Information architecture and credibility of medical service provider website

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Abstract. *There are many kind of websites dealing with health services and health (medical) information: from those intended for (prospective) professionals e.g. websites of medical schools, universities, health professions associations, medical search engines, ..., to those intended for patients and other interested people e.g. public health portals, web database directories of medical doctors, websites of medical clinics, health centers and private medical practitioners, ... Besides delivering quality medical service, quality website – its information infrastructure and information content help to gain business success.*

Usage of the websites mentioned above (its information and services offered) is directly influenced by credibility and trust of prospective and existing users, customers and patients.

Users of those websites perceive its credibility and trust them based on some websites information architecture elements.

In this paper expectations and requirements of users regarding web information architecture elements and some examples of typical medical service provider website information architectures are discussed.

Keywords. web site, web information architecture, medical service provider, credibility, trust

1 Introduction

The Internet is now one of the most used sources of information in all spheres of human activities. Very often, users on the Internet search for information related to health and healthy living, symptoms of the disease and its cure, medical evidences, surgery procedures and other medical services.

Different web sites provide a variety of medical and information to different users, whether they are professionals - health workers (doctors, nurses, pharmacists, researchers, etc.), those who want to become it - pupils and students, or patients or their families/relatives.

Websites providing medical or health related information could be e.g. websites of medical schools, universities, health professions associations, or medical search engines intended for professionals. They could be more patient oriented such as public health portals, web database/directories of medical doctors, websites of medical clinics, health centers and private medical practitioners, etc. Those websites are very important and specific because they offer very sensitive and vital information. So the argue for quality of such websites is even bigger. On other side finding quality information (especially medical information) on the Internet is affected by users' information literacy, i.e. their ability to recognize when information is needed and to locate, evaluate, and use effectively the needed information [1].

Locating and selecting a medical service provider and getting basic information about some medical service is the topic of this paper. For this purpose information architecture and credibility of six web sites of medical service providers' websites will be inspected and described regarding their context, content and users.

1.1 Web information architecture

As users we experience very often some websites as very intuitive, simple, easy and pleasant to use and to find information. On the contrary, some web sites create the opposite impression of their users. Very often such impressions are related to "bad/good web design" but it is much more – it is about bad/good web information architecture.

Some of information architecture or IA definitions are:
- "the structural design of an information space to facilitate task completion and intuitive access to content" [4]
- "the combination of organization, labeling and navigation schemes within an information system" [4]
- "the art and science of organizing and labeling web sites, intranets, online communities and software to support usability and findability" [3].

According Rosenfeld and Morville [4] closely related disciplines to AI are graphic design, interaction design, usability engineering, experience design, software development, content management and knowledge management, while disciplinary backgrounds are in graphic design and information design, information and library science, journalism, usability engineering, marketing, computer science, technical writing, architecture, product management etc.

The importance of IA for an institution or organization is in organizing and labeling information to lower the costs of (not) finding (web) information and the costs of building and maintenance of web sites, and to raise the value of brand and/or web credibility (to make website trustworthy and knowledgeable).

Rosenfeld and Morville [4] break IA components into organization systems (the way in which information is categorized), labeling systems (the way in which information is represented), navigation systems (the way in which information is browsed or moved through) and searching systems (the way in which information is searched). Due the problems with mentioned categorization of AI components (unclear boundaries of the systems), the same authors present another one: categorization into browsing aids (organization systems, site-wide navigation systems, local navigation systems, sitemaps/tables of contents, site indexes, site guides, site wizards, and contextual linking systems), search aids (search interface, query language, retrieval algorithms, search zones, and search results), content and tasks (headings, embedded links, embedded metadata, chunks, lists, sequential aids, identifiers), and "invisible" components (controlled vocabularies, thesauri, and rule sets).

Three elements build a basic for AI of organizational website: context (business goals, funding, politics, culture, technology, resources and constraint), users (audience, tasks, needs, information seeking behavior, and experience) and content (document/data types, content objects, volume, and existing structure).

Those elements together with AI components are the subjects of the research described in the paper.

1.2 Web credibility

According Tseng and Fogg [6] credibility is a perceived quality; it doesn't reside in an object, a person, or a piece of information. Self [5] (in [6]) emphasizes "trustworthiness" and "expertise" as the two key components of credibility. Trustworthiness is defined as well-intentioned, truthful, and unbiased and it is perceived through goodness or morality of the source, while expertise is defined as knowledgeable, experienced, and competent and it is perceived through knowledge and skill of the source.

