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SELECTED ISSUES OF INFORMATION ARCHITECTURE

Abstract: The article deals with the main assumptions of information architecture and information architects' tasks. This article describes fundamental problems connected with information organization, giving distinctive names and choosing searching schemes in the information system.

Keywords: e-commerce, information architecture, information architect, web services designing.

1. Introduction

All the fields of our life are currently dominated by information. The development of information technology brought changes in the access to information and facilitated this access. Unfortunately, there are also negative points of this situation, for example, users are flooded with unwanted information. The article shows a relatively young domain of knowledge – information architecture (IA). IA is connected with forming an easy access to information for the user. It can be done by structural designing of information space.

2. Information architecture

Rosenfeld and Morville, the authors of a classic textbook in building of the Internet service, whose title is *Information System Designing and Evaluating*, present some definitions of information architecture (IA). They define IA as [Rosenfeld, Morville 2006]:

- combining the way of information organization, giving distinctive names with the schemes to go through an information system;
- structural designing of information space to facilitate completing of information and making it available to users;

- the art and science of giving structures and classifying Internet services, the main purpose of which is to make finding and using information easier for people;
- new, cognitive and practical discipline, whose task is to provide the rules in designing and creating constructions in the virtual scene.

Information architecture concerns indeed designing easily accessible and clear information for the user of an Internet service. A definition of the information architecture is not easy. In general, information architecture is concerned as structural designing of information space whose main function is to facilitate drawing up information and later opening it to users. Reducing the scope of this field, we can state that IA is an art and a science concerning giving structures and classifying Internet and intranet services in order to make searching and using of information easier for users. Information architecture does not introduce any new ideas that were not known earlier.

Techniques and methods of information architecture were borrowed from different practical fields [Skórka 2004]:

- visual designing,
- information designing,
- library science, cognitive psychology,
- engineering of human elements, journalism,
- editing.

Information architecture consists of organization systems, label systems, navigational systems and searching systems. Organization systems deal with dividing information into categories. Label systems define ways of describing information. Navigational systems describe ways of browsing through information in services. Searching systems deal with methods of searching and their task is also to present information that somebody found.

Table 1. Information architecture components

Information architecture components	
Organization systems	They deal with dividing information into categories (in other words, grouping of contents)
Label systems	They decide about the ways of describing information (in separate categories)
Navigational systems	They influence ways of information searching in services (facilitations in navigation)
Searching systems	They deal with the methods of searching and present information that somebody found

Source: Nojszewski [2004].

The description of the components of IA from Table 1 was expanded in Table 2, which shows the detailed elements of IA and their functions.

Table 2. Detailed elements of information architecture

Information architecture Detailed elements	
Supporting the process of browsing	
Organization systems	They divide systems into logical segments (taxonomy of service)
Systems of wide navigation	They show to the user where he or she actually is and where he or she can go
Systems of local navigation	They support moving within a service module
Service maps and contents	They support navigational systems which present an overall outline of the whole service
Service indexes	They alphabetically order links to all parts of a service
Guides to service	They describe and provide references to appropriate parts of a service
Creators	They lead step by step according to earlier established service route
Systems of contextual links	They create links to familiar terms (correlated with each other)
The rules of building and planning of the geographical schema	They aim at improving visual clearness and service usage comfort, for instance, by suitable graphical highlighting of key elements
Supporting the process of searching	
Searching interface	It describes the rules of creating forms with questions
Question language	It defines the grammar of questions
Searching algorithms	They specify which service elements match inquiries
Searching ranges	They are subsets of service content narrowing the process of searching (only to a particular part of the service)
Presentation of searching results	It describes the scope of data and the way in which results are shown
Invisible for the user components: • controlling dictionaries, • thesauruses	They are a combination of key words from specific fields that are prepared earlier; sets of rules to form answers to inquiries
Elements of the web service facilitating an act of understanding its structure and its actions by the user:	
• headings and built-in links	They are labels describing the content of subpages with references directed to them
• set metadata	They constitute information that can be pull out and they can be used as metainformation
• sequential help	It allows making the user realize at what stage he or she is
• identifiers	They are a kind of hint, most often in visual form (colours, characteristic graphical feature for a particular part of the service) enabling easier orientation in which part of the service the user is

Source: Rosenfeld, Morville [2006].

