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Library and Information Specialist in the Light of Information Architecture and his Role in Organizing Content

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Abstract:

In the age of digital information and technological development, there is an exponential and increasing growth of digital products and other sources of information that require a new approach to organization and structuring to help users navigate intuitively in complex information environments. Therefore, we find that the roles of the information specialist and even the nomenclature began to change with the emergence of this development in technologies.

This research sheds light on the concept of information architecture or what is called information engineering, and clarifies some concepts about the tasks and roles of information engineers and librarians, and the existing problems facing librarians who play the role of information engineers and offers some proposed solutions, and the research recommends the need to change the role of librarians and their qualifications to become information engineers in the current era of digital information environment.

Study Terms:
Information Architecture, User Experience Designer , Metadata

Study Importance:

We all know the importance of quality content for websites that users find valuable, but what is just as important is that the content is easy to find. In light of the increasing growth of data and complex information, organizations are grappling with data that comes in an unorganized and difficult to control form and sites that contain many old and modern designs side by side. Therefore, there was an urgent need to organize that information and arrange it easily so that the term “information architecture” or what is called information engineering was created to meet that need to help users navigate easily in complex information environments.

All this required that the digital library be managed by an information specialist who combines a set of skills to obtain information in order to improve its usability, such as organizing content, how to structure sites, providing a navigation system, creating interactive designs...etc. Therefore, we find that his role has turned into an information architect working to bring knowledge, provide access to it, and identify effective strategies for retrieving information.

Based on the foregoing, the study attempts to draw a clear vision of the new role of librarians as information architects, as they are responsible for organizing the content in their libraries, thus enhancing the ease of the site and retrieval of information by customers in light of these changes.

Study Problem:

Despite all the efforts made by librarians to satisfy their clients, there are still some critical issues that require a new approach that helps users easily navigate complex information

environments and re-design library websites to be more usable to meet the needs of their users, but the question is, do librarians have the skills to play the role of information architects?

In her report on Information architecture, Jane Leganza states that despite the leadership role of the information architect in the process of developing organizations and building enterprise information with best practices of enabling consistent access to the right data, but we cannot ensure that librarians play the role of information architects correctly and effectively. (Leganza's, 2010).

Marsh Haverty asserts that: The IA design process is one of the most important factors in motivating the proper building of information within organizations. Information architecture designers create solutions to meet the overall goals or functional requirements of a system within organizations using the basic components of structures and ways of navigating and interacting with information from a user-centered perspective. Easy use is also a critical factor for the success of organizations, however, these roles are not clear to many information architects themselves (Haverty, 2002).

Therefore, this study attempts to draw a clear picture of the responsibilities of the library and information specialist and the tasks assigned to him as an information architect, and to monitor the most prominent difficulties that hinder the information architect, in addition to the solutions that can contribute to overcoming the difficulties and developing the current status of information architecture.

Study Questions:

Several questions fall under this problem:

- What is information architecture?
- What is the importance of information architecture and its role in organizing content?
- What is the relationship between an information architect and a user experience designer?
- What is the role of librarians as an architect and information organizer?
- What are the difficulties that prevent the librarian from performing his role as an information architect?
- What are the proposed solutions to enhance information architecture services in libraries?

Study Objectives:

This study aims to shed light on the role of the library and information specialist as an information architect and the skills required to transform the librarian as an information architect, and the existing problems facing librarians who play the role of information architects, as well as to provide some proposed solutions to enhance information architecture services in libraries.

In light of the foregoing, these objectives can be formulated in a number of elements:

1- Understanding the concept of information architecture.
2- Recognizing the main role of information architecture in organizing content.
3- Determining the size of the role that must be played by librarians as information architects.
4- Monitoring the most prominent difficulties that may hinder the transformation of a librarian into an information architect

5- Coming up with some suggestions, directions and recommendations that hopefully will contribute to the development of information architecture services in libraries.

Study Methodology and Tools:

The research relied on the descriptive-analytical method to analyze and interpret the elements of the study by collecting data and facts from the literature, previous studies and scientific references related to the subject of the research.

Data Collection Tools:

A comprehensive and careful review of the subject literature by monitoring everything that was written on the subject of information architecture and the main role of librarians as information architects by searching in a number of databases related to the subject of the study.

