DESIGN AND DEVELOPMENT OF WEB-BASED DATABASE FOR MANAGING NARSS PROJECTS

Ghada Atta Youseff and Rania Elsayed Ibrahim
National Authority for Remote Sensing & Space Sciences,
Cairo, Egypt

ABSTRACT

In today’s rapidly changing business environment, few firms can afford to remain completely self-sustaining. Thus, the web-based database (WBDB) was developed based on the technology of databases within web-applications to support scientific publishing, sustainable development and marketing. It allows storing enormous volumes of information. It is a strategic tool, designed not only to attract new customers, but also to strengthen the relationship among existing customers and to build a competitive advantage for NARSS. The methodology of this paper was divided into three stages, a classification and coding projects, then the system design and development of WBDB, and finally, design the evaluation model. Design evaluation model for government websites provides a scientific approach to examine and analyze all items which built the website. It was created following a systematic review of contemporary research in the area of e-government along with a review of best practices in website design and Dubai government website guidelines. WBDB would provide a good database for future projects with the classification of knowledge. It is expected to increase the organizational learning competence of NARSS and to help it to create organizational memory.

Key words: Organizational Memory; Data Management; Web-Based Database; Evaluation Model.

http://www.iaeme.com/IJITMIS/issues.asp?JType=IJITMIS&VType=7&IType=2
1. INTRODUCTION

Knowledge is often viewed as the most strategically significant resource of the organization. Organizations are beginning to understand the importance of knowledge as a resource which enables them to obtain a sustainable competitive advantage [1]. Since acquiring, sharing, and using knowledge in firms are crucial, knowledge management is considered to be one of the key sources of success for the government projects[2]. Without knowledge sharing and storing, firms can lose intangible assets [3]. Managing data as a resource is an important managerial task in any organization today.

The main concerns of organizational managers are how to build knowledge infrastructure efficiently and how to expand knowledge activities. The most popular and common approach is implementing a knowledge management system or knowledge repository system to organize the enterprise-wide knowledge resources [4].

It is evident that business success depends not only on the possession of resources, but on the efficient utilization of resources - data and information within an organization and its environment form part of the strategic, tactical and operational resources of an enterprise [5]. The final goal of managing data is to gain competitive advantage and sustain it by producing new products or service or enhancing organizational processes in terms of speed, quality and costs [4].

Scientific publications information is one of the main assets for any Research and Development organization and knowledge institutionalization contributes to build competitive advantage by converting learning into practice [6]. IT accordingly played a very central role in the organizational change process [7]. So to create and develop a database for managing scientific publications of NARSS such as projects and theses information, etc has a great importance, from the establishment of NARSS in 1972 to present. NARSS has many publications in various studies such as geological, Agricultural, natural hazards ... etc. These studies are considered the scientific production of NARSS. These projects are considered the scientific production of NARSS. The work done by [8] was limited to collection and inventory of the projects without creating a database. The current study is the first study to create a database of scientific publications information in a research institute in Egypt.

The main objective of this paper is to present the developed web-based database (WBDB) to aid in capturing, storing, sharing, and using projects and corporate information at NARSS. It is developed based on the technology of databases within web-applications and it allows storing enormous volumes of information.

The second objective of this paper is to present the standardized evaluation criteria model for evaluating the content of the e-government websites according to standardized criteria. WBDB is a strategic tool, designed not only to attract new customers to NARSS, but also to strengthen the relationship among existing customers who we have worked so hard to get, and to build a competitive advantage for NARSS. The main advantage of WBDB is to create organizational memory and to assist NARSS in terms of their project management activities. It is expected to increase the organizational learning competence of NARSS and to help it to create organizational memory.

Organizational memory (OM) is a corporate asset which is gained by the integration of knowledge into the organizational activities. Organizations develop their corporate memories by capturing, organizing, disseminating and reusing...
knowledge by the knowledge created by their individuals [2]. Due to increasing competition, the organization is required to constantly revise its product and service, and managerial methods, and to increase productivity. Differences between the organizations exist exactly due to the differences between human capital, i.e. the organizations human resources, ways of their management and development [9].

Our goal is to transition from an organization that relies on corporate memory to one that embraces change and adapts to the new environment through continuous improvement. This change in culture will foster the notion of NARSS becoming a learning organization. According to [10] learning organizations are continually adapting and improving to respond to the system around them. Another definition, learning organization is an organization skilled at creating, acquiring and transferring knowledge, and at modifying its behaviour to reflect new knowledge and insights [11].

The remainder of this paper is organized as follows. Section 2 discusses the methodology of the current project. Section 3 presents the findings of the current research. Section 4 gives conclusion and further work.

