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The contribution of Information Technology to Science, Economy, Society and Education

eRA-5

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Editorial

The "eRA-5" Proceedings reflect the innovation procedure that has been undertaken by universities, research centers, enterprises and researchers in the field of Information Technology. The results of this procedure have been presented in the "eRA-5" International Scientific Conference at T.E.I. of Piraeus, Greece, during 15 - 18 September 2010. This volume contains 76 papers, for the contribution of Information Technology to Science, Economy, Society and Education and for the International synergy in Energy, Environment and Tourism. The papers have been reviewed by members of the Scientific Committee of the Conference and all needed revisions have been requested.

We think that the most of primary aims of the Conference have been satisfied. This fact leads the way to the "eRA-6" International Conference at Piraeus on 21 – 24 September 2011. We hope that this fourth conference will be of higher quality than the previous one and contribute in innovation and improvement in a wider context and to the improvement of international collaboration in the above fields.

The Editor

Prof. D.I.Tseles

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Contents

50 Digital libraries as knowledge management systems

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Abstract

This paper presents the results of two questionnaire instruments, one for knowledge sharing attitudes among librarians and one focused on digital libraries as knowledge management systems. The results derived from surveys undertaken in four European countries, indicate a positive attitude of librarians towards accepting digital libraries as knowledge management systems. Librarians also exhibit stronger intrinsic rather than extrinsic motivation to share knowledge in the workplace.

50.1 Introduction

Electronic content explosion has become a force of change for traditional library practices and it —has challenged the status of the library as the only provider of information (Sarrafzadeh, Martin & Hazeri 2010, p. 198). The advancement of digital technologies expanded libraries from physical brick and mortar entities to libraries without walls. Marchionini, Plaisant and Komlodi (2003, p.123) consider DL as the logical extension and augmentations of physical libraries in the electronic information society.

In an effort to provide their patrons with a broad array of electronic resources libraries are increasingly seeking ways to integrate digital collections, which alongside with traditional print collections offer a comprehensive knowledge source base for research, learning and instruction.

The term digital libraries -encompasses a wide range of working systems and research prototypes, collections of information and documents, and technologies‖ (Van House, Bishop, and Buttenfield 2003, p.1) and thus extends its scope in several directions. From the community of library and information science viewpoint the Digital Library Federation (DLF) states that —Digital Libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities".

According to experts KM is holding the —core position in Digital Libraries‖ (Shuchun nd) and though DL cover the needs of contemporary users they are —not so efficient without effective Knowledge management‖ (Shuchun nd). Rydberg-Cox, et al. (2000), equate KM to -the new document delivery and knowledge management tools‖ in a digital library while Infield (1997) poses that KM is ‖the biggest thing to hit the information profession since the internet‖. Ponzi identified the top 10 interdisciplinary influences of KM in rank order with the library and information science holding the fourth position (in Wallace 2007, p.5).

According to Dillon the definition and viewpoints on KM are so many that it —makes a consolidated understanding of the core concept difficult and that none of the definitions is fully satisfactoryll (in Wallace 2007, p.3).The Encyclopedia of Library and Information Science defines KM as —a management practice that uses an organization's intellectual capital to achieve its organizational missionll (Clair 2003, p. 1486).
KM originated in the business sector in the beginning of the 1990's with a goal to -make full use of the knowledge existed in a corporation to increase the productivity and/or operational efficiency so as to build an edge in the competitionll (Wen 2005). Research by Roknuzzaman, Kanai and Umemoto (2009, pp. 379-380) has shown significant overlaps between DL and KM. They hold the same *objective* of providing users with access to knowledge resources. Date, information and knowledge are the main *content* resources they provide. *People* are the key actors in the organizational processes and the main users of information and/or knowledge systems. Both KM and DL follow the same *process* of acquisition, processing, organization, storage, retrieval and dissemination of information and/or knowledge for its proper utilization. Finally, the use of *technology* tools and techniques such as indexing, taxonomies, codification, metadata, data mining, database management, knowledge mapping techniques, etc. are being used for the management of contents and their retrieval.
Organizations which employ KM values develop a knowledge – based culture, promotion of knowledge sharing, innovations in DL services and a strong leadership position for Digital Libraries (Roknuzzaman, Kanai, Umemoto 2009, p. 372). Cultivating a knowledge sharing culture is difficult and it is primarily a principle fostered by the organization. A concern in organizational knowledge sharing as expressed by Ghosh and Jambekar (2003, p.9) is that people —might not be willing to share negative experiences and lessons learned based on failure because of their negative connotationll but llthese problems can be overcome with the effective utilisation of traditional resources (manpower, materials and money) as well as information and knowledge resourcesll. It was also evident from previous research that -library staff acknowledges that the new digital working environment affects the way in which they share knowledge and recognize the importance of the role of intrinsic motivation in knowledge sharingll (Garoufallou et al. 2009).

