

A Framework for the Evaluation of user Experience in Information-Driven Websites

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Abstract: Usability and User Experience (UX) are critical factors for the success of information driven websites. Because, this specific type of websites can only be experienced by the users as the sum of their parts: content, aesthetics, navigation and interaction most studies are applied when the site has already been released. This research presents a framework proposal to measure the UX of information driven websites at early stages by means of the combination and adaptation of established tools. The framework was tested empirically with three website redesign projects in the higher education sector at the planning stage.

Key words: User experience, websites, usability, UX, framework, tested, projects

INTRODUCTION

Now a days, most organizations in the public and private sector own one or more websites created to inform users about specific aspects of their business such as: products and services, support and legal information, hiring and contact information, among other topics (Abdallah and Jaleel, 2015). Compared to websites dedicated to e-Commerce, e-Banking or intranets, information driven websites are mostly used as a component in electronic marketing activities, usually in the early stages of user/customer acquisition process (Erickson *et al.*, 2013) and do not have a captive audience. Because of this, usability and user experience should perform at a minimum level of quality, otherwise, the user will recur to a different information source (Everard and McCoy, 2010).

Given that information driven websites are experienced by the user as the sum of its parts (software, content, brand identity and visual design), the evaluation of the user experience for this type of website must consider criteria such as usability, content, navigation, aesthetics, performance and the emotional response of the user (Wilkie *et al.*, 2012). The goal of this research is to propose a framework for the evaluation of user experience in information driven websites by the following definitions as specified in the ISO 9241 standard (Anonymous, 2010).

Usability: An extension in which a system, product or service can be used by specific users to achieve determined goals with effectiveness, efficiency and satisfaction in the defined context of use.

User Experience (UX): Extends the concept of usability (effectiveness, efficiency and satisfaction) to the perception and responses resulting from the use and/or anticipated use of a product, system or service.

Literature review: A systematic review was completed to identify the state of the art in methods tools and criteria used to evaluate the user experience in information driven websites (Ten and Paz, 2017). About 65 relevant studies were obtained from the following databases: web of science (13 studies), IEE (32 studies) and EBSCO (20 studies). We found out that the dominant methodologies are user testing and expert evaluation by themselves or combined. Analytics, data mining and automated tools appeared in a lesser number of studies and did not provide the same quality of information. The most frequently used tools for evaluation were questionnaires, heuristic evaluation and interviews. Usability, content, information architecture, aesthetics and performance are the most frequently used criteria for the evaluation. Most studies were conducted over already published websites because navigation, content and visual design are aspects that need to be included for a complete user experience evaluation.

MATERIALS AND METHODS

Framework proposal: The main objective of this proposal is to elaborate a framework that is effective and efficient in the usability and user experience evaluation for information-driven websites. The following specific objectives were considered in its elaboration:

- The framework will incorporate attributes that are adequate, relevant and measurable for the user experience evaluation specific to information-driven websites
- The framework must include methods and tools that are adequate for the evaluation of the selected attributes
- The framework should be simple to use by non-technical evaluators
- The effectiveness and efficiency of the framework must be validated with a real project

The proposed framework evaluates the following criteria; usability, information architecture, anticipated use expectations, aesthetics and context of use. The tools that compose the framework for each evaluated criteria are shown in Table 1.

The methodology is a combination of user testing, analytics and general guidelines for the framework’s application. The framework is best applied at the planning stage but can also be applied after the implementation is complete. For the purpose of this study, we define information architecture as “the combination of organization, labeling, search and navigation systems” (Morville and Rosenfeld, 2007). Also, the aesthetics attribute will be measured by a word list based on the concepts of brand personality scale used for marketing research (Azoulay and Kapferer, 2003) and the method suggested in the “Desirability toolkit” from Microsoft, considering that the results are a point of reference for the execution of the visual design.

