Integration of Business Intelligence into Virtual Libraries

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Abstract

Virtual Libraries enrich the society with a vast amount of knowledge, being developed more and more in the last years and facilitating users access from all around the world to knowledge. Covering a wide range of topics, they represent a past, present and future mirror of our world, which is continuously developed by researchers from different domains.

Extracted and analysed through various methods, the information offered by virtual libraries can contribute more to the society wisdom, can represent an innovation catalizator and can take one step closer to be applied in the reality.

As a response, Business Intelligence represent the actual viable solution that help Virtual Libraries' administrators to manage this hole information, analyze it and create valuable asset for the community.

For this, in our paper we analyse the advantages of integrating Business Intelligence into Virtual Libraries, focusing on the contribution that this solution can bring to both the virtual communities of practice and local communities. The linkage between them facilitate the forecasting activity regarding the society trends and human behavior. Also, as a case study, we applied a questionnaire among the youth from the Romanian medical environment, aimed to help us to analyse different aspects regarding virtual libraries.

Keywords: virtual libraries, business intelligence, virtual communities of practice, innovation, medicine

Introduction

In the past few years, Virtual Libraries become one of the most accessed inspirational and informational resources among people of all ages. Even if these people are students interested in finding out more about a subject, or if they are scientists leading researches on a very specific matter trying to find a way to improve the actual state, or people who are interested in finding new solutions to their problems and keeping their business activity up to the latest findings in the domain, all the people in question are now more attracted by Virtual Libraries then the traditional ones.

This because traditional libraries present some limitations beside virtual ones, limitations that include: 1) territoriality - traditional libraries are offering services which are not available elsewhere, but only into the location of the library. Of course, there are some of them that borrow to the readers books

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available in multiple copies, for a short period of time, but none of them are offering to the loan service specialized studies and researches; 2) service availability - traditional libraries operates on a schedule determined by manager and sometimes they are restricted also by the schedule of the institution where they are located (eg. libraries situated into the universities follow the university' schedule); 3) service scalability - this restriction refers to the fact that in the situations when there is one single print of a study, and this is being read by somebody, another person have to wait until the study become available; 4) resources variety - traditional libraries are limited regarding the variety of resources that they can offer to the readers, mainly because of limited purchase capability; 5) restricted access - this limitation regarding traditional libraries may refer especially to the libraries situated into the universities and universities campuses, where people from outside the university are not allowed into it. Excepting territoriality, virtual libraries can also present this limitations. But in the informational age, when the access to the internet represent a vital condition to conduct most of the activity on earth, when the focus on availability and scalability is much higher than anytime and solutions like cloud computing are coming to tackle this needs, such limitations are almost inexistent. Also, to the access issue people can respond by paying a fee and so they can download the resources they need, no matter if they are members of an institution, where they are located on the globe, or exactly when they want to access it.

The resource variety issue represent a minor limitation in the virtual libraries, this because this type of libraries are more easy to be managed, more accessible to the authors and so they can satisfy better the readers demand.

Extracted and further analysed through various methods and technologies, the information offered by virtual libraries represent a valuable asset of the society that is insufficiently exploited. For this, we propose Business Intelligence as the best solution now available on the market (and probably for a long period from now), capable to collect huge amounts of data from different sources and transform it into valuable information aimed to be the input or catalizator for the next actions of entrepreneurs, scientist, politicians and other people.

Virtual Libraries

According to Heradio, virtual libraries "utilize various information and communication technologies to deliver information collection and associated services to user communities, playing the role as the extension of traditional physical libraries in a modern information society" (Heradio et al., 2012).

In universities, virtual libraries have gone from "a curiosity to mainstream" over the last three decades (Arms, 2012). For this, many academic libraries have allocated significant budget to purchase electronic resources (Noh, 2012), according to Yan, in some cases it was allocated more than 50 percent of the budget (Yan et al., 2013), (Hooper, 2001). But in the last years,

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Software as a Service become wide-spread and more accessible for virtual libraries administrators, this technology offering the possibility to grow and develop vast pools of digital knowledge, made available to people.