Fogg et al. in their *Web credibility study 2002: Investigating what makes Web sites credible today* [2] explore four groups of factors affecting web site credibility. These are, besides expertise and trustworthiness, sponsorship and the other factors.

According respondents' in this study positive effect on credibility have the expertise factors (in order of decreasing value/level of importance/effect) showing that the web site: provides a quick response to customer service questions, provides comprehensive information that is attributed to a specific source, lists authors' credentials for each article, has articles that list citations and references, has search capabilities, offers information in more than one language, contains user opinions and reviews, has ratings or reviews of its content, selects content according to customer/user preferences, recognizes that customer/user have been there before, and the site displays an award it has won. Negative effect on credibility regarding expertise have the facts (in order of decreasing value/level of importance/effect) that the web site: provides comprehensive information that is unattributed to any source, has a typographical error, is sometimes unexpectedly unavailable, has a link that doesn't work, and it provides comprehensive information that is unattributed to any source.

Trustworthiness factors [2] (listed in order of decreasing value/level of importance/effect) have the positive effect on web credibility in a way that the web site: has proven useful to customer/user before, lists the organization's physical address, gives a contact phone number, gives a contact email address, is linked to by a site you think is believable, states its privacy policy, links to outside materials and sources, was recommended by a news media outlet, such as a newspaper, magazine, or email newsletter, was recommended to customer/user by a friend, lists well-known corporate customers, represents a nonprofit organization, and the URL for the site ends with ".org".

Sponsorship has the positive effect on credibility if the web site [2]: is advertised on the radio, billboards, or other media, and has ads that match the topic customers/users are reading about. The effect is negative if the web site: has one or more ads on each page, automatically pops up new windows with ads, and it is hard to distinguish ads from content.

Other factors effecting credibility of a web site cover different aspects from organization owning the site brand and recognition, web site design and organization (information architecture),... to some technical (i.e. download time). The positive effect [2] on credibility has the facts (listed in order of decreasing value/level of importance/effect) that the site: is by an organization that is well respected, has been updated since customers/users last visit, looks professionally designed, is arranged in a way that makes sense to customer/user, design is appropriate to its subject matter, sends emails confirming

transactions customers/users make, provides printer-friendly pages, provides live chat with a company representative, appeared on the first page of search engine results, was the first site listed by a search engine, is designed for e-commerce transactions, and contains content that differs from customers/users opinions. Negative is if the web site [2]: requires customer/user to register or log in, has a commercial purpose, is hosted by a third party (e.g. AOL, Geocities), requires a paid subscription to gain access, takes a long time to download, has domain name which does not match the company's name, represents a company that is having financial or legal difficulties, links to a site customer/user think is not credible, is difficult to navigate, and is rarely updated with new content.

Regarding the long time (in year 2002) from when the study has been done, the specificities of the domain of the web sites explored in this paper, and some additional aspects of web information architecture, new model of web site credibility has been build and used.

2 Medical service provider websites: the research

The research consists of analyzing medical service provider website information architectures and templates. For this purpose websites has been selected trying to follow typical user behavior: asking Google to find polyclinics in one particular town. Six websites of private medical service providers come out from the top 10 search results. Polyclinic A provides all kinds of specialist examination and medical service (radiology, internal medicine, gynecology, laboratory diagnostics, cytology, ophthalmology, urology, neurology, physical medicine and rehabilitation, otorhinolaryngology, pediatrics, surgery and psychiatry), at nine locations in Croatia with nearly 250 health care professionals. Polyclinic B is a medical institution that provides prevention, diagnosis and treatment of certain medical conditions, especially in the field of internal medicine and psychiatry, and it works at one location. Polyclinic C was established four years ago and today operates at two locations in the field of ophthalmology, gynecology and obstetrics. Polyclinic D provides services in the field of gynecology, obstetrics, acupuncture, laboratory services, and massage; and operates at one location. Polyclinic E is a clinic for gynecology, obstetrics and radiology-mammography, which operates for ten years at one location. Polyclinic F is a polyclinic for plastic surgery and gynecology that operates for fifteen years at three locations.

There are two bases of the research – information architecture and credibility of web sites. The first base represents three main parts of the process of developing information infrastructure according Rosenfeld and Morville [4]. In this process it is necessary to understand the business objectives of websites and resources that are available to us to design and implement (Context), then amount and type of content that will be on the website today and one in the future (Content), and the needs and desires of clients seeking information (Users). The second base consists of four main factors of web credibility according Fogg et al. [2]. These are expertise, trustworthiness, sponsorship and other factors effecting credibility of web site(s).