3. Information architects

Information architects are new specialists on the market. Their main goal is to decide how to give, in a clear and friendly way, basic information about a product or service to the user. To form user-friendly information sources, the information architect uses the following criteria:

- type and needs of the user,
- information environment,
- form and clarity of information,
- destiny, purpose,
- graphical form.

The information architect has to familiarize with user needs. It is necessary to describe the type of user. Information environment, in which the user moves, has to be appropriately designed by the information architect. He or she is obliged to take care of the destiny, purpose of the information and their graphical form.

The information architect makes access to information easier by:

- gathering different information units,
- grouping units into useful categories,
- giving them easy names, well-known by most people,
- putting information in such places where it can be easily found.

The information architect should have the following skills:

- organizing information,
- being familiarized with standards of the Internet services creating,
- ability to conduct research with users,
- ability to test functionality and usefulness,
- planning navigational and searching systems,
- managing a designing team,
- cooperating in a team.

The information architect starts his or her work from selecting smaller information units (i.e., categories) from the contents of the designing information-searching system. Categories are organized hierarchically. They are combined with navigational systems in such a way that it is possible to obtain their blending, both structural and semantic. Stages of information-searching system building are preceded with the research on the target group which consists of users. Information architects rely on users' opinions while categorizing, designing navigational systems, using names and terminology.

4. The user in the center of attention of information architects

The satisfaction of the information user is the main and the most important purpose for the information architect. For instance, satisfaction of the library user is the result of an appropriate interaction between the following elements: the electronic collection

of a library as well as printed collection, technical improvements, the attitude to users and readers' value [Skórka 2008].

The information architect has to have the right attitude to users' service. He or she must not only get to know their preferred strategies in information searching, their education, interests, etc.

What benefits can the user receive from the acts of information architects? This aspect will become clearer if illustrated by the example of the Internet services which have been the subject of a great amount of research.

The service user is looking forward to find information in a fast and comfortable way from the information system. The information architect is responsible for designing and forming of the aforementioned system.

Skórka [2006] noticed that, for some years, information architects have cared about the users of Internet services, especially about the users of commercial services. Their main aim is to provide comfort during browsing and looking for some interesting issues.

To obtain satisfactory results in searching information, we should take into account knowledge related to the searching problem, effectiveness of the searching systems, established strategy of the information searching and abilities to use searching systems.

Information architects approach to the situation when the user-receiver will be able to move independently in information space. Therefore, desirable features of the user are currently independence and self-sufficiency. These features are particularly useful for the Internet user, who must manage it. The task that belongs to the information architect is to facilitate access to information.

When the information system will be built according to information architecture rules, it will be possible to match precisely all components, namely systems of the contents organization, navigation, searching and labeling.

5. Selected applications of IA

This section provides the most distinctive areas of IA application currently. The first application relates to librarianship. This is an interesting application because librarianship, among others, has given birth to IA. And then the IA has been used in libraries.

The second area of applications – e-commerce – directly results from the nature of the field. The typical e-commerce consists of Internet shops. The primary use of IA is a professional web development for these shops indeed.

The last of these applications relates to CRM systems, whose importance is constantly increasing. IA is applicable both to organizing customer data and organizing relations with them.

5.1. Information architecture in libraries

The library subject is particularly essential and it is completely justified to analyze it in this article. Libraries formation became the beginning of the process of information organizing that has been done by librarians. Not only did the creators of information architecture benefited from librarians' experience but also the first information architects. The librarians' knowledge, methods preferred by them to organize a collection of books have become the basis of information architecture. Classification of any collections of books, describing them and making them available for their readers are in fact nothing else than organizing information and making it available.

However, there have been times when access to information was harder than nowadays. We need to remember that access to information is, in fact, the most important purpose of a library. As a good example, we can use the fact that since the second half of the previous century libraries have been computerized and technically modernized. The society forgot about main functions of a library, namely gathering, studying and allowing readers to access information. People focused on equipment, computer hardware and software that have been thought to bring great changes in libraries. Nevertheless, the effect was different. Putting a computer in a library appeared to be insufficient; furthermore, it cannot solve all kinds of problems. We should not forget about an appropriate preparation to work as a librarian.

Fortunately, the process of computerization did not hide the main tasks of a library. There have been many attempts to familiarize with readers' opinion associated with libraries work and services provided by them.