Students are more likely to access an academic library's collection using the online platforms, rather than to go within the four walls of the physical libraries (Goldsmith and Fonseca, 2014). More and more students access an academic library's collection online, doing their research from dorms, parents' homes, coffee-houses, and the great outdoors (Polger, 2011). For business people, virtual libraries represent an informational resource where they can find next tendencies on the science and market or actual real state of the market. Accessed in this way, they save valuable time for their activity. For people from different domains like medicine, keeping track with new findings can be vital for their patients, and for the health of future generations.

Therefore, there is plentiful evidence of how valuable digital libraries might be for users success. But on the other hand, various studies show that users of online public access catalogues and other bibliographic databases encounter difficulties in finding the information they are looking for (Proctera et. al, 1998), (Borgman, 1996). More than that, for many users, the interesting questions about information retrieved from virtual libraries refer to tendencies, topics of interest, geographical analysis, forecasts and so on.

Talking about virtual libraries, cannot be excluded virtual communities, which gather people interested on a common subject. On one hand, users are likely to perceive a higher level of information quality, system quality and service quality of digital libraries than of virtual communities (Yan et al., 2013). But both virtual libraries and virtual communities are important online information system applications with the development of the internet, and both are potentially important information sources in the modern information society.

Business Intelligence

In the Informational Age, the ability to obtain useful information in real time and predictions for the future has become an extremely important, even critical factor of success for any activity domain. This because the ever growing competitive climate that is developing in everything that surround us require quick, intelligent and the right decisions, and the "tool" that enable us by now to do this is Business Intelligence (BI).

According to Williams, business intelligence "combines products, technology, and methods to organize key information that management needs to improve profit and performance" (Williams and Williams, 2007). Business Intelligence represent a mechanism composed by products, technologies and methodologies in order to offer informational assets. It helps those who use it to make decisions and bring improvement and innovation in their activity.

Business intelligence was spread into the IT communities in the 1990s, one decade later business analytics was introduced "to represent the key

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analytical component in Business Intelligence" (Davenport 2006). In the recent years, "big data and big data analytics have been used to describe the data sets and analytical techniques in applications that are so large and complex that they require advanced and unique data storage, management, analysis, and visualization technologies" (Chen et al., 2012).

Recently, due to the opportunities associated with it, Business Intelligence, analytics and big data analytics have gained the attention of both the academic and the business communities. Business Intelligence and analytics "is often referred to as the techniques, technologies, systems, practices, methodologies, and applications that analyze critical business data to help an enterprise better understand its business and market and make timely business decisions" (Chen et al., 2012). In addition to this, BI and analytics include business-centric practices and methodologies that can be applied to a large variety of applications such as e-commerce, market intelligence, e-government, education, healthcare, and security.

Between the most essential capabilities of Business Intelligence and analytics we remind reporting, interactive visualization, dashboards, ad hoc query, scorecards, search-based BI, predictive modeling, data mining and others. (Sallam et al. 2011)

In Romania, the level of acceptance of BI into Small And Medium Enterprises is reduced and there are no public institutions that implemented BI. Only few of them use reposts implemented in BI by external providers, but the level of extracting real information analyzing the data, and integrating different domains in order to create value to other institutions and businesses is an unsatisfied need for our society and a real opportunity for development.

Moreover, the acceptance of BI into Virtual Libraries, at the global level is non-existent, which denotes a large amount of unanalyzed data. For this, we consider this step an important one that will help to accelerate the development of humanity.

Case Study

As presented in our paper, we consider the need of Business Intelligence implementation in Virtual Libraries, a valuable source of generating information that can be wisely used by innovation catalysts.

Virtual Libraries (VL) contains unstructured data and information, categorised into different domains. Inside the Virtual Libraries, users (as individuals or as part of a virtual community) generate searches by keywords on which they are interested.

Through correlation of information contained by Virtual Libraries, search data, the main results generated by searches and sometimes other data that can bring a valuable input, processing and analysing them, there can be determined valuable information. Different areas of interest, poorly exploited subjects, forecasts or actual state of the market are some examples that can be

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further used as input for education and research, businesses and innovative activities, in order to help communities (local and online) to develope themselves. This roadmap is represented in Figure 1.