In the research, factors and some specific elements relevant to existence purpose of web sites were checked at chosen medical service providers' websites. It has to be mentioned that the borders of the first base groups are not always clear and some elements tend to be in more groups (i.e. human resources: are they for end-users/customers or context). Evaluation form used for the research (together with the results) is shown in Table 1. In the first column are elements of web credibility according to Fogg et al. [2], divided into four groups and adjusted for the purpose of medical service provider website research. Some of the elements were interpreted in the way adjusted to purpose of these websites, for example, quick response to a customer service questions was graded by existence of important elements, such as institution description, human resources, frequently asked questions and similar. Also, some elements were adjusted, such as statement that the site provides live chat with a company representative, it is complemented with statement that it gives an opportunity to make appointments online, and some elements were added, such as statement that the site provides mobile webpage version, since technology nowadays is evolving. In second column it is indicated whether elements have the positive or negative influence, impact on the credibility. In third column elements are classified in related element of information architecture. In the rest of table, there are grades for six chosen polyclinics for each element. The scale, which was used, is scale from one to five, depending on agreement with the statement or existence of certain element. Grade one means that the statement is false or element is absent on specific website, grade two means that the statement is partially false or something similar to specific element exists on the webpage, grade three means that the statement is neither true nor false or that the specific element exists, but it is not very elaborated, grade four means that the statement is partially true or specific element exists, but not all of its opportunities are used, and grade five means that the statement is completely true or there is full existence of that element. Grade has a positive or negative sign depending on the second column (influence) in the table. There are also some negative aspects (according to Fogg et al. [2]), so they were graded the same way (by grades from one to

five), but at calculating the final grade, these grades were subtracted from overall grade.

2.1 Medical service provider website context

Each website has a purpose regarding mission, strategy and goals of the organization owing the website. Website is a digital representation of an organization on the web.

Information architecture of a website should match its context, i.e. organization's business culture, values, communication with and to customers and other parties (own employees, business partners, media), to fulfill its purpose.

In planning the context organization should discuss the strategy first - setting the goals of the website, its audience, content and functionality. After that the content should be discussed regarding its publishing policy, technology used, the purpose and the audience of the content, responsibilities for the content (creation, maintaining), legal issues regarding the content and so on. Technology (relationship between IA and website technical infrastructure) is the next thing to discuss especially in nowadays of mobile business and communication. Last but not least, all interested parties, managers should be given the possibility to give their opinion and suggestion about the AI and website context.

2.2 Medical service provider website users

In order to adapt the information architecture of the web site to users, it is needed to know who is using this kind of web sites, how they are using it and what kind of information are they searching for. Users are probably people from different age groups, what means they also have different computer literacy level, cognitive ability, eyesight... Therefore, it is important that navigation is simple, and web page user-friendly. We can also assume that users who visit medical service providers web sites, come to this web sites with a concrete purpose, for example to find information on a particular type of medical examination, services and programs of medical service providers, contacts, recommendations and more. However, one should keep in mind that users might not know exactly what are they looking for, the exact term or how to express them. Given the very nature of the topic, users probably want to find out as much information as possible. For this reason, it is important that these sites have good information architecture, so users can easily locate needed information. It is also important to point out contacts, list of doctors and their area of expertise, allow some interaction via web site, for example queries for questions. In addition, web sites should point out frequently asked questions about clinic, so users can easily find answers to most common questions. Very

important information about credibility of medical service provider is opinion of existing patients, so it would be good to have user's forum where patients can share their own experiences and impressions. It is extremely valuable to have in mind mentioned user's needs, behaviors, priorities and typical (prospective) user's profile.

2.3 Medical service provider website content

Content of websites includes all kind of documents, data, images, files, etc. The most important for content is to be easily and quickly found. Findability is one of the key attributes for website usability. "Usability refers to how well users can learn and use a product to achieve their goals" [7].

To accomplish both findability and usability information architecture/website should follow some guidelines [4] as providing multiple ways to access the same information, employing indexes and sitemaps to supplement the taxonomy, building the navigation system to provide users with a sense of context, using consistently language appropriate for the audience, integrating searching and browsing to reinforce one other.

The content should reflect all kind of different users (their abilities, experiences, preferences, expectations, etc.), different goals (to inform, present, visualize, entertain, obtain some transaction, etc.) and usages (to read/see online, to print, to download).