Tool’s definition

Web analytics report: For existing websites, usage data of the existing version of the website can be collected using free services such as google analytics or other web analytics tool. Server analytics were not considered relevant to the purpose of the analysis because they are focused on the data usage by downloaded resource (for example, each downloaded image and script), not in the visitor (Croll and Power, 2009). The selected metrics to represent the current state of the evaluated site’s usability, information architecture and context of use in Table 2.

Two iterations of this dashboard were made before the final version was applied to the case of study. The first iteration was complex in nature included more metrics relevant to developers (for example, avg. time to load the page) and used the standard name of google analytics metrics. After testing, clients were most interested in content usage and entrance pages than the time it took for the page to load. In mobile, viewport size was critical for

Table 1: Tools that compose the framework

Tools	Evaluated criteria	Software
Web analytics	Usability, information architecture, context of use	Google Analytics, Google Data Studio
Questionnaire (system usability scale, word prompt list and additional questions)	Usability, anticipated use expectations, aesthetics	SurveyMonkey
Card sorting	Information architecture	Optimal Workshop
Emotion icons (faces)	Emotion	SurveyMonkey

Table 2: Web analytics dashboard contents

Sections	Metrics
General usage	Total number of sessions
	Total number of page views
	No. page views per session
	Average time per session
	Average time to load
	Sessions per month (sessions vs. users)
	Traffic sources (percentage from total)
	Access per device type (percentage from total)
	Evolution of traffic sources per month
	Evolution of access per device category per month
Content usage per section	Access to the (sessions vs. bounce rate)
	Landing pages (sessions vs. bounce rate)
	Load time per section
Mobile usage	Predominant operating systems (context of use) (percentage from total)
	Traffic sources per device
	Browser usage per device
	Screen resolutions per device category

the prototyping/design process. A common event in the evaluated projects was that the most viewed content was not the content that the client had invested the most time to elaborate or the content that they wanted to prioritize the most (users are more pragmatic in their information consumption).

Questionnaire: For the elaboration of the questionnaire, the following characteristics were considered:

- The questionnaire must be simple to deploy and not require programming knowledge for its implementation
- Data processing must be fast and allow collecting data from several users (>8) with a single moderator
- The questionnaire should take an approximate of 30 min to complete
- The questionnaire should load in a single page

The questions are shown in Table 3. For question 3, it is required that the website’s information goals have been clearly defined before the configuration of the questionnaire. For question 4, the positive version of the system usability scale was used to avoid data processing errors and because of its simplicity.

Table 3: Questionnaire structure and questions

Questions	Answers
How frequently do you visit this site?	Daily from 2-3 times a week
Why would you visit this site?	Multiple choices, selected from the site's information goals
What information do you think is missing from this site?	Open question
System usability scale questionnaire (positive version, 10 questions)	Likert scale
The design of the website should be	Word list
Overall, after using this site	I completely dislike it I do not like it Neutral I like it I like it a lot

The use of positive and negative questions in the original version could lead to error during the data extraction and also with the users that answered the questionnaire. Since, it has been proven that there is no difference between the positive and negative version of the SUS, we decided to use the positive version (Sauro and Lewis, 2011). For question 5, for already built websites, the question should change to "I consider the design to be". Question 6 uses emoticons to measure the user's emotion immediately after use. This approach was selected because of the universality of the symbols, ease of deployment and lack of ambiguity by comparison to other emotion measurement tools such as emo-cards (Meschtscherjakov *et al.*, 2009).

It was necessary to ask the user to complete 3 information seeking tasks obtained from the business requirements before completing the questionnaire for him to get a real sense of the website functionality. A survey development software was used to avoid the complexity of implementing a form from scratch to collect de data. Functional requirements for the platform selected for the questionnaire were:

- Should display the branding elements of the organization
- Should display all the questions in a single page (to avoid users abandoning the test)
- Should include graphics in the question and option answers
- Capacity to duplicate existing questionnaires created previously

The questionnaire was deployed in the following platforms: Google Forms, Optimal Workshop, Survey Monkey and e-Encuestas. The selected platform for the case study was survey monkey because of its flexibility and data processing capabilities.