50.2 Aims and Objectives

Σhis research paper investigates the results of two surveys. The first survey examines whether the establishment of knowledge distribution mechanisms or sharing environments is a familiar territory for librarians. Librarians traditionally created knowledge distribution systems for their users. The question is do they share knowledge between themselves? How librarian's knowledge sharing values as well as intrinsic and extrinsic motivation are influenced by the shifting IT environment?
The second survey investigates the hypothesis of whether DL are considered as KM systems. The objectives are focused on recording how familiar are librarians with the developing KM and sharing concepts and how those concepts are interrelated and connected with digital libraries. The survey also outlines the various positions of librarians on the elements of KM systems which contribute to the successfulness of digital libraries.

50.3 Methodology

The paper presents the results of two online surveys distributed in 2010 by Deltos Research Group (http://www.deltos.org). The surveys were carried out in four European

countries: Greece, Czech Republic, Malta and Cyprus. The first survey was on knowledge sharing attitudes among librarians and the second focused on DL as KM systems. Both of the instruments incorporated items following a seven point semantic referential scale, and it was circulated via e-mail. The analysis included comparisons on the mean values of all variables, examining each country's participants' perceptions on both topics. Furthermore, a set of Spearman's tests were also performed for checking any correlations between the factors that motivate knowledge sharing attitudes on the one hand, and on the other those factors that influence the effectiveness and efficiency of digital libraries as KM systems. The data collected were analyzed using SPSS.

50.4 Results

The total number of respondents in the survey on DL as KM systems was one hundred twenty nine (129). Most respondents, forty eight, were from Greece, thirty eight from Cyprus, twenty five from Malta and eighteen from the Czech Republic. The following table provides the mean percentages to the questions. On a scale of one to seven opinions reflect positive or favourable opinions on whether DL can be used as KM systems and what elements are considered as more important in a DL. The results revealed that the majority of the participants were neither positive nor negative on their opinion of whether DL can be considered as KM systems. It could be estimated that in these 4 countries DL are still under development and possibly their application is yet measured as repositories and not in correlation to KM systems.

At the question of -What elements should be considered in creating an effective KM system within a digital library‖ the results showed that crucial factors considered are —technology support‖ with total sum of positive answers (5-slightly agree to 7-strongly agree) 94.7%, followed by -rich metadata description‖ (86.8%), —understanding user needs‖ (83.7%) and -good knowledge of subject‖ (79.1%). The factor —Strategic plan establishment‖ and the designing of a DL collected distributed opinions varying from slightly disagree to slightly agree. A guesstimate of the first two high percentages can be that the libraries in these four countries are still struggling with succeeding negotiations with IT departments for getting the necessary DL technological support and with acquiring an adequate number of staff for working specifically on enriching the metadata description of the DL records.

Digital libraries as KM Systems	Percentages						
	1	2	3	4	5	6	7
Do you think that digital libraries can be used as Knowledge Management Systems?	0%	0%	0.8%	33.3%	11.6%	31.8%	22.5%
Do you think that digital libraries have affected the way people share their knowledge on workplace?	0%	0.8%	21.7%	50.4%	14.7%	7.0%	4.7%
Do you think that the designing of a digital library affects the way knowledge is shared?	0%	0%	20.9%	17.8%	31.0%	20.9%	9.3%
What elements should be considered in creating an effective KM system within a digital library? **Understanding User needs**	0%	0%	5.4%	10.9%	24.8%	24.8%	34.1%
What elements should be considered in creating an effective KM system within a digital library? **Good knowledge of subject**	0%	0%	10.9%	10.1%	18.6%	34.9%	25.6%
What elements should be considered in creating an effective KM system within a digital library? **Rich metadata description**	0.8%	0%	7.8%	4.7%	35.7%	11.6%	39.5%
What elements should be considered in creating an effective KM system within a digital library? **Strategic plan establishment**	0.8%	10.9%	10.9%	22.5%	23.3%	19.4%	7.8%