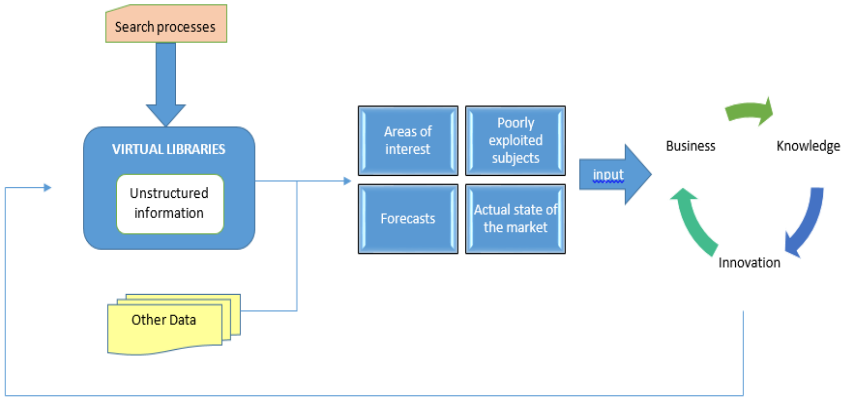


Figure 1 - The information roadmap

In order to take a look on the perception of Romanian youth over the Virtual Libraries, we conducted a short questionnaire between the young doctors. The respondents have ages between 20 and 40 years old, both men and women, cover 22 domains from medicine and come from 11 different Romanian cities.

One important issue that we follow was to find out which are the main sources used by young doctors to obtain information. From the total number of respondents, 30% use electronic books, 25% prefer physical books, 23% consult specialized online sites, 16% prefer electronic specialized magazines and only 6% read physical specialized magazines (Figure 2). A very interesting aspect deducted in this step was that 10% of the respondents use only physical resources in order to perform their activity, and 36% of the respondents use only electronic resources. This confirm the fact that our generation tend to move the activity more into the online environment.

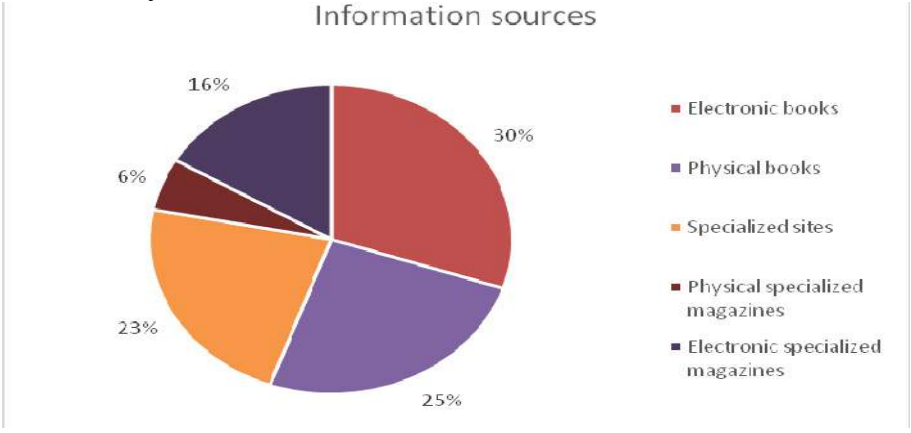


Figure 2 - Information sources used by young Romanian doctors

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Regarding Virtual Libraries, 88% of the respondents know the concept of a Virtual Library, and 12% do not know much about it. As shown in Figure 3, almost half of total number of respondents who knows the concept of virtual libraries, use them often in their activity, 41% log into such a library sometimes, 8 % use them rarely and only 2 % of respondents never used a VL.