Card sorting: The card sorting activity uses the content blocks defined for the website navigation as the cards to

be grouped by the user (open card sort). Card sorting was included as part of the framework because it is a simple, quick and user centric tool (Spencer, 2004). The activity can be conducted online using a service such as optimal workshop or by hand using post its. In the first case, the service includes the data analysis process which allows quicker results.

Guidelines for the framework application: The main component of the framework is the questionnaire. Information goals should be defined before application, since they are required for the information seeking tasks that the user must complete before applying. The tool can be applied in a laboratory setting or remotely. No personal data gathering is required. It is possible to create segments and apply the questionnaire to different interest groups. The questionnaire can be applied over a fully implemented website or a prototype. Paper prototypes are not recommended, since, they do not allow a correct representation of complex content and interactions.

The web analytics report role is to provide a point of reference to measure the site performance before and after improvements are applied. If the project is a new website, it can be applied after website's publication. The card sorting activity is more useful in medium to complex websites (>10 pages of content).

RESULTS AND DISCUSSION

Case studies: The framework was applied to three information driven websites projects in the higher education sector. The evaluation was applied during the planning stage. Each project's characteristics are detailed in Table 4.

Two projects were developed by the university's in-house development team and one was implemented in collaboration with an external team. Each project had an UX designer responsible of content mapping, information architecture and prototype creation. The prototypes that were used for the tests included the real content that will be published in the website. In the case of "website 1", the prototype incorporated the visual design. The prototypes of the other cases were black and white layouts representing functionality, content and navigation with no visual design.

The main limitation of the prototypes was that they did not represent the multiple instances of the same content type (for example, a website that shows information of several services but uses the same layout for its visualization). For each tool, the observations that emerged from the test case are shown in Table 5.

Table 4: Project's details

Variables	Website 1	Website 2	Website 3
Test case	Prototype+design	Prototype (no design)	Prototype (no design)
Users	8	12	101
User profiles	No	No	Yes (2)
Application	78 remote	Laboratory	Laboratory
Project type	Redesign	Redesign	Combination of 2 existing websites
Content size	Small	Medium	Medium
Audience/website main goal	Business owners and entrepreneurs/university business relations	News portal/students, teachers, authorities	Administration workers/information about administration, services and benefits
Annotations	No card sorting activity	None	No analytics
Stakeholders asked to include additional questions	No	No	Yes
Development team	External contractor	In-house	In-house

Table 5: Observations obtained from the case studies

Tools/Positive aspects	Negative aspects
<p>Analytics Provided useful information for prototype elaboration, frequently used content and the technology used to access the website Useful to convince stakeholders of going “mobile first” in the cases of websites that have a majority of traffic of that device category Fast to deploy, if using a service as Google analytics with dashboards</p> <p>Questionnaire Users took on average 20-30 min to complete the activity including the card sorting tasks Really effective with large numbers of users, can provide rich datasets that register variability in UX needs in specific user groups Emoticons were easy to read by both users and stakeholders Users were specific about what type of information was missing from the website Word prompt provided useful information about what attributes were considered relevant for the visual design</p> <p>Card sorting Was not considered as necessary with websites that have a limited set of navigation options (website 3)</p>	<p>Cannot represent information that has not been published in the previous version of the website, since there is no data After release will provide a point of reference in performance for audience, information usage and user retention Some stakeholders asked to include search and campaign effectiveness data</p> <p>To the stakeholders, some of the questions in the system usability scale were considered not to match the website being evaluated In some cases, stakeholders asked to include additional questions about usage of related websites Optimal application is in a lab setting. Remote application worked with previous call to make sure the user was informed. Responses obtained by email invitation were slow and hard to obtain</p> <p>Results were not as useful as the one obtained in the questionnaire. The user's subjectivity could result in mislabeling of concepts</p>

The analytics report and questionnaire were really fast to deploy, since, Google Data Studio and Survey Monkey provide the option to replicate a previous instance of the tool. The questionnaire only required to update the introduction text, information seeking tasks and the options for the question “Why would you visit this site for?” The card sorting tool was the most time-consuming tool to configure.