What elements should be considered in creating an effective KM system within a digital library? **Technology support**	0%	0%	0.8%	0%	26.4%	35.7%	94.7%

Table 1: *Digital Libraries as Knowledge Management Systems*

The Spearman's correlation test was performed in order to see any positive correlations between the variables. The purpose of selecting Spearman's correlations was due to the fact that the data was not normally distributed. The results showed that the effect of the design of a DL in the way people share their knowledge was positively correlated with two elements that should be considered in creating an effective KM system within a digital library. These were —understanding user needsll (r_s=0.526, N=129, p<0.01, two-tailed) and –rich metadata descriptionll (r_s=0.715, N=129, p<0.01, two-tailed). Also, —good knowledge of subjectll was positively correlated with —strategic plan establishmentll (r_s=0.561, N=123, p<0.01, two-tailed) and —understanding user needsll (r_s=0.570, N=129, p<0.01, two-tailed).

The second survey was conducted to determine the knowledge sharing attitudes among librarians. A total of 145 participated from the same countries as in the previous survey. Sixteen respondents were from Malta, seven from the Czech Republic, three from Cyprus and one hundred and nineteen from Greece. The majority were female (n=113), thirty one were male and one missing. Thirty two of work in academic libraries, nine in college libraries, three in school libraries and two in special libraries. Most of the respondents were students (n=54) followed by twenty six librarians, nine library assistants, ten library administrators, and one archivist.

Table 2 shows the mean percentages of all the questions. From the four statements provided at the questionnaire the mean percentage of the question -When a colleague asks me for help or assistance, I share what knowledge I may have on the subjectll collected the highest score (75.2%) at a scale of one to seven (1=strongly disagree to 7=strongly agree). The statement that followed was -When I encounter a work related problem, I seek knowledge and help from my colleaguesll with 51%. Consequently, we could estimate that librarians are eager to provide their knowledge to and facilitate their colleagues and also willing to request their colleagues' assistance when they need it.

The responses to the four statements are motivated by several intrinsic and extrinsic factors. From the intrinsic factors, sharing knowledge is an important value for the 55.9% of the participants and an important part of their job for the 47.6%. They like to work as a team with other colleagues (40.7%) and equally share knowledge for the pleasure of discovering new insights (40, 7%). On the other hand, the percentages of the extrinsic factors as they were formed showed clearly that librarians where actually motivated to share their knowledge by intrinsic factors. Specifically, librarians responded negatively on being motivated by to the extrinsic factors of -I share knowledge because it may help me get a salary increasell (29%), —I share knowledge because I want my manager to praise mell (23.4%), —I share knowledge because It may help me get promotedll (22.1%), and —I share knowledge because I want my colleagues to praise mell (21.4%). At the last extrinsic factor -I share knowledge because it is important for the evaluation of my job performancell the views seem to diverge. Most of the participants though seem to agree with the factor in a total sum of 59.3% (5-7).

	1	2	3	4	5	6	7
When I have knowledge that might be relevant for others in the library, I do what I can to make it available to them.	0%	1.4%	3.4%	7.6%	15.2%	21.4%	50.3%