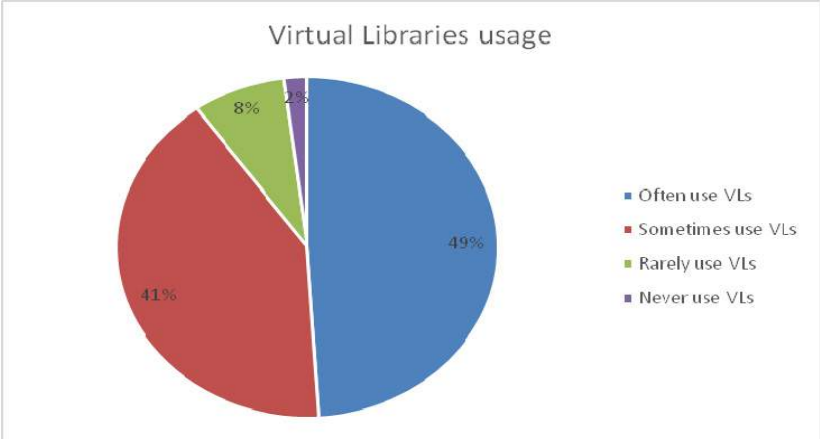


Figure 3 - Virtual Libraries usage

All the respondents consider that the information that the virtual libraries made available to users is very useful, and 58% of them consider that it is applicable in the Romanian medical environment, while the rest of them find the information very useful but not applicable in our country.

From the total respondents that use VLs, 48% of them find this resources useful for education, to deepen or enhance certain aspects. Research and raise new questions on certain issues is the second purpose that 34% of respondents invoque, while 18% of them log into the virtual libraries in order to find ways to innovate their work, techniques or treatments (Fig 4).

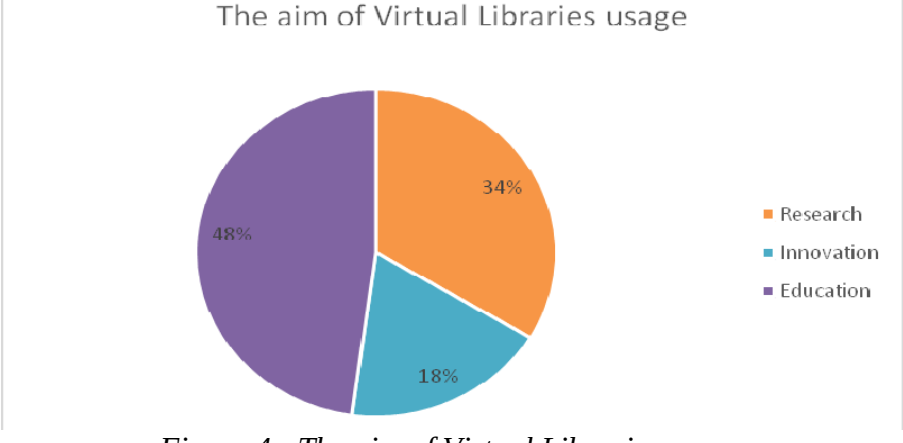


Figure 4 - The aim of Virtual Libraries usage

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Even if 88% of the respondents know the concept of a Virtual Library and as we saw, most of them use it, they agreed that a course aimed to inform population more on virtual libraries would be useful. This because searching and reading information from a virtual library represent a vital activity for the three purposes mentioned above. But having the opportunity to visualize the most searched topics in a library may signify the actual concerns of the people from a region, or tendencies of the humanity. Visualizing graphics of different subjects can be determined gaps or opportunities to combine elements and innovate into the society.

Conclusions

There is a plenty evidence that the trend among Romanian youth is to change their focus on the online environment, and use virtual libraries more and more into their activity in order to obtain proper information. They find it useful for education, to deepen or enhance certain aspects, to research and raise new questions on certain issue, and discover ways to innovate techniques or treatments.

People use virtual libraries as a valuable source of information in order to develop their activity better, to improve their work and to keep track of the new tendencies. The integration of business intelligence into virtual libraries make possible the creation of a more valuable information extracted from available data, through reporting, dashboards, ad hoc query, search-based BI, OLAP, interactive visualization, scorecards, predictive modeling, and data mining.

Therefore, the advantages of integrating Business Intelligence into Virtual Libraries, and the linkage between them facilitate the forecasting activity regarding the society trends and human behavior and contribute to knowledge enrichment, innovation activity and business development.

Acknowledgments

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