- Library & Information Science Abstracts(LISA)
- Library & Information Science and Technology Abstracts(LISTA)
- Google schooler

Study Terms:

Information Architecture:

Information Architecture can be defined as: the process of structuring the content of a digital product logically and within a specific context, to help the target user to access the content easily. (Rosenfeld, 2002)

User Experience Designer:

A user experience designer performs processes related to extracting context and user needs through user research and then building and testing prototypes. The user experience design team may include an individual who specializes in information architecture, a user experience architect, or a UX Architect. (McManus, 2009)

Metadata:

Metadata is digital data that describes the characteristics of digital resources available on the Internet, or they are sentences that describe information sources in order to enable us to find, use and save those resources (Wikipedia, 2010)

Previous Studies

Many studies have applied usability principles and methods to evaluate and redesign library websites using architectural principles, to ensure that the design of these websites meets the accessibility and continuity of user interface components and the requirements of the design unity, including the study of David Robins et al., which conducted user tests to analyze the effectiveness of the university's website structure (Kelsey, 2002).

David Robins and Sigrid Kelsey conducted usability tests of the University Library website using the questionnaire as an assessment tool. The questionnaire was distributed to a number of users to evaluate the website of the central library of the university (McManus, 2009).

Louise McGillis and Elaine Toms also used task-based user testing to evaluate a university library website (Toms, 2002). And in all previous studies, evaluations indicated problems with the labeling, classification, and structures of the sites that were evaluated, all of which are essential site information architecture criteria. These studies provide important cautionary notes for library website designers to use user-centered design principles for specific situations to create websites that are most usable for different groups of users and to apply information architecture principles.

Jennifer Duncan and Wendy Holiday's study re-designed Utah State University (USU) library websites using information architecture. The main problem has been the growth of these websites over the years in terms of size and scope but without comprehensive planning. It included many different graphic variations with "old" pages from previous designs along with newer content. Between 2000 and 2003, the home page underwent two major overhauls. However, the redesign was not entirely satisfactory. Graphical elements, layout and some nomenclature have changed, but the examination showed that users found the site complex in design and unsatisfactory for many users (Jennifer D., 2008).

Helen's study sheds light on the concept of library portals and information Architecture and the relationship between the two concepts. Moreover, it includes the tasks of librarians in traditional ways in setting up a web benchmark, clarifying the roles that librarians and information architect s can play (Okpala., 2011).

As for the Arab level, the first Arab Conference on Information Sciences was preceded by the title: "Information Architecture", which was held at Beni Suef University from April 5-6, 2015. The conference discussed the emergence of the term "information architecture", its development, definition, and its connection to other disciplines, especially its relationship to the library and information science, in addition to evaluating the architecture of some libraries' sites.

Besides, Maysa Mahrous Ahmed (Mahrous, 2015) analyzed the basic components of information architecture by identifying information organization systems, content addressing systems, navigation and search systems, and identifying the technical processes that link it to the field of libraries and information in the digital space. In addition, clarifying the role of the library and information specialists as information architects and the tasks assigned to them.

Mohamed Abdel Mawla Mahmoud's research dealt with patterns of searching for information and methods of studying it from the point of view of information architecture by identifying the needs of the beneficiaries and their patterns of searching for information. In addition to the importance of the field of information architecture and its relationship to the library and information science (Mahmoud, 2015).

Maha Ahmed Ibrahim, 2015 dealt with the information architecture and informational architecture of the portal of the Arab libraries and information departments on the web (Ibrahim, 2015). We also find that Mahienour Soliman, 2014 dealt with information architecture with the application on some academic libraries' websites.

Information Architecture Concept.

The information architecture (IA) creates software intuitive browsing element schemas that aim to organize information within digital products into a coherent structure, the preferred structure that people can quickly understand, to help the user access the information they want easily and faster. It is usually a hierarchical organization, but it can have other structures, such as a concentric or chaotic one. (Al-Hayek, 2015)

Information architecture is defined as "a set of aids that match user needs with information resources" (Rosenfeld L., 2002), and as "a structure or map of information that allows others to find their personal paths to accessing knowledge." Warman's Web Content Style Guide provides a more comprehensive definition of information architecture in the context of web development. He sees that information architecture as a field concerned primarily with the processes of information organization, and the planning of the content of site pages Page Content Layout. In other words, in more specific and detailed terms, the functional design of content refers to the processes related to the organization of information and the creation and development: metadata, classification, navigation, searching, and content layout of pages (Klyn, 2009).

The Information Architecture Institute has defined information Architecture as the art and science of organizing and numbering websites, internal networks, and social networking programs to support them and ease their use. From the organization's point of view, usability will be a critical factor for the success of applications, software and websites. The Foundation states that good information architecture is what establishes the business roots of information systems that are beneficial for the benefit of customers (Information Architecture Institute, 2007).