When a colleague asks me for help or assistance, I share what knowledge I may have on the subject	0.7%	0%	2.1%	2.1%	4.8%	14.5%	75.2%
I stay updated by exploring the information I can find on the different knowledge systems and databases	1.4%	1.4%	4.1%	10.3%	22.8%	25.5%	33.1%
When I encounter a work related problem, I seek knowledge and help from my colleagues	0.7%	0.7%	2.8%	6.9%	17.9%	19.3%	51.0%
Factors of intrinsic motivation							
I share knowledge because is an important value for me	0%	0.7%	0.7%	4.8%	11.7%	22.8%	55.9%
I share knowledge because I want to find out whether my ideas are relevant	0.7%	4.8%	4.8%	12.4%	29.7%	2.8%	20.7%
I share knowledge because I think it is an important part of my job	0.7%	2.1%	1.4%	6.9%	10.3%	27.6%	41.6%
I share knowledge because I enjoy doing so	1.4%	2.8%	4.1%	11.0%	20.7%	26.2%	29.0%
I share knowledge because it fulfils my personality	0%	1.4%	3.4%	12.4%	15.9%	16.6%	22.1%
I share knowledge because the senior management does so	10.3%	11.7%	13.1%	22.1%	17.2%	9.0%	6.9%
I share knowledge because I trust my colleagues	3.4%	3.4%	7.6%	14.5%	23.4%	24.8%	17.2%
I share knowledge because I am working as a team with other colleagues	2.1%	0.7%	4.8%	6.2%	14.5%	24.8%	40.7%
I share knowledge because sharing is safe and confidential	2.1%	3.4%	4.1%	17.9%	16.6%	12.4%	13.1%
I share knowledge for the pleasure of discovering new insights	0%	0.7%	4.1%	6.9%	14.5%	27.6%	40.7%
I share knowledge because I can use knowledge from others which is provided to me just in time	0%	0.7%	2.1%	10.3%	15.2%	35.9%	29.7%
I share knowledge because I can use knowledge of value from other colleagues	0%	0.7%	3.4%	8.3%	18.6%	30.3%	33.1%
I share knowledge because it is easy to do so	5.5%	10.3%	16.6%	15.9%	19.3%	17.2%	9.7%
Factors of extrinsic motivation							
I share knowledge because It may help me get promoted	22.1%	15.2%	14.5%	17.2%	11.7%	9.0%	4.8%
I share knowledge because I want my manager to praise me	23.4%	20.0%	9.0%	20.0%	13.1%	6.9%	2.8%
I share knowledge because I want my colleagues to praise me	21.8%	17.9%	11.7%	20.0%	13.8%	6.9%	2.8%
I share knowledge because it may help me get a salary increase	29.0%	10.3%	9.7%	18.6%	13.8%	6.2%	6.9%
I share knowledge because it is important for the evaluation of my job performance	11.0%	2.8%	5.5%	15.2%	16.6%	24.8%	17.9%

Table 2: *Attitudes towards knowledge sharing*

A set of Spearman's tests were also performed in order to examine possible correlations between the variables. It was found that the participants tended to share their knowledge when it was needed because —giving knowledge was important to themll (r_s=0.526, N=170, p<0.01, two-tailed). From the results also appeared that in the sharing knowledge attitude of librarians some intrinsic factors where strongly correlated to each other. More specifically, the intrinsic factor —I share knowledge because I like itll was strongly correlated to —I share knowledge because it is an important part of my workll (r_s=0.640, N=167, p<0.01, two-tailed) and to —I share knowledge because it fulfils my personalityll (r_s=0.772, N=133, p<0.01, two-tailed).

Although, as it is aforementioned the participants were motivated by intrinsic factors for sharing knowledge with their colleagues, some correlations were interesting between the intrinsic and extrinsic factors. Specifically, the intrinsic factor —I share knowledge because I want to find out whether my ideas are relevantll was positively correlated to

the extrinsic factor —I share knowledge because it may help me get promotedll (r_s=0.383, N=136, p<0.01, two-tailed). Also, the intrinsic factor —I share knowledge because the senior management does soll is positively correlated to the extrinsic factor —I share knowledge because it may help me get a salary increasell (r_s=0.480, N=133, p<0.01, two-tailed). The intrinsic factor —I share knowledge because it is easy to do soll was correlated to the extrinsic factor —I share knowledge because I want my colleagues to praise mell (r_s=0.246, N=137, p<0.01, two-tailed) and the intrinsic factor —I share knowledge because sharing is safe and confidentialll was correlated to the extrinsic factor —I share knowledge because it is important for the evaluation of my job performancell (r_s=0.301, N=103, p<0.01, two-tailed).

50.5 Conclusions

Librarians have been in the forefront of sharing knowledge and creating knowledge distribution systems for their users. The results of the survey indicate that they have a stronger intrinsic rather than extrinsic motivation to share knowledge even though these factors are correlated to each other. Knowledge sharing is an inherent value in the field of Library and Information services and it was evident from the results that they consider it an important value as part of their job.

The results indicate that librarians accept digital libraries as knowledge management and sharing systems with opinions being distributed towards a positive attitude. Knowledge management and systems is a rather new concept for librarians and as digital libraries develop it will take time and effort to fully acknowledge and incorporate them as a vital element. Lack of technology support and tools are the crucial factors for librarians in order to implement an effective KM system. These are connected with skills acquisition which will keep librarians up to date and become more appreciative of the value of knowledge management systems in libraries.

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