It seems to be clear that the reader will be satisfied if he or she gets a comfortable and easy access to various types of information – either a collection of books or electronic resources.

In order to guarantee proper service to all users, we have to get to know their needs, desires, favourite ways of information searching, their educational background and interests. Knowing all these details, librarians are able and should teach us all those skills that are highly connected with professional finding of information and moving in information space either this real or virtual. Their next task is also to familiarize us with the methods owing to which we can move in the information system, certainly, by means of some special devices. These were the observations of Skórka [2008].

The information architecture that has its roots in libraries, nowadays contributes to the improvement of library functioning. It is achieved by providing new, better and clearer methods and rules concerning gathering information and making it available.

5.2. Information architecture in e-commerce

Generally, the term “e-commerce” is closely related to the process of selling and buying products and services; in other words, it is an electronic trade. Among the examples of e-commerce, we can list the internet shops, the internet auctions and virtual stock markets.

According to Hernes et al. [2005], “The problem of the information architecture in e-commerce refers to the lack of standards and simultaneously the lack of homogeneity of the information architecture. The typical e-commerce consists of the Internet shops. They are really ubiquitous in the Internet. A structure of the internet shops is very complex. We can list here, for instance, goods, categories of goods and subcategories of goods. Goods, categories and subcategories are linked with each other hierarchically by means of relations, equivalence and associations. What is more, they have their own individual structure of data. A shop is a peak of a hierarchy; on the second and next levels we have categories and subcategories, while, on the lowest level of hierarchy there are some certain goods”.

In the next part of this article, another role of the information architecture in a traditional enterprise will be described. Companies try to find better and better ideas to gain an advantage over competitors to make their products attractive in terms of price, quality and suitability to customers’ needs.

It became clarified by Kotecki [2010] that information architecture “may appear to be an essential factor to form a positive image of products and services that are offered to the customers. The next crucial aspect is technology, as well as, more and more popular usage of the internet and multimedia devices to build communication with the customers. It is essential, especially, in the act of selling and service after the whole transaction. Most enterprises have their own websites or business blogs which main function is to make communication with the customers easier. It is very important to help the receivers to use these offered services rather than discourage people from contacting with the firm”.

Information architects who work for any business cope with an analysis of products searching techniques and presentation of the information connected with the product on a website. They are able to increase selling through suitable connection of the information and mechanisms supporting the process of selling. These activities make websites more competitive, which later contributes to higher income.

If consumers choose specific products and services offered by one particular enterprise, in spite of many other comparable businesses with respect to their offer, it is usually implied by the user’s experience (UX). It is related to the user’s general view correlated with his or her experience gained during making the use of companies’ services. For that reason, it is so important to enable the user to take advantage of a website where customers have a possibility to find either the information concerning an enterprise or products and services that are on offer. Such websites should be simple and comfortable to allow customers to act intuitively.

Therefore, enterprises pay attention to fit their products and services to people needs remembering, simultaneously, about encouraging users to come back to this website. To achieve these goals, careful service designing is necessary as well as using IA at the same time.

5.3. Information architecture and CRM

CRM (Customer Relationship Management) is a combination of procedures that are crucial in management of company contacts with customers. CRM aims at an improvement of the contacts with customers. Thanks to that, more dynamic development of a company, better realization of determined purposes and achieving a profit are possible.

CRM should be treated as a part of a strategy and business philosophy where permanent contact and the customer's satisfaction are key values. An assurance of a uniform system in all business processes – from the beginning of the selling process to the service whose task is to compile appropriate statistics is a really crucial aspect.

CRM systems are classified into many various communication modules. Efficient acting of CRM systems could not be possible without database systems and information systems.

The basic challenge to implement any CRM initiative is using the customer-centric information architecture. CRM business requirements connected with information architecture concern the opportunities to use real, complete, actual, upgrade data. Many companies are currently in the process of implementing CRM initiatives. Those initiatives are especially designed in order to improve company's capability to identify customers, to attract and keep them and take advantage of these contacts in a broader perspective.

CRM is going to serve successful marketing strategies, giving an advantage over a competition. It appeared that the customer's name is not sufficient to identification. That is the reason why new identifiers, apart from basic ones, such as the customer's name, telephone number, address. The new identifiers allowed segmenting the customer's base. Segmentation allows differing the customers in such categories as demographic data (salary, educational background, family), behavior (buying preferences and the customer's loyalty). It also permits discovering a potential threat of the loss of a customer.