2.4 Medical service provider website credibility

Users evaluate medical service provider website expertise aspect of credibility depending on the quality of information provided, sources of information, speed of retrieval and similar. Polyclinic' websites need to provide a quick response to user questions. Users will probably search for some general information about the institution, its mission, services, human resources, technology, prices, etc. It is useful to point out frequently asked questions for quicker response. Polyclinics often give information, tips and instructions to users, and they need to show credibility of given information, especially in the field of health care. Therefore, it is important to point out source of information and medical information/service provider's credentials. Some other elements, which affect on credibility, are user opinions and ratings of content. It is also important that site does not have some typographical errors, broken links and it is always available, etc.

Trustworthiness aspect of credibility is related to listings of physical address, contact phone number and possibility to contact polyclinic by e-mail or contact form on the site, stating polyclinic' privacy

Table 1. Results of the assessment

Element: According Fogg et al. [2] Additional, suggested	Influence	Related IA element	Polyclinic*					
			A	B	C	D	E	F
Expertise								
The site provides a quick response to your customer service questions.	+	Context	3	4	3	3	3	3
Institution description		Context	5	5	5	5	5	5
Mission		Context	5	2	1	1	1	1
Services		Context	5	5	4	4	5	5
Human resources (CV?)		Context	2	5	2	1	2	5
Technology		Context	5	4	1	1	1	1
Frequently Asked Questions		Users	1	5	1	1	1	1
Prices/Payment types		Content	1	3	4	4	1	5
News		Content	4	4	2	5	1	1
Tips and instructions		Content	5	5	4	5	5	5
Newsletter		Content	1	5	1	1	5	1
The site provides comprehensive information that is attributed to a specific source.	+	Content	4	5	3	3	4	3
The site lists authors' credentials for each article.	+	Content	5	5	4	3	5	3
The site has articles that list citations and references.	+	Content	3	4	2	3	3	3
The site has search capabilities.	+	Content	1	5	1	1	1	5
The site offers information in more than one language.	+	Content	4	1	1	1	1	5
The site contains user opinions and reviews.	+	User	1	1	4	1	1	1
The site has ratings or reviews of its content.	+	User	1	1	1	1	1	1
The site selects content according to your preferences.	+	User	1	1	1	1	1	1
The site recognizes that you have been there before.	+	User	1	1	1	1	1	1
The site displays an award it has won.	+	Content	1	1	1	1	1	1
The site provides comprehensive information that is unattributed to any source.	-	Content	2	1	3	3	2	3
The site has a typographical error.	-	Content	1	1	2	1	1	1
The site is sometimes unexpectedly unavailable.	-	Content	1	1	1	1	1	1
The site has a link that doesn't work.	-	Content	1	1	1	1	1	1
Trustworthiness								
The site lists the organization's physical address (and map).	+	Content	5	5	4	5	5	5
The site gives a contact phone number.	+	Content	5	5	5	5	5	5
The site gives a contact email address (or a contact form).	+	Content	5	5	5	5	5	5
The site states its privacy policy.	+	Content	1	1	1	1	1	1
The site links to outside materials and sources.	+	Content	3	1	1	3	1	3
The site was recommended by a news media outlet, such as a newspaper, magazine, or email newsletter.	+	Content	3	1	3	3	1	1
Sponsorship								
The site is advertised on the radio, billboards, or other media.	+	Content	5	5	5	5	5	5
The site has ads that match the topic you are reading about.	+	Content	5	5	5	5	5	5

Table 1. Results of the assessment (cont.)

Element: According Fogg et al. [2] Additional, suggested	Influence	Related IA element	Polyclinic*					
			A	B	C	D	E	F
Sponsorship (cont.)								
The site has one or more ads on each page.	-	Content	1	1	1	1	1	1
The site automatically pops up new windows with ads.	-	Content	1	1	1	1	1	1
The site makes it hard to distinguish ads from content.	-	Content	1	1	1	1	1	1
Other								
The site is by an organization that is well respected.	+	Context	5	5	5	5	5	5
The site has been updated since your last visit.	+	Content	1	1	1	1	1	1
The site looks professionally designed.	+	Content	5	5	4	5	3	5
The site is arranged in a way that makes sense to you.	+	Content	5	5	4	5	5	5
The site's design is appropriate to its subject matter.	+	Content	5	5	4	5	4	5
The site provides printer-friendly pages.	+	Content	5	5	3	3	5	5
The site provides mobile webpage version.	+	Content	1	1	1	1	1	5
The site provides live chat with a company representative or gives an opportunity to make appointments online.	+	Content	5	3	1	1	1	1
Online appointments		Content	5	5	1	1	1	1
Online clinics		Content	5	1	1	1	1	1
The site appeared on the first page of search engine results.	+	Content	5	5	5	5	5	5
The site was the first site listed by a search engine.	+	Content	5	1	1	1	1	1
The site requires you to register or log in.	-	Users	1	1	1	1	1	1
The site has a commercial purpose.	-	Content	5	5	5	5	5	5
The site is hosted by a third party (e.g. AOL, Geocities).	-	Content	1	1	1	1	1	1
The site requires a paid subscription to gain access.	-	Content	1	1	1	1	1	1
The site takes a long time to download.	-	Content	1	1	1	1	1	1
The site's domain name does not match the company's name.	-	Content	1	1	1	1	1	1
The site links to a site you think is not credible.	-	Content	1	1	1	1	1	1
The site is difficult to navigate.	-	Content	1	1	2	1	1	1
The site is rarely updated with new content.	-	Content	2	4	2	2	3	4
Final grade			**121**	**119**	**82**	**90**	**87**	**102**