2. METHODOLOGY

The team realized at some point that they have accumulated mountains of paper without the ability to search and retrieve specific information. The team realized a need to capture and store NARSS knowledge in a centralized location. We began to look for a way to capture and retain useful information with the following objectives in mind:

- Facilitate the exchange of experience and sharing of information.
- Break down communication barriers.
- Lead to process improvement.

With these concepts in mind, the team began to examine tools that would support the storage and accessibility of information. The team selected Microsoft SharePoint. MS SharePoint is appropriate for team collaboration and project management, easily modify pages [12][13]. It includes search engine and guarantee information security and integrity, etc.

The methodology of the current project was as follows.

1. Projects Classification and Coding

1.1. Projects Classification

Projects were divided and implemented by the NARSS into:

- Studies and Research (SR) Projects are funded from state budget to NARSS
- National Contracts (NC) Projects are funded by various companies benefiting from NARSS to serve the development projects
- International Contracts (InC) Projects are funded by international organizations

1.2. Projects Coding

Coding projects was done to achieve excellence and tracking, and the method of coding was as follows
0000 \ 00 \ 0000 –sub \0000 (Serial number \ Project Type \ fields-sub fields \ Year which the project has been ). For example (0250\NC \ GEO\ 2016)

2. Projects Collection and Inventory

2.1. Projects from 1972 until 2013 were collected as follows

- Research and contract projects (local / foreign) from 1972 to 2003 have been collected from the project of Arafat et al. (2004).
- Research and contract projects (local / foreign) from 2003 to 2014 have been collected from NARSS library.
- Projects were reviewed to make sure that all projects have been counted and collected from 2004 to date.
- Duplicated projects have been deleted
- Collected Projects have been reviewed with NARSS annual reports from Technical Office.
- Missed projects have been collected from their principal investigators.

2.2. Projects data were recorded and divided in excel.

2.3. The projects have been re – arranged based on publication date

3. System Design

- Forms and layout were designed using Photoshop.
- Photoshop forms were converted to MS SharePoint
- Excel database is converted to database

4. System Development

WBDB was built on a three-tier client server architecture based on the benefits of [14]. The client interface is simply a web browser where the user connects to the system and retrieves the data. In this architecture, all the business logic was implemented on the middle-tier.

WBDB was created to run on a server with Microsoft Windows Server platform and MS SharePoint 2010. MS SQL databases were used to store the relevant project information, user account information. The contents of the web pages as follows:

- The main page of WBDB. This page reveals the basic information of projects, theses which includes team work; contact us, search, etc.
- Classified projects page. Projects can be sorted by code, name, principal investigator, and publication year, etc.
- Projects entry page. This page enters data details for each project
- Classified theses page. Thesis can be sorted by name, researcher, specialization, etc.
- Thesis entry page. This page enters data details for each thesis
- Search page. User can search by region, project field graphically using a map. For example, by clicking on the region, the tool will show all projects have been achieved within this region. The page was designed to include a map of Egypt. If a user clicked on any place on the map, the tool will show all projects have been carried out in such place.
• Suggestions page was developed for improving the system. The teamwork read and evaluates the input for optimizing the system and its features.

5. Monitoring and updating

• All projects have been added into WBDB.
• NARSS Chairman sends new projects periodically to the project management office.
• Project management office updates database and sends a statement of new projects to the Technical Office.
• The Technical Office encodes projects and adds the detailed information collected from researchers to the database.
• Follow-up and review from Quality Assurance and Control (QA/QC) Unit.

6. Empirical Evaluation

The current research is a qualitative study in which data was typically collected by using several methods. Questionnaires were used to collect data on all criteria. Informal information were also gathered through interviews and conversations with users. Users were from NARSS staff and their average age was 35 years.

The objectives of the evaluation were to assess the impact of the developed system from the following perspectives: a) The effectiveness of database, and b) The role of the developed system in increasing the organizational learning competence of NARSS and to help it to create organizational memory.

Evaluation criteria model was designed according to standardized criteria grouped under seven categories as in Table 1. Within these seven categories, there are a total of 40 criteria which use a 10 point scale to measure the presence and the degree of implementation of the proposed criterion. These criteria have been developed that extends Dubai excellence model [15]; regrouping criteria and adding additional categories such as Maintenance and Currency. It was created following a systematic review of contemporary research in the area of e-governance along with a review of best practices in website design, the WebQual framework [16] and KPI criteria [17] for website evaluation. Table 2 gives an example of an element in each category and the type of question that may assist in checking for an element’s application. Multiple questions were developed for each of the abovementioned criteria.

