje će pomoći korisnicima u saradnji, komunikaciji, razmeni ideja, deljenju informacija i znanja i radu na zajedničkim projektima i zadacima. Sve veći broj organizacija implementira i koristi intranet za internu komunikaciju, saradnju i deljenje informacija i znanja. U ovom istraživanju, prezentiran je primer srpskog javnog preduzeća za proizvodnju električne energije koje je implementiralo intranet portal. Analiza ovog primera je fokusirana na to kako su informacije dizajnirane i organizovane na ovom portalu i koje usluge nudi korisnicima. Takođe, ovo istraživanje daje teorijsku osnovu koja se odnosi na karakteristike, aplikacije, prednosti i nedostatke intranet tehnologije..

**Ključne reči:** Intranet tehnologija, elektronsko poslovanje, web portal