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Foreword

The African Journal of Computing & ICT remains at the nexus of providing a platform for contributions to discourses, developments, growth and implementation of Computing and ICT initiatives by providing an avenue for scholars from the developing countries and other nations across the world to contribute to the solution paradigm through timely dissemination of research findings as well as new insights into how to identify and mitigate possible unintended consequences of ICTs. Published papers presented in this volume provide distinctive perspective on practical issues, opportunities and dimensions to the possibilities that ICTs offer the African Society and humanity at large. Of note are the increasing multi-disciplinary flavours now being demonstrated by authors collaborating to publish papers that reflect the beauty of synergistic academic and purpose-driven research. Obviously, these developments will drive growth and development in ICTs in Africa.

The Volume 7, No. 4, October 2014 Edition of the African Journal of Computing & ICTs contains journal articles with a variety of perspective on theoretical and practical research conducted by well-grounded scholars within the sphere of computer science, information systems, computer engineering, electronic and communication, information technology and allied fields across the globe. While welcoming you to peruse this volume of the African Journal of Computing and ICTs, we encourage you to submit your manuscript for consideration in future issues of the Journal.

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Wishing you a productive reading

Thank you

Longe Olumide Babatope PhD
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Development of an Interactive Web-Based Raw Materials Information System With Web 2.0 Features

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ABSTRACT
Raw materials play an important role in feeding the industries of many nations with agro-based or mineral-based inputs. As a result, the importance of having the right information at the right time about what materials available, where and what cost is vital to many stakeholders including researchers. The need for a web-based raw materials information system that incorporates Web 2.0 features such as user participation in content creation was identified as a gap to be filled. This paper outlines the design, development and implementation of such a system which was christened as the interactive web-based raw materials information system (iWRMIS). User participation in content creation was achieved through providing Edit and Save buttons for modification or addition of textual content. Furthermore, file Browse and Upload buttons were provided to enable a user upload user created documents in various formats to the database. For future work it was recommended that an intermediate channel for a moderator be provided to allow for vetting of content before saving to the database.

Keywords: Content Management, Databases, Information Systems, Raw Materials, Web 2.0.

1. INTRODUCTION
Information is now widely regarded as an important organizational resource, and like all other resources, it has to be managed effectively in order to achieve organizational goals and objectives. It is very important to design an information system, which is cost effective and flexible to allow fast changes at low cost [1]. Since the 1960s, information technology (IT) has been utilized successfully in the creation, processing, storage, dissemination and use of information.

In a very broad sense, the term information system is frequently used to refer to the interaction between people, algorithmic processes, data and technology. In this sense, the term is used to refer not only to the information and communication technology (ICT) an organization uses, but also to the way in which people interact with the technology in support of business processes [2]. According to Turban et al. [3], the basic components of computer-based information systems (CBIS) are hardware, software, database, network, procedures and people.

With widespread availability of access to the Internet and advances in web programming, web-based information systems are now the rule rather than the exception. A web-based information system or web information system usually consists of one or more web applications (which are functionality-oriented components that utilize web technologies to deliver information and services to users or other applications/information systems), together with information components and other non-web components [4].

Traditional websites offer users the ability to check and retrieve information. However, the rise of the social networking phenomenon has provided avenues for increased user participation in the World-Wide-Web. Web 2.0 is associated with web applications that facilitate participatory information sharing, interoperability, user-centred design, and collaboration on the World Wide Web [5]. A Web 2.0 site allows users to interact and collaborate with each other as creators of user-generated content in a virtual community, in contrast to websites where users are limited to the passive viewing of content that was created for them [6].

1
It is generally stated that while Web 1.0 was all about connecting people, most of the early specified web technology standards were not implemented until lately, and that Web 2.0 is the consequence of a more fully implemented web [1]. Interactivity happens when there is a widespread willingness to share information and participation in an ongoing project.

The following terms are commonly associated with web-based applications development:

- **HTTP**: Hypertext Transfer Protocol which is a program used by computers in a computer network to communicate with each other. It also specifies how a web browser should display a page on a computer screen.
- **MySQL**: Structured Query Language database software which is used to create database files for storage and retrieval of records.
- **PHP**: Preprocessor Hypertext Language, a widely-used general-purpose scripting language that is especially suited for web development and can be embedded into HTML.
- **SSADM**: Structured System and Design methodology.
- **WAMP**: Apache MySQL PHP - an application used for design and implementation of interactive websites/web portals.
- **XAMPP**: Apache MySQL PHP an application used for design and implementation of interactive websites.

2. THE PROBLEM

Raw materials, which are broadly classified as agro-based or mineral-based, are essential for the sustainable functioning of modern societies [7]. For developing countries to maximally benefit from globalisation and trade liberalisation, the domestic industries have to develop and utilize the natural resources available in such countries. One of the ways of achieving this is to provide an avenue where information on research and development activities on the available raw material resources can be disseminated to end-users [7]. The prospective entrepreneur requires information on a wide range of issues including local availability of processed inputs, size of domestic and regional markets, competition, and local regulation guiding corporate affairs in order to invest in a particular economy [8].

