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## KNOWLEDGE DSS FOR REAL ESTATE

**Abstract.** One of the major problems in Internet based information systems is to find what you want. The number of alternative products and services on the Internet are in the thousands. How can customers find the rational products and services on the Internet? Once product or service information is found, the customer usually wants to compare alternatives. There are five types of aids to comparison shopping: search on hypertext files by agents, search alternatives on databases, alternative search and tabular comparison, comparison of alternative products and services from multiple malls, search and multiple criteria decision-making. The authors have developed Knowledge DSS for Real Estate. Proposed Knowledge DSS for Real Estate can create value in next important ways: search for real estate alternatives, finding out alternatives and making an initial negotiation table, multiple criteria analysis of alternatives, negotiations based on real calculations, and determination of the most rational real estate purchase variant.

**1. Introduction.** Explicit knowledge belongs to the group of the traditional resources of a real estate company. Knowledge is the integrated sum of physically intangible resources, the bigger part of which is tacit: skills, competences, experiences, organizational culture, informal organizational communication networks and intellectual capital of an organization. It is frequently believed that the utmost knowledge resource leaves the real estate organisation at end of each working day in the heads of employees. Capturing the tacit knowledge of individuals in a way that can be leveraged by real estate companies is perhaps one of the biggest challenges in real estate sector. For real estate companies that successfully tap into this invaluable information source, there's tremendous payoff in improved customer results.

One of the main role of explicit and tacit knowledge management in real estate sector is sharing best practice. Throughout the world there are many examples of the adoption of the best practice by the major players (appraisal services, brokers, consulting, facility management, insurance, matching/listing services, mortgages, property management, project development, real estate finance, real estate's transaction process, and relocation services) in real estate.

The authors of this paper participated in the project Framework 6 “Intelligent Cities” (INTELCITIES). The main objective of INTELCITIES is to create a new and innovative set of interoperable e-government services to meet the needs of both citizens and businesses. One of the INTELCITIES’s goals (from Lithuanian side) was to develop a Knowledge DSS for Real Estate (KDSS-RE) which can use best practice, explicit and tacit knowledge.

The paper is structured as follows. Following this introduction, Section 2 outlines explicit and tacit knowledge in a real estate sector. In Section 3 we describe best practice in a real estate sector and Multiple Listing Service Systems. The development of a Knowledge DSS for Real Estate is introduced in Section 4. Finally, some concluding remarks are provided in Section 5.

**2. Explicit and Tacit Knowledge in a Real Estate Sector.** Explicit knowledge is comprised of documents (appraisal reports, balance sheets, buy-sell agreements, insurances, market analysis, contracts, declarations, etc.) and data that are stored within the memory of computers. This information must be easily accessible, so that a real estate organization could receive all the necessary knowledge without disturbances. Explicit knowledge is information that is widely used in information technologies.

The main real estate organizational knowledge is tacit. The creation and distribution of tacit knowledge requires creativity and competence. Tacit knowledge is a mixture of informal and non-registered procedures, practice, skills, deliberations, subjective insight, intuition and judgment that employees acquire by virtue of their experience and expertise. This knowledge is vitally important because it defines the abilities and experience of employees. Tacit knowledge represents an important intellectual resource that cannot easily be duplicated by competitors. Tacit knowledge must be converted into explicit knowledge so that it can be recorded. Recorded knowledge is static and can soon become outdated. Innovative real estate organisations establish an environment where knowledge is continuously created, captured and disseminated.

The transfer of tacit knowledge is unverifiable and requires face-to-face contact, creation spatial nearness significant. Creating and sharing tacit knowledge are basically social activities. Therefore the key to effectively capturing tacit knowledge within a real estate organization is to precisely find the right expert to solve that particular task. Expertise management becomes a central principle of tacit knowledge. Experts can share information about a current issue, problem, or topic through meetings, workshops, seminars, video conferencing, e-mail, intranet based discussion groups, extranets, telephone, working on joint projects, coffee conversations, canteen

discussions, brainstorming sessions. For example, via regular meetings know how can be transmitted among group members, communities of practice can help drive strategy, solve problems quickly, transfer best practices and develop new skills.

Experience allows the expert to transform information (dwelling economic, technical, infrastructure and qualitative characteristics, market survey, etc.) into work product (i.e., calculation of market value of dwelling) that is delivered to a client. The task is to get this tacit knowledge out of the mind of an expert and capture it in a form that can be used by clients – traditionally, in the form of the calculations and written word.

To convert tacit knowledge into explicit knowledge, it must be extracted and formatted. Some tacit knowledge systems use the natural learning questions WHAT-HOW-WHY and codifies the answers in a specific knowledge structure which can easier for stakeholders explain what they do, and how they get good results. Most advantage real estate organisations have focused on tacit knowledge which routinely conducts sessions between knowledge management staff and real estate employees to capture tacit knowledge acquired during a matter. This knowledge may then be converted into multiple forms of explicit knowledge, such as methodologies, precedent documents or a record of newly acquired skills and expertise. Different knowledge capture techniques (interview, on-site observation, brainstorming, protocol analysis, consensus decision making, nominal-group technique, Delphi method, concept mapping) can be used to capture tacit knowledge and writing down tacit knowledge in the form of appraisal reports, buy-sell agreements, market analysis, contracts, methodology. Once knowledge is captured or codified it's no longer tacit.