The organizations which define strategies and CRM initiatives have to fulfill difficult changes in CRM environment. Integrated information about the customer in a company requires these challenges. CRM is becoming more and more popular thanks to the development of the best economic practices and improvement of the process associated with an enterprise's influence on the customer. The Enterprise Customer Data Store is the focal point of the customer-centric information architecture that makes it possible for an organization to realize the promise of CRM.

6. Information architecture in the web services designing

Creating Internet services is an art that is not easy. Nevertheless, the problem is not making a website but, in fact, the most problematic is organizing such a huge amount of data so that it would be easy to use.

Internet services consist of hundreds or even thousands of elements connected with each other. Those connections are carried out owing to links. Information architecture decides about the structure of above mentioned links, ensuring the process of information classification, labeling and, last but not least, forming systems of navigation and searching.

Data organizing is aimed at lowering the costs of finding the information both in financial way and in terms of time (fast information receiving). Additionally, finding appropriate information demands being familiarized with the system of information organization. This activity may be also streamlined through obeying the rules of information architecture accurately.

From the very beginning of the creation of internet services, information architecture has influenced its character, precise design and forming. All website elements need to be in the right places, which guarantees users' satisfaction connected with the effects of searching. On the basis of the project, the information architect creates a simple and transparent navigational system. The next step in forming a website includes the programmer who is responsible for producing a code, graphic and generally for the overall look of a website. A good practice is a cooperation between designers and programmers from the very beginning, namely in the initial stages of designing. Thanks to that, a design is in better quality, more coherent and describes the reality better.

In the built website the most crucial information should be easily accessible. Obviously, decision about the importance of particular pieces of information is made by research among users. It was mentioned earlier that the main research task is to give answers to questions about users' needs. On these grounds, we ought to choose the right navigational system, an order of menu elements, etc. Such operational research will contribute to the fact that users will be satisfied and, moreover, they will benefit from this service willingly.

We can order information in two ways. We can take advantage of a criterion that refers to all sorts of data (date, an initial letter of a name linked to a specific geographical place). This method permits finding information quickly, however, on the other hand, it is useless in the case of looking for similar (related) data. Therefore, ordering data by means of thematically organized methods is frequently applied. Such data ordering is more difficult to accomplish but it is often use by users.

Applying the rules of information architecture from the initial stage lets us form a good website that will stand out from the others owing to an interesting offer or substantive satisfaction. What is really necessary for users is easy and comfortable working conditions with a website and short time of expectation for an answer. Satisfying their needs leads to higher audience as well as bigger and more frequent visits.

Additionally, following Nielsen [2003], one of the pioneers of information architecture, we ought to pay attention to the importance of content designing. As it turned out, users frequently go through websites, however, they do not read them. Therefore, we should describe:

- the length of a text on a website,
- clarity and simplicity of language,
- appropriate division of websites with texts,
- suitable matching of a title to content (a title is very often used as a text which might be found in a search engine).

There is also another aspect of information architecture. Namely, forming Intelligent User Interface – IUI. Such interfaces take advantage of artificial intelligence technology to support an interaction between a human being and a computer. Nowadays, it is an intensively developing field. After graphical interface that we are familiarized with, IUI will be the next very important giant step in the development of user interfaces.

According to Stankiewicz, Susłow [2004], “in the process of IUI building there are used such methods as adaptation to the user, to the task and to the thematic field, creating a model of the user, an interpretation and generation of an utterance in a natural language, a dialogue modeling, a generation of system activities explanations. Intelligent User Interface limits to the minimum possibilities to make mistakes in navigation and simultaneously, it enables a special flexibility of actions giving the users wide freedom of choice”.

The emergence of an increasing amount of services in particular commercial services contributed to the situation in which they compete with each other. It turned out to be insufficient to have a company website; we should create a website that will attract users. To build such a website, we need to be properly prepared, which means that we ought to design an Internet service correctly.