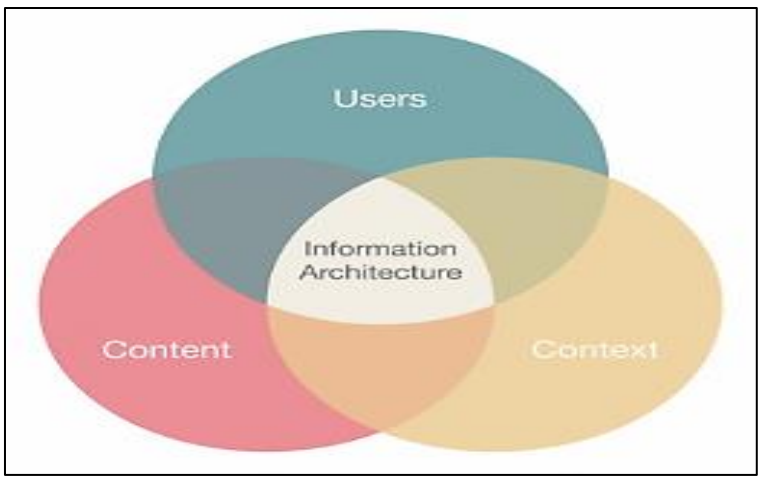

Figure (1) shows the users' IA design's link to content and context.

According to Rosenfeld and Peter Moreville, (IA) Information Architecture is: (Jennifer D., 2008)

1- Combining the organization, tagging and navigation systems within an information system.
2- The structural design of the information space to facilitate the completion of tasks and intuitive access to the content.
3- The art and science of structuring and categorizing websites and intranets to help people find and manage information.

4- An institutional system and community of practice focused on bringing design and architecture principles into the digital field.

Information Architecture and its Role in Organizing Content

Information architecture has emerged to confront two problems in the digital environment: controlling the vast amount of digital information, and the multiplicity of ways to access and deal with it.

Koman reports, "Nearly two-thirds of users of websites are looking for specific information." However, the impact of website's information structure on a user's ability to navigate that website has been overridden by many website designers, who tend to focus primarily on the "form and style" of the site. How information is categorized, differentiated and presented and how navigation and access is facilitated - the structure of information - determines not only whether users will find and be able to find what they need, but also influences user satisfaction and influences return visits. Information architecture is part of the design movement that focuses on the user and more specifically on the organizational structure and the elements of mobility (Koman, 1998).

Fields of Benefit from Information Architecture in Organizing Content:

- Organizing information by placing information in separate categories and specific classifications, separating them in a logical manner, such as alphabetical order, chronological or geographical order, and deciding how to link them to other information.
- - Addressing the contents and placing labels, defining and classifying the content of the site and putting labels to ensure that the names remain. This system is known as the alternate model. It was developed by Forsman in 2003 (Al-Bunyan, 2018).
- Availability of a navigation system that easily displays the content through a set of elements that allow the user to move from one page to another, while clarifying the relationship between the links contained in the navigation system so that the user understands the options available to him in order to browse the site well.
- Arranging the research results with the degree of their relation to the beneficiary’s inquiry or the degree of their popularity, or by a specific classification method such as chronological, alphabetical, or geographical sequence, or grouping them on the basis of the degree of similarity between them.
- Metadata is used to increase the retrievability of metadata, as it helps users to find relevant information and discover resources.
- Information Architecture is part of the user-centered design movement, as it balances the information structure of the site on the one hand and the needs of the users on the other hand. If users cannot find what they need through a combination of browsing, searching, descriptors and links, the site will fail.

Relationship between Information Architect and User Experience Designer (IA and UX):

User Experience (UX) Design is the process of designing products and services based on a customer's needs and problems. Thus, design becomes a catalyst in achieving the customer's goals of using the product or service. (Shelley G., 1999)

The user experience design should answer the following three questions:

Why does the customer want to use this product (motives - goals - problems)?
What does the customer want from the product specifically (uses - features)?
How can the customer use the product (interface - time - easy steps to follow)?

Therefore, the UX design process is the first step to building any product or service today.

The same applies to the architecture of user-centric information and how users interact with web content. The information structure of a site should not be taken into consideration without studying the needs of the beneficiaries and user behavior, and enhancing the effectiveness of the site and successful interaction with the beneficiary.