CONCLUSION

After testing, the framework proved to be efficient in time usage and human resource requirements, the tools were quick to deploy and fast in the process of data gathering and reporting. Data about what each user expects in content, aesthetics and usage was obtained in a repeatable and consistent process that can be quickly applied to a different project and obtain meaningful results for each website communication goals. Observations of the framework can be summarized as. The framework proved to be really effective in gathering information from large groups of users quickly. The

framework can be used with complex or simple websites for quick testing at an early stage. A qualitative layer of user research can be added to fill the gaps left by the questionnaire to answer questions such as “why didn't you like the website”?

The questionnaire was effective identifying gaps in the content scope of the project give a reference of the website usability, obtaining data about the aesthetic (expectation or validation) and the overall reaction (emotion) after use.

The framework can be used by new practitioners in the user experience field as long as the guidelines for its application are followed. The same questionnaire can be applied to the context of mobile and desktop. The web analytics report and card sorting activity are optional, since, the bulk of information is obtained from the questionnaire.

RECOMMENDATIONS

Further research would be required to test the level of learnability of the framework with novice user

experience practitioners. Also, since, the tool has only been proven in the same sector (higher education) testing with information driven websites from other sectors such as government or finance is advisable as well as testing with agile methodologies.

REFERENCES

- Abdallah, S. and B. Jaleel, 2015. Website appeal: Development of an assessment tool and evaluation framework of E-marketing. *J. Theor. Appl. Electron. Commerce Res.*, 10: 45-62.
- Anonymous, 2010. Ergonomics of human-system interaction-Part 210: Human-centred design for interactive systems. International Organization for Standardization 9241-210, Geneva, Switzerland.
- Azoulay, A. and J.N. Kapferer, 2003. Do brand personality scales really measure brand personality? *J. Brand Manage.*, 11: 143-155.
- Croll, A. and S. Power, 2009. Complete Web Monitoring: Watching Your Visitors, Performance, Communities and Competitors. O'Reilly Media, Inc., Newton, Massachusetts, USA., ISBN:978-0-596-15513-1, Pages: 636.
- Erickson, W., S. Trerise, C. Lee, S. VanLooy and S. Knowlton and S. Bruyere, 2013. The accessibility and usability of college websites: Is your website presenting barriers to potential students?. *Commun. Coll. J. Res. Pract.*, 37: 864-876.
- Everard, A. and S. McCoy, 2010. Effect of presentation flaw attribution on website quality, trust and abandonment. *Aust. J. Inf. Syst.*, 16: 5-19.
- Meschtscherjakov, A., A. Weiss and T. Scherndl, 2009. Utilizing emoticons on mobile devices within ESM studies to measure emotions in the field. Proceedings of the 2009 Conference on MME in Conjunction with Mobile HCI, September 15-18, 2009, ACM, Bonn, Germany, pp: 1-4.
- Morville, P. and L. Rosenfeld, 2007. Information Architecture for the World Wide Web. 3rd Edn., O'Reilly's Publisher, Sebastopol, California, USA., ISBN-13:978-0-596-52734-1, Pages: 505.
- Sauro, J. and J.R. Lewis, 2011. When designing usability questionnaires, does it hurt to be positive?. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, May 07-12, 2011, ACM, Vancouver, British Columbia, Canada, ISBN:978-1-4503-0228-9, pp: 2215-2224.
- Spencer, D., 2004. Card sorting: A definitive guide. Boxes and Arrows Company, Boulder, Colorado, USA. <http://boxesandarrows.com/card-sorting-a-definitive-e-guide/>
- Ten, A.C. and F. Paz, 2017. A Systematic Review of User Experience Evaluation Methods in Information Driven Websites. In: Design, User Experience and Usability, Marcus, A. and W. Wang (Eds.). Springer, Cham, Switzerland, ISBN:978-3-319-58633-5, pp: 492-506.
- Wilkie, L., K. Romance and J. Rosendale, 2012. Website usability: Reasons underlying emotions reported by users. *Insights Changing World J.*, 2: 133-156.