*Scale: 1 - 5
1 – statement is false / absence of specific element
2 – statement is partially false / existence of something similar to specific element
3 – statement is neither false nor true /existence of specific element, but not very elaborated
4 – statement is partially true / existence of specific element, but not all opportunities used
5 – statement is completely true / full existence of specific element

policy, linking to outside sources and recommendations by media.

Sponsorship aspect of credibility depends on number of ads on pages and appropriateness of advertising. It is not appropriate to have many ads on these kinds of websites, because of seriousness of health care area, and users usually do not have patience for dealing with ads (pop up windows, distinguishing ads from content…). Also, if the site is advertised in media, it is more credible.

Some other credibility factors are updates of content of the website, professional design of the website, availability of online information or in this case, existence of online appointments or online clinic, findability of the website (good search engine optimization), easiness of navigation etc. Having in mind global trends, one other factor that needs to be added to the list is mobile webpage version.

3 Research results and interpretations

The results of the research, i.e. the assessment of websites are shown in Table 1. It is important to mention that the research has been performed from the aspect of ordinary prospective user who searches for information.

The results obtained show us that some of chosen polyclinics do not have some very important information provided on their website. For example, some of polyclinics do not have information about human resources – specialists and nurses, which is one of very important information for (prospective) patients/customers. Customers like to have this kind of information, and the ability to read through specialists CV, and *check their level of expertise* in their field. Already the ability to read CVs (even though the customer may not read full CV) makes polyclinic more credible, especially in the area of expertise. In addition, patients like to check for prices and compare prices to others, and some of polyclinics do not provide this kind of information.

Another very important thing is that four out of six chosen polyclinics do not provide possibility to search through websites, so users have to find everything by themselves, browsing. In this case, it is required that information architecture and especially navigation of the website are good and easy. Similar to that, only two websites' contents are available in more than one language. Besides, none of the polyclinics does state privacy policy. Polyclinics collect some personal information from users, for example through queries that users submit (name, contact information, medical history, the intention to use certain services…). Therefore, it is important to inform the client whether these information are kept confidential.

Results also show that polyclinics are not that oriented on users. Users cannot leave opinions, reviews or suggestions on websites. That does not have good effect on their expertise aspect of credibility.

Trustworthiness and sponsorship aspects of credibility of checked websites are good: the contact information are provided, and there are no inappropriate ads.

Nowadays, life is busy and people like to set appointments in just few clicks from wherever they are. Therefore, it is necessary for users to have possibility to set appointments on polyclinics website, on the contrary users will search for other place where they can do it. Also, many people use social networks or mobile phones for access information, so it is important to follow trends and adapt websites to these trends.

Absence of mentioned factors can cause consequences such as obtaining lower opinion about polyclinic, because users often acquire opinion only based on their websites.

4 Conclusion

In the presented research, a way of evaluation of credibility and information architecture elements is provided. In further research this evaluation criteria can be expanded, and changes of potential user's preferences with regard to technology development and adoption of web pages to it could be explored.

The importance of web for communication with (prospective) patients is visible in free services as a quite new one Dodo.hr ("dobri doktori" meaning "good doctors") – database of experienced, recommended medical professionals, doctors.

Dodo service is intended to patients looking for a doctor in specific medical discipline/of specific specialization in some particular town/place. Very important thing is that for each doctor the possibility of tree elements rating (recommendations, comfortable accommodation and waiting time) is provided. Each doctor is also described with some additional elements such as: education, professional experience, memberships of professional organizations, foreign languages he/she speaks, the price lists of his/her services and health insurance companies he/she works with.

Such a web service is very important and useful place to visit before deciding which medical service provider to choose.

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