Accordingly, some may ask: “Isn't IA design the same as UX design? The answer is No. Although the two are closely related, they are not the same.

To understand the difference between the two, it is important to remember UX design. User experience (the user's interaction and experience with a product) is the way a person thinks and feels while using a product, system, or service. UX incorporates utility and ease of use much more than just content architecture. At the same time, it is almost impossible to create a good user experience without a solid information architecture foundation. This is why every good UX designer should also be a competent information architect. (Shelley G., 1999)

Peter Moreville and Louis Rosenfeld state: In the information age, the work of information architects, UX designers, interaction designers, and content managers is more important than ever and without them, the Internet will be a mess (Resmini, 2011).

The Role of Librarians as an Architect and Organizer of Information:

Librarians are knowledge organizers and are seen as information architects. Davis (2001) writes in his blog at (suite101.com) that "Librarian training in developing an information classification scheme, establishing hierarchies, thesaurus and databases, and focusing on information navigation and access is directly applicable to information architecture."

Librarians are practically responsible for organizing the content in their libraries and thus promoting the ease of the site and the retrieval of information by customers. Benson (2001) described librarians as organizers of information and stresses the need for librarians to put their talents to work as organizers of information, which contributes to facilitating the locating and accessing of Internet resources.

Organizing the information on the library website has become the responsibility of librarians as they learn how to create and design websites for their libraries rather than the involvement of outside hands. This role was emphasized by (Subramanian, 2004), who pointed out that "the role of the information architect is to determine how to structure the site, the type of content it should host, and how to accommodate future growth." Librarians are teachers who organize and evaluate information resources, they bring unique perspectives and skills to the development of their library sites. To plan and implement those portals, they bring their content expertise, copyright knowledge, commitment to customer service, and expertise in creating customized information delivery systems on the Internet.

Librarians Act as Information Architects in The Following Ways:

Content Creators

Librarians are agents who provide information to clients. They read the minds of the readers, anticipate what they need and then make the decision. This allows librarians to read customers' thoughts, anticipate what they need, and ask questions that readers can ask if they come to the library. Librarians are initiators. In the field of designing library portals. The librarian must have a good understanding of the content they provide and this helps to compile and proof it so that customers can easily refer to it.

Copyright Experts

The librarian is very knowledgeable about copyright matters. In fact, according to Zemon (Zemon, 2001), Librarians' knowledge of current copyright policy is now used more than ever before to create electronic reserves and online information for Blackboard-built online learning portals and other web-based course management systems. Zemon went so far as to state that librarians guide in identifying web-based materials that are subject to copyright and request permission to use such works. Librarians inform faculty about the Fair Use Guidelines and Library-Related Provisions of the Copyright Act and the CONFU (Conference Fair Use) Guidelines of 1997, which specify the time, copy/distribution, and partial restrictions on the use of educational multimedia work not in the public domain. A librarian's knowledge of current copyright policy is more necessary than ever (Konnur, 2010) .

- **Digital Reference Services Staff**

We hear about online chats, ask the librarian, chat with a librarian, etc. All these services are provided by web librarians to customers who have no experience in how to navigate through the library website. These services may be useful for both actual and external students who may not be physically present at the library site. According to Kasowitz, Digital Reference Services (DRS) provides high-quality service at any time to customers outside the library. (Kasowitz, 2000)

- **Metadata Builders**

Metadata is “data that provides information about other data.” In other words, it's "data about data." There are distinct types of metadata, including behind metadata, structural metadata, administrative metadata, signal metadata, statistical definition, and legal definition.

Metadata has different purposes. It helps users find relevant information and discover resources. It also helps to organize electronic resources, provide digital identification and archive and preserve resources. Metadata also allows users to access resources by “allowing resources to be found through relevant standards, identifying resources, bringing similar resources together, differentiating among different resources, and giving location information. (McManus, 2009). Information Architecture is based on three simple concepts: types of data, structural metadata, and descriptive tools.