Different harvesting the tacit knowledge of experts and placing it in explicit form systems can be used in the practice. LearnerFirst [9] is a company that specializes in harvesting the knowledge of experts and incorporating it in computer-based learning resources. These learning resources encapsulate the tacit knowledge of an expert, placing it in explicit form. The process is akin to the more familiar Knowledge Engineering activity in the Expert Systems field. The resulting software from the process is designed so that an individual can simultaneously understand, learn, perform, and record the performance in a single action. In this sense, it can be classified as an Electronic Performance Support System [9]. According to Mitri [10], the problem of tacit knowledge capture is a central theme in the field of knowledge management, and assessment management can be thought of as a form of knowledge management. Therefore, tacit assessment management can be facilitated through technologies commonly used in knowledge management systems such as databases, Internet architectures, artificial in-

telligence, and decision support techniques. Mitri [10] describes tacit performance assessment in the context of knowledge management and presents a prototype decision support system for managing tacit assessment knowledge using knowledge management techniques.

Knowledge management systems facilitate the storage, registration, organization, filtration, analysis, collection and distribution of tacit knowledge. One of the main role of knowledge management in real estate sector is sharing best practice.

**3. Best Practice in a Real Estate Sector and Multiple Listing Service.** Much more attention has to be paid to knowledge creation and its distribution in the form of the knowledge and data bases of best practice, and this has recently begun in the most progressive activities of real estate sector. Throughout the world there are many examples of the adoption of the best practice by the major players in real estate. Some of their works are presented in the following list: appraisal services, brokers, consulting, facility management, insurance, matching/listing services, mortgages, property management, project development, real estate finance, real estate's transaction process, and relocation services, etc.

Search, storage, management and improvement of the best practice, and the best practice knowledge and data bases created on their basis, is one of the newest priorities of real estate sector in most advanced countries.

Comparative analyses of the best practice are becoming more popular in the real estate sector. Comparative analyses are based on the analysis of the best examples of services available to clients. On the basis of comparative analysis, certain recommendations are formed, indicating how to provide services of higher quality and how to better serve the needs of clients. Comparative analyses provide the possibility to quickly and efficiently understand and apply the methods, which could help to achieve the quality of client service at a world-class level. The best practice in the real estate sector is obtained in different ways, e.g. applied research, wisdom and experience stored by practices, experiences of clients and other stakeholders, and opinion of experts, etc. Real estate databases and knowledge bases of the best practice are knowledge-obtaining tools, which allow one to save a lot of time, provide information on the best real estate practice in different forms (appraisal reports, buy-sell agreements, insurances, market analysis, contracts, declarations, e-mail messages, slide presentations, text, video and audio material).

Stakeholders in the real estate sector most often are trying to achieve different economic, maintenance, facilities management, comfort, technical, technological, social and other aims. Different means could be used to achieve them. Some aims are not so easy to be achieved, and others might

require more expenses. The best practice allows one to not limit oneself only to the implementation of economic aims; it creates conditions to reach a higher level and realise, from what perspective this practice was named as the best one. The main problem of many best practices is the way they are presented, i.e. they are suggested, by not taking into account certain situation.

Comparative analysis systems of the best practice help real estate sector companies to determine directions of priority for their increase in activity efficiency and ways of determining achieved progress, which allow one to compare the performed activities with existing activities in other organisations; as well as, determining the spheres that are lagging behind and suggest tools to eliminate these gaps. Modern real estate companies know how to use the possibilities of a comparative analysis, and therefore decrease their expenditure and increase competitiveness.

In order to demonstrate the application of the best practice in real estate sector a Multiple Listing Service (MLS) systems will be considered below as a sample. The trends of MLS systems were investigated by researchers from various countries [1–3, 7, 8, 11–14].

MLS systems have produced outstanding results in different countries and could be adapted for Lithuanian and other countries. A multiple listing service benefits both the buyers who have access to the maximum numbers of listings and the sellers, who are assured the maximum number of potential customers, according to real estate officials. The property Multiple Listing Service (MLS) system was introduced at the end of the last century in the US; afterwards it has been extended to the most of the countries in which the free real estate market exists. The MLS enables introducing complex services on the local real estate markets, linking brokers operating on this market [7].

A service created and run by real estate professionals which gathers all of the property listings into a single place so that purchasers may review all available properties from one source. The MLS also deals with commission splitting and other relations between brokers and agents.

Majority of MLS contains data on various types of real property objects, offered for sale and lease. The MLS may increase efficiency of business of the MLS members, allow the MLS members to occupy a special place on the market, assist to realtors in search of information about sale of compatible facilities, accelerate and facilitate purchase and sale of property by customers, provide precise statistical data about the market and information on the trends and become a valuable source of income for the association [11]. At present the developed MLS don't allow for the performance of the following functions: multiple criteria analysis of alternatives (priority, utility degree and market value of the analysed real estate alternatives), ne-



gotiations and determination of the most rational real estate purchase variant based on real calculations. In order to demonstrate above functions practically a Knowledge DSS for Real Estate developed by authors will be considered below as a sample.

**4. Conclusions.** By finding, capturing, and sharing explicit and tacit knowledge, real estate companies can significantly improve customer results. One of the main roles of explicit and tacit knowledge management in the real estate sector is sharing best practice. Throughout the world there are many examples of the adoption of the best practice by the major players (appraisal services, brokers, consulting, facility management, insurance, matching/listing services, mortgages, property management, project development, real estate finance, real estate's transaction process, and relocation services) in real estate. In order to demonstrate the application of best practice, explicit and tacit knowledge in a real estate sector a Knowledge DSS for Real Estate (KDSS-RE) will be considered as an example.

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