Nigeria is rich in both agricultural and mineral resources, boasting a wide variety of materials, which constitute suitable raw material for almost all mineral-based industries [8]. Despite the existence of remarkably favourable climatic conditions for agricultural production, immense land mass and large reserves of mineral deposits, there continues to remain in Nigeria, a large gap between local supply of industrial raw materials and demand [9].

The Raw Materials Information System (RMIS) hosted by the Raw Materials Research and Development Council (RMRDC), Abuja, Nigeria, was conceived as an institution-building avenue for creating a sustainable national capacity to provide relevant information on raw material development. It was designed to generate technical information on local sourcing of raw materials, processing technology, equipment selection, new product formation and development, efficient enhancement of indigenous research and development activities, standardization/certification, testing and quality control, productivity improvement, consultancy and advisory services, and so on [10].

The RMIS was designed and implemented using Oracle relational database and has been domiciled in the headquarters server of the RMRDC. Clients with the organization who are granted access to the application connect to the database server to carry out their transactions. This means that for information to be accessed, a prospective user resident at sites other than the headquarters building have to cover some distance, sometimes extensive, to reach the RMRDC headquarters. Alternatively, the Council launched a website recently – www.rmrdc.gov.ng - as a way of making information on raw materials available to users. However, the site contents are static and prone to displaying stale and incomplete information.

The RMIS at the RMRDC consists of six modules and each module is meant to disseminate a specific type of information/data. The modules are Raw Materials Profile, Investment Profile, Research and Development (R&D) Activities, Equipment Fabrication/Machinery, Profiles of Research Experts, and Company Profiles. The software uses a top-down approach and is menu-driven. The RMIS of the RMRDC addresses the availability as well as location of primary raw materials in the Nigeria. The structure is represented in the flow chart shown in Figure 1.
The interactive web-based raw materials information system (iWRMIS) developed covers the distribution of raw materials in Nigeria by States and Local governments. Raw materials are grouped as either agro-based or mineral-based. It also migrates details on the profile of raw materials, its uses, materials from the research and development activities so far carried out on individual raw materials, which are part of the RMIS of the RMRDC. The iWRMIS developed offers users the ability to interact freely with the database because it is web-based. Furthermore, users can add and modify content in the database of the information system with ease.

3. DESIGN OF THE INTERACTIVE SYSTEM

The conceptual framework for the interactive web-based raw materials information system (iWRMIS) was designed to consist of three basic elements. These were the:

(a) Database for storing information,
(b) Application systems and
(c) Technology platform used to deliver the services.

The following files commonly referred to as site assets were proposed for building the new system:

- **HTML files**: HTML is a tag-based markup language that describes all or part of a web page. Static HTML files have a file extension of .html or .htm. HTML (HyperText Markup Language) can also be generated dynamically by an application server such as PHP; in that case, the file extension is determined by the application server. PHP uses pages with the file extension .php.
- **CSS files**: A CSS (cascading style sheet) file contains rules that determine the appearance of web page elements. CSS files use the file extension .css.
- **JavaScript files**: These files contain programming code that controls the behaviour of a page in the web browser. This code can be embedded in an HTML page or stored in a separate, external file with the file extension .js.
- **Images**: These are binary files that are rendered visually by the browser. Modern web browsers typically use three image formats: JPG files (for photographs or other photorealistic images with many colours), GIF files (for computer-generated graphics that use continuous tones) and PNG files (which can display both photorealistic and continuous tone images). Both GIF and PNG files support transparent backgrounds, while JPG files do not.
- **Flash files**: These are binary files that are loaded and played by Adobe Flash Player. Flash files can be used to present animations, sound and video, 3D objects and other rich content that is beyond the capabilities of the web browser.
The site was proposed to be built using PHP as the application server and thus all web pages were to be built as PHP files. Also, a common look and feel was achieved with the use of PHP-based header and footer files. The Blog page, which allows the business to share news with website visitors, was also proposed. The design expectation was for the site to be hosted initially on a server running the Microsoft Windows XP operating system using Mozilla Firefox web browser while being portable to Linux and other operating systems that are compatible with Apache and PHP.

A simplified overview of the physical design which shows the flow of how data is input into the system, how it is verified, how it is processed, and how it is displayed as output, is shown in Figure 2.