Metadata creates space for marking contents. According to Nielsen (Nielsen, 1999), metadata makes information accessible by constantly classifying its contents. Metadata leaves a path for customers to follow to find the information they need all in one place. Librarians, as creators of metadata, provided keywords for those tools online. These are search terms that customers can use to easily locate these materials on library sites. Speaking about who creates metadata, Hodge stressed (Hodge, 2001) that it is better for indexers or other information specialists to

create metadata because data authors or creators do not have the time or skill. Thus, the librarian as an Information Architect (IA) will, according to McManus, identify descriptive patterns that do not change in the long run (McManus, 2009)

Gateway Teachers:

Librarians play their role as Information Architects in teaching customers how to navigate the library portal and take advantage of the various features offered by these portals. Librarians, as web portal specialists, are talking about buying portal design platforms. This situation occurs in case the librarian is not the gate designer. According to McManus, the librarian interested in purchasing the portal product must develop the requirements and send them to the seller (s) (McManus, 2009)

Activities Carried out by Information Architects:

Information Architects organize content so that users can easily find what they are looking for. The more content there is, the more important the Information Architect's (IA) role is in the UX design process. Below are some common activities in which the UX engineer may play a role (Helen. N, 2011).

Products Research

Another key element in (IA) design is user and market research. Because it helps to understand customer needs, goals, behavior, expectations, and motivations. Initial design according to existing data is vital. Product research can be done in many ways – surveys, interviews, focus groups, etc. Searching for what users need and want is critical to create an effective (IA) design, through which Information Architects can know how the target audience thinks as they search for information, and this will help them organize the information in a way that meets the user's needs. An effective (IA) takes users, as well as their problems, behaviors and needs, into account (Bagley, 2020).

(IA) plays an active role in:

- **User Interviews.** The IA practitioner will join other team members to ask questions related to product design.
- **Card Sorting Sessions**. Seeing how potential users categorize information into groups helps IA practitioners understand users' mental models.
- **Usability Testing:** IA also needs to access the results of usability tests to determine whether the structure they have created is working for their users.
- **Surveys:** UX engineers may also visit users in real-world environments to learn how they interact with the product.

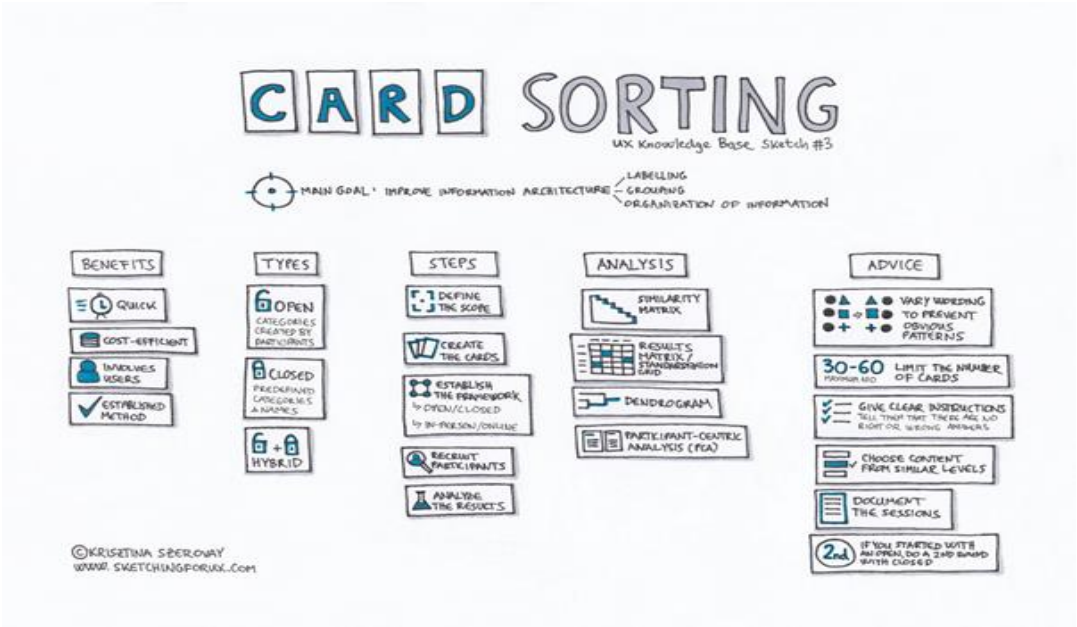

Figure (2) The method of sorting cards in the design of the information environment

Sorting cards plays an important role in designing the information architecture because it is a simple way to understand how users classify information into groups.

Content Compilation and Audit

Information Architects must have a good understanding of the content provided by the product, its aggregation, and its audits UX engineers to achieve this (Faller, Apr2020).

The content inventory shows IA practitioners what content they have and where it is located (usually a spreadsheet or list).

- **Content aggregation defines** the relationships among information.
- **Content audits give** the Information Architect insight into the usefulness, accuracy, and effectiveness of content (practitioners evaluate content based on these metrics).