<table>
<thead>
<tr>
<th>N.</th>
<th>Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Authority</td>
<td>Refers to the trustworthiness of the information carried at the site, and how reliable it is.</td>
</tr>
<tr>
<td>B</td>
<td>Layout design</td>
<td>Refers to how effectively a site is designed in order to help you navigate around it.</td>
</tr>
<tr>
<td>C</td>
<td>Accessibility</td>
<td>Refers to ease of use and access the website.</td>
</tr>
<tr>
<td>D</td>
<td>Content and services</td>
<td>Content is judged on the amount of public information available on the Website. The amount of horizontal integration between various government agencies is also assessed. Services comprise two sub-categories: services for citizens, and services for businesses.</td>
</tr>
<tr>
<td>E</td>
<td>Citizen Participation</td>
<td>Examines the extent to which citizens are able to communicate both with the government agency and with each other through the Website. The availability of opinion polls, bulletin boards and satisfaction surveys etc.</td>
</tr>
</tbody>
</table>
Table 2 Evaluation categories and Example

<table>
<thead>
<tr>
<th>Category</th>
<th>Example of element</th>
<th>Example of check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authority</td>
<td>Organization quality</td>
<td>Does WBDB Provide a Clear and Readable Entity &amp; Government Logos</td>
</tr>
<tr>
<td>Layout Design</td>
<td>Website design</td>
<td>Are there headings and subheadings on the page?</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Provide a functional bilingual website</td>
<td>Does WBDB provide a functional bilingual website?</td>
</tr>
<tr>
<td>Content and Services</td>
<td>Completeness of information about the service</td>
<td>Does WBDB provide sufficient information about government entity services &amp; eservices?</td>
</tr>
<tr>
<td>Citizen Participation</td>
<td>Citizen centric features</td>
<td>Does WBDB provide a facility to submit feedback on the website?</td>
</tr>
<tr>
<td>Security, Privacy and Policies</td>
<td>Provide information regarding the protection and handling of privacy in the website</td>
<td>Does WBDB provide information regarding the protection and handling of privacy in the website?</td>
</tr>
<tr>
<td>Maintenance and Currency</td>
<td>Maintenance, currency and updating information</td>
<td>Is there a date that shows when the site has last been updated?</td>
</tr>
</tbody>
</table>

3. RESULTS AND DISCUSSIONS

The findings of WBDB effectiveness were:

- Authority succeeded with 75%.
- Accessibility: The findings show that it provides appropriate access to website files with 93.3%, simple and easy to use forms with 73.3%, and good active and external links with 80%.
- Layout design: The findings show that pages loaded quickly with 46.7%. It provides standard format and readable by browser with 86.7% and the text and background colors make the page easy to read with 73.3%
- Content and Services: Site organization logical and easy to maneuver with 73.4%, content readable by intended audience with 33.3%, the information on the page/site is useful for audience with 93.3%, and it provides accurate information with 80%.
- Maintenance and Currency: succeeded with 66.7%
- Citizen Participation: succeeded with 84.6%.
- Security, Privacy and Policies: The findings show that it doesn’t provide information regarding security, privacy and policies.

Number of daily unique visitors and number of pages views per date are shown in Figures 1, 2 respectively.
The most important findings of the current research were:

- Projects collection and inventory from 1972 to date, to assist staff to use previous studies easily.
- Maintaining of NARSS scientific production
- Developments of an integrated system to store, collect, retrieve, and maintain information to support sustainable development. It provides a good database for future projects with the classification of knowledge and a broad information storage capacity.
- The ease of use and benefits of the system due to its features of sorting by different criteria (Project field, Principle investigator, Publication year, Keywords, Region, etc)
- The web-based nature of the system offers a considerable advantage when compared to other styles of communication and data sharing mechanisms by both minimizing the time spent for data transfer and reducing the communication costs and ensuring the access of the site as well.
- Follow-up and review from Quality Assurance and Control (QA/QC) Unit to ensure sustainability.
- The system would improve the OM of NARSS.
4. CONCLUSION
The teamwork emphasis the following points when building similar database system:

- Projects classifications and coding should be done to ease and expand searching criteria for greater use of information.
- Monitoring and updating is essential task towards sustainable development.

Authors recommend research institutes and universities to adopt similar systems and combine them into an integrated system, which includes all projects information at the national level to support sustainability and scientific publishing.

WBDB was developed to increase the organizational learning competence of NARSS since it required the acquisition of several data, interpretation of data and transferring data into information, storing in a database and utilization of knowledge.

As further work, the system might be combined with a decision-making program or software which would assist not only the knowledge management activities but also the strategic decision-making process of NARSS.

ACKNOWLEDGMENTS
Authors thank NARSS Chairman for his guidance and providing resources for completing the project.

Authors thank also the efforts of NARSS staff and data entry team for their help in entering the data, designing forms, evaluating and developing the database.

REFERENCES