The research dealing with the rules of Internet services designing was conducted, for example, by the company Norman Nielsen Group and such authorities as Steve King and Jacob Nielsen. This research permitted us to formulate some rules and rights concerning Internet services designing. The most essential ones according to Krug [2006] are:

1. “Do not order me to think.
2. It does not matter how many times you will click, if only this click is a deliberate choice, did without thinking.
3. Throw a half of words away from every page and later a half of words from those that remained.
4. The user does not read the content, he only goes through it.
5. The user does not choose in an optimal way, but he is satisfied with the results.
6. The user does not analyse how it is working but he just copes with it”.

In the first rule Krug gave us the most essential message concerning quality and effectivity of electronic information systems. First of all, this rule implies that an intuition of a service that can be achieved by writing understandable commands and putting the elements of a website orderly and invariably.

The second rule concerns visible information transmission in a link label or a heading. Moreover, it gives a chance to navigate with the awareness of own location and a direction in which we are moving.

The third rule discourages from introducing a large amount of content to read from the screen. It applies either to the texts presented on a website or the instructions and options created to help. This rule is a result of users' unwillingness to read from the screen.

The fourth rule describes the fact that the satisfaction of the user is an effect of found results although they are often incomplete because of a lack of time.

The fifth rule elaborates on the usage of different devices by the user, for instance, browsers, without knowing the rules of their working and users' managing with problems that appear during the process of using it that eventually ends with finding searched information.

These rules apply to each situation where the user searches the information independently, for example, Internet services, libraries. It should be added that the information architect, by organizing digital information, uses one of the two types of information organization: precise organization schema and ambiguous organization schema. The precise schemata are based on the formal criterion used to organize the expressions, whereas the ambiguous schemata are based on logical and semantic criterion. In the precise schemata each expression determines an explicitly identified class of objects or content and the scopes of particular classes and separate. The precise schemata ensure fast and easy finding of information if only the user knows the names of people, places, work or other informational objects in which he or she is interested. They, however, are not able to give the whole access to the contents of such organized information stores.

Woźniak-Kasperek [2006] said, "in the ambiguous schemata we can notice a division into groups (classes, categories) organised according to logical and semantic criterion. To the ambiguous schemata belong various kinds of hierarchical structures which classes are represented by natural expressions. Because of the fact that it does not happen often that a word or expression, phrase has only one meaning in class hierarchization we need to take into consideration one, arbitrarily accepted interpretation of the meaning represented by its expression or we can try to include many or all its possible meanings into hierarchy".

It ought to be added that present Internet and intranet services are bigger, more complex and they have more functions than in the past. Present users have more requirements. Designers, information architects and Internet services managers have to control large amounts of data and they need to update data efficiently because of new technologies that appear and because of changing company strategies. It turns out that information architecture has never been so crucial as nowadays.

7. Conclusions

Information architecture came into existence as an answer to the quick increase in the number of the information stores on the Internet. IA is a device that allows designing Internet infrastructure. It helps in describing the structure, searching

methods and the internet service navigation. According to information architecture, the communication with the user is the most crucial sphere, especially, giving him or her comfortable and effective access to data. In times when information spreads very quickly, usefulness is a decisive factor that allows websites to obtain success. As a result, good information architecture will give indispensable logical grounds for information system users.

Information architecture uses methods and techniques from different fields, for instance, management, cognitive psychology, information technology, ergonomics, library science or journalism. Information architecture is simultaneously used in many different fields, such as the internet service designing, e-commerce and many other fields associated with storing and making the information available.

Information architecture is perceived as the field of science and art at the same time. IA requires, on the one hand, the knowledge of technical issues and, on the other hand, it requires us to think creatively, solve problems and adjust created services to atypical users' needs.

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WYBRANE PROBLEMY ARCHITEKTURY INFORMACJI

Streszczenie: Artykuł przedstawia relatywnie młodą dyscyplinę wiedzy – architekturę informacji – zajmującą się tworzeniem łatwego dostępu do informacji dla użytkownika poprzez strukturalne projektowanie przestrzeni informacyjnej. Przedstawiono również architektów informacji jako specjalistów, których zadaniem jest zaprojektowanie przestrzeni informacyjnej, wygodnej w użyciu i zarządzaniu zasobami informacyjnymi, aby użytkownik mógł wyszukiwać informacje w sposób zindywidualizowany.

Słowa kluczowe: architektura informacji, architekt informacji, projektowanie serwisów internetowych, e-commerce.