	Page Title	URL	Comments
Page A			
Page B			

Figure (3) An example of a content audit spreadsheet, listing each page within a website or in an app

Ratings and Labelling

Classification is the practice of organizing and classifying items based on similarities. This is typically followed by user search and content inventories, IA classifies items using categories, sections, or metadata tags, and the way it is organized should be easily scalable.

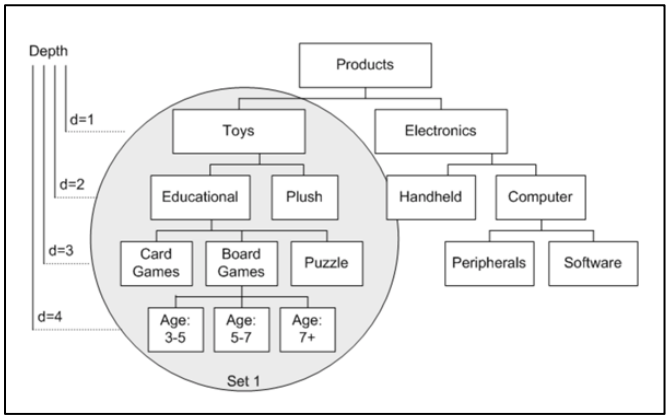

Figure (4) Example of Product Classification

Labeling is an important element of AI, because specific labels help users discover information. For example, a page containing information about a company should be named "About" rather than "General Information", which may be too vague for users to understand.

Create Hierarchy and Navigation Tools:

The hierarchy and navigation tools are two components in the IA the first determines the structure of the content, while the second determines how users will move through it. In order to create a hierarchy, IA needs to consider what the user expects to see (based on user research) as well as how they want to show information (based on project requirements). In this step, practitioners consider typical scenarios of user-product interaction and use this information to design Information Architecture schemes. These diagrams are usually in a sitemap format that shows the hierarchy of content across the website.

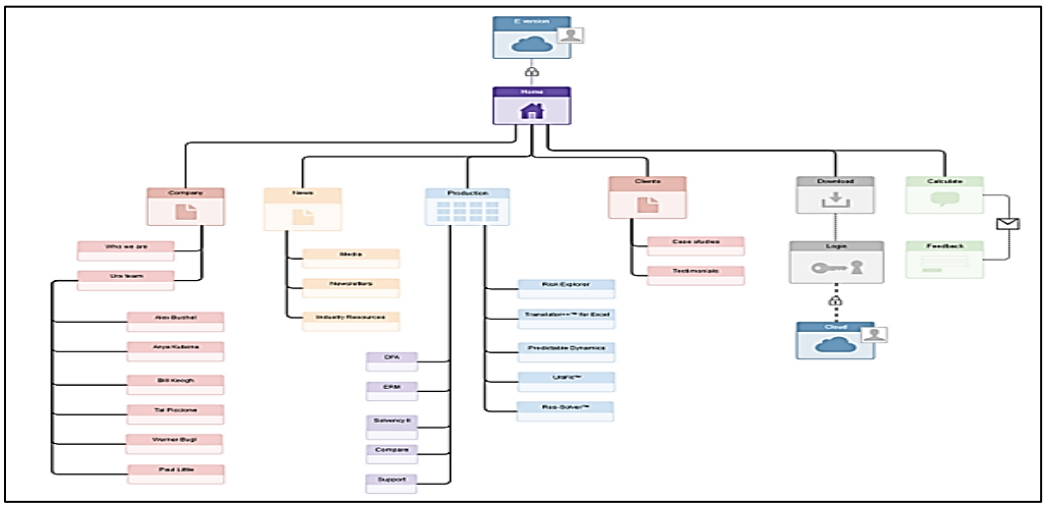

Figure (5) Schematic Diagram of the Site Plan

A site diagram, a kind of Information Architecture diagram, helps indicate how different pages and content relate to each other.

Models:

An Information Architect may also create simple, low-resolution prototypes to show the hierarchy of information and navigate based on the information gathered during the research phase. The architect draws ideas to show the screens that the product will have, the content that will be on those screens, and how they will be arranged (Rosenfeld L. , 2002).

IA engineers typically create clickable wireframes that serve only useful purposes, with a limited number of graphical elements. Later, visual designers use these clickable mesh frames as a reference when creating actual layouts.

Figure (6) Portable Mesh Frames

Clickable Mesh Frames help product designers assess the structure of the information correctly and meet the desires of the beneficiaries.