Database tables to capture records on raw materials (as Agro-based or Mineral-based) and information on the States in Nigeria were designed to capture the item listing for the drop down menus, details of each item, and information on users. The physical structure of the output design which is basically the website design flow consists of three main areas: The homepage, the main sections and the subsections. The structure is as represented in Figure 3.
Figure 3 shows that the website has three tiers of content which can be accessed in two clicks. From the homepage to the main sections (click 1) and then to the subsections (click 2), which is a simple and intuitive path. If required, a third tier of data may be added but more than that may not only begin to confuse users but also impede the deep access of search engine spiders. Interactivity as was discussed earlier offers users the ability to supply content as a co-creator by adding, modifying, or manipulating information, and the potential for controlling content personalization. Interactivity was incorporated into the design by allowing for editing of content and uploading of files. Figure 4 shows how users can select a raw material, modify its contents and/or upload documents of relevance to the raw material, including research output.

![Interactive Structure](image)

**Figure 4. Interactive Structure**

4. IMPLEMENTATION

The design was implemented using the following tools and techniques:

- WAMP (Windows Apache MySQL PHP) server was used for the design and implementation.
- Windows forms the operating system on which the application depends for interface.
- PhpMyAdmin is a tool written in PHP intended to handle the administration of MySQL over the Web. Currently it can create and drop databases, create/drop/alter tables, delete/edit/add fields, execute any SQL statement, and manage keys on fields.
- All the web pages were created using Adobe Dreamweaver as the front end and saved in a PHP format. Adobe Fireworks and Adobe Flash were also employed for the formatting of pictures and text or photo animations.

The database tables created using phpMyAdmin are as shown in Figures 5a and 5b.

![Main Database / Tables Created](image)

**Figure 5a. Main Database / Tables Created**

![Database/Tables Created for Raw Material Details](image)

**Figure 5b. Database/Tables Created for Raw Material Details**

The database was populated with the known raw materials monitored by the RMRDC. This was done using the following code:

```
INSERT INTO `agro_items` (`id`, `name`, `image`) VALUES
(1, 'Cassava', 'cassava.jpg'),
(2, 'Sorghum', 'sorghum.jpg'),
(3, 'Maize', 'Maize.jpg'),
(4, 'Groundnut', 'Groundnut.jpg'),
(5, 'Yam', 'Yam.jpg'),
(6, 'Rice', 'Rice.jpg'),
(7, 'Moringa', 'Moringa.jpg'),
(8, 'Wheat', 'Wheat.jpg'),
(9, 'Beniseed', 'Beniseed.jpg'),
(10, 'Pawpaw', 'Pawpaw.jpg');
```

For example, rice is a cereal crop farmed in swampy ...

![Select raw Material to Modify](image)

![Browse to upload file](image)
5. SYSTEM TESTING

The developed system was set up and tested on a local server. By typing the website address pointing to the desired index.html file, the page shown in Figure 6 is launched. This is the home page from where users can navigate to other pages by clicking on the links.

Clicking on the “About Raw Materials” link takes the user to the page shown in Figure 7. This page contains information about raw materials, their groupings, etc. Information on this page depends on the administrator for remaining current. The contents of the page are static and non-interactive.

On the Home page, a user may click on the “Raw Materials Information System” link to obtain a page that is interactive. The default page, shown in Figure 8, allows the user to choose a raw material from the drop down list of raw materials in order to access information specific to that raw material. This brings up the desired page as shown in Figure 9. The “Raw Materials Information System” page (Figure 8), also provides information on the distribution of raw materials by the States in Nigeria including information on the local government areas where such materials are located. This is done by clicking on a State of interest from the list or by clicking on the State from the map of Nigeria displayed.
A more detailed view of the interactive page is shown in Figure 11. The page allows users to modify content under three categories – Introduction, Uses and Research and Development (R&D). Under each category, content can be edited as shown in Figure 11. In addition, users of the system with R&D publications or other materials on raw materials can upload such documents using the Upload, Browse and Submit buttons. Such documents are viewable by clicking on the named file link under the “Files Uploaded” label as seen in Figure 12.

In Figure 12, a pdf file named AJAX_tool_MVC2asset.pdf has been uploaded under the raw material Tantalite. The “Correspondence” link on the Home page provides the user with information on where to direct enquiries or correspondence arising from use of the iWRMIS.

6. CONCLUSION AND RECOMMENDATIONS

Traditional websites offer users the ability to check and retrieve information as the case may be, but with the dynamism of information systems there are needs for users to be able to communicate their opinions on a subject matter. Particularly, raw materials information is the bedrock of the growth and development of industries worldwide; hence there is the need for users of this information to be able to communicate their ideas on raw materials to other remote users to achieve purposeful and useful results. This paper has outlined the design and development of an interactive web-based raw materials information system in which Web 2.0 features have been incorporated. This was done by including in the interactive section of the system, features that give users the capability to modify content and upload documents pertaining to raw materials of interest. The developed application is, therefore, recommended for adoption by organizations dealing with raw materials information dissemination in general and the Raw Materials Research and Development Council, Nigeria, in particular.

7. DIRECTION FOR FUTURE WORKS

For future work, it is recommended that the application could be enhanced with the option of moderated content modification in order to ensure that user provided content is relevant and credible before it is saved to the application database for display to other users.
REFERENCES


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