Card Sorting:

The card sorting process is a practical way to obtain data on how users think about content and categories, and through the sorting of cards, users are provided with cards on which the content titles are written and asked to arrange them in the way they see fit, and after finishing the order, the paths that consisted of users are described and compared, and the results that are drawn help to determine the most acceptable information structure among users.

Challenges Facing Librarians as Information Architects:

Libraries should be able to provide everything customers need even if they cannot physically attend. Beneficiaries should be able to find materials in the library while connecting to the "remote" internet. All these and other services are provided by librarians to their clients. Despite all the efforts that librarians may make to satisfy their clients, there are still some crucial issues that pose a problem for librarians in their role as Information Architects, as follows (Helen. N, 2011).

- **Lack of Training in IT Matters**

Librarians, especially in developing countries, have little or no knowledge of using computers to perform their routine functions, let alone to design their library sites. This is one of the new functional requirements that their role as an Information Architect requires (Dillon, 2002).

- **Classification Problems:**

Creating hierarchies, navigation tools and metadata is essential for librarians to master the basics of indexing and classification. The hierarchy determines the structure of the content, and the navigation tools determine how the beneficiaries will move through it, searching for what the beneficiaries need and want is critical for the Information Architect IA to create an effective design (Dillon, 2002).

- **Lack of Interest**

Some librarians may not have the care to become Information Architects and therefore sell the job to business leaders who claim to know all about the library portal even if they don't know the basics of the libraries.

- **Increasing Administrative Burdens on Librarians:**

In the case of a few librarians in an institution, the librarians who are present have a myriad of administrative burdens to carry out. In such a case, librarians will face basic traditional library services such as traditional cataloging, reference services, course teaching, consulting assignments, and others.

Solutions Provided:

The following are the solutions presented by the authors in an attempt to enhance Information Architecture services in libraries (Helen. N, 2011):

- **Training Librarians on Information Technology:**

Librarians should be trained on everything related to information technology and new trends in library services. This will provide them with opportunities to compete with colleagues who use IT to reach their customers. This step will be necessary to improve office services.

- **Training Librarians as Metadata Creators:**

This will broaden the horizon of librarians working in the field of indexing.

- **Teaching Information Architecture in Library Schools:**

Information architecture should be an additional material in library and information science curricula where students are taught the basics of information architecture and library portal designs. Thus, relieving the burden on libraries that hire them in the future instead of paying large sums to people from abroad for the same job (Hodge, 2001).

- **Career Opportunities for Information Architects "Librarians":**

They will be in the right position to deal with these responsibilities.

Conclusion:

With the transformation that the developed world is witnessing and its transition from the industrial society to the information society, the necessity of controlling the production of information, processing it and trying to benefit from it has emerged, the term information architecture has emerged as a turning point in terms of organizing, searching, sailing and addressing the contents of websites to support and facilitate the user's access to the information he needs.

The human element is one of the most important components of information architecture, and it is necessary to have all the skills of analyzing and organizing information, and experience in data extraction, knowledge, extraction, and designing structures and user interfaces. Etc., and define its role and functions vis-à-vis the organization of digital content as an Information Architect.

The role of the Information Architect was to bring knowledge and provide access to it, identify cost-effective strategies for retrieval, diffusion, and retrieval of new knowledge, i.e., redirect the focus of information institutions, it is time to invest in human resources not technology.

The study recommends that librarians should be trained in new trends in library services and information and technology issues, have the skills to act as Information Architects, develop the curricula of the library and information sections, and review them on an ongoing basis to accommodate new changes in the production and processing of information.

References:

1. Al-Bunyan, R. F. (2018). *Reem Faisal Al-Bunyan. Information architecture for government agencies websites: an evaluation study. Faculty of Arts, .* Cairo University.
2. Al-Hayek, H. (2015). *Information architecture and browsing elements: the new information architecture.* Retrieved 4 12, 2022, from Naseej Academy: http://blog.naseej.com
3. B., K. (2020). *Information Architecture Process: How to Create the Best UX.*
4. Bagley, K. (2020). *Information Architecture Process: How to Create the Best UX.* Retrieved from Blue Fountain Media: https://www.bluefountainmedia.com/blog/information-architecture
5. Benson, A. C. (2001). *Complete Internet Companion for Librarians.* New York: Neal-Schuman Pub.
6. Davis, G. (2001). *Information Architecture and Librarianship*. Retrieved from http://wwwsuite101.com
7. Dillon, A. (2002). Information Architecture in JASIST: Just Where Did We Come From. *Journal of the American Society for Information Science and Technology, 53*(10), p. 821.
8. Faller, P. (Apr2020). *Top 5 Content Inventory Tips for Information Architecture.* Retrieved from INFORMATION ARCHITECTURE: https://xd-adobe-com.translate.goog/ideas/process/information-architecture
9. Haverty, M. (2002). Information Architecture without Internal Theory: An Inductive Design Process. *Journal of the American Society for Information Science and Technology*(10), p. 839.
10. Helen. N, E. (2011). Library Portals and Information Architecture: Librarians emerging Info architects. *Journal of library & Information Science, 1*(2).
11. Hodge, G. (2001). *Metadata Made Simpler.* USA: National Information Standards Organization.
12. Ibrahim, M. A. (2015). Information architecture and informational architecture for the Arab Library and Information Departments website portal. Cairo: Beni Sue University.
13. Information Architecture Institute. (2007). *What is Information Architecture?* Retrieved from http://www.iainstitute.org/documents/learn/What_is_IA.pdf
14. Jennifer D ., W. H. (2008). *The Role of Information Architecture in Designing a Third-Generation Library Web Site.* the Utah State University: College & Research Libraries.
15. Kasowitz, A. B. (2000). Quality Standards for Digital Reference Consortia. *Reference and User Services Quarterly, 39*(355).

16. Kelsey, D. R. (2002). Analysis of Web-Based Information Architecture in a University Library: Navigating for Known Items. *Information Technology and Libraries, 4* (21), pp. 69-158.

17. Klyn, D. (2009). *Conversation with Richard Saul Wurman.* Retrieved from http://wildlyappropriate.com/?p=781.

18. Koman, R. (1998). *Helping users find their way by making your site 'smelly.* Retrieved from WEBREVIEW.COM: http://Webreview.com/wr/pub

19. Konnur, P. V. (2010). *Library Portal: Role of Librarian.* Retrieved from https://drtc.isibang.ac.in/bitstream/handle/1849/273/libportal-urk.pdf;jsessionid

20. Leganza's, G. (2010). *information architecture* (Vol. 10). Forrester Research.

21. Mahmoud, M. A. (2015). Patterns of searching for information and methods of studying it from the point of view of information architecture. Cairo: Beni Suef University.

22. Mahrous, M. (5-6 April 2015). The basic components of information organization systems within the information architecture. *the first Arab Conference on Information Sciences entitled: Information Architecture.* Beni Suef University.

23. McManus, M. (2009). *What is information engineering?* Retrieved March 26, 2010, from http://www.maya.com/the-feed/what-is-information-architecture

24. Nielsen, J. (1999). User interface directions for the web Communications of the ACM. *1*(42), pp. 65- 72.

25. Okpala., H. N. (2011). Library Portals and Information Architecture: Librarians emerging Info architects. *International Research: Journal of library & Information Science, 1*(2).

26. Resmini, A. a. (2011). A Brief History of Information Architecture. *Journal of Information Architecture, 3*, pp. 33–48. Retrieved from http://journalofia.org/volume3/issue2/03-resmini/.

27. Rosenfeld, L. (2002). Information Architecture: Looking Ahead. *Journal of the American Society for Information Science and Technology ., 53*(10), p. 875.

28. Rosenfeld, L. (2002). Information Engineering: Looking Forward. *Journal of the American Society for Information Science and Technology, 53*(10), p. 875.

29. Shelley G., R. B. (1999). The impact of information architecture on academic web site usability. *The Electronic Library, 17*(5).

30. Subramanian, S. (2004). *An Introduction to Information Architecture.* Retrieved from http://articles.sitepoint.com/article/information-architecture

31. Suleiman, M. (2014). *Information architecture: theoretical studies with application to Some academic library websites* . Alexandria: Alexandria University.

32. Toms, E. G. (2002). Information Interaction: Providing a Framework for Information Architecture. *Journal of the American Society for Information Science and Technology, 53*(10), pp. 855–62.

33. *Wikipedia.* (2010). Retrieved March 26, 2020, from https://ar.wikipedia.org/

34. Zemon, M. (2001). The librarian‘s role in portal development: Providing unique perspectives and skills. *C&RL News*. Retrieved from http://www.ala.org/ala/mgrps/divs/acrl/publications/crlnews/2001/jul/ALA_print_layout_1_169488_169488.cfm