Measuring the Effectiveness of an Organizational Website to Stakeholders

Anna Shum  
*City University of Hong Kong, a.shum@cityu.edu.hk*

Lili Liu  
*City University of Hong Kong, llili2@student.cityu.edu.hk*

Christian Wagner  
*City University of Hong Kong, c.wagner@cityu.edu*

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Organizational websites have become a vital element in informing its stakeholders and inducing transaction decisions, especially for institutions dealing with a large and dispersed user group. Achieving the desired user-centricity to satisfy users’ needs is ever more difficult when the organizational website offerings are large and diverse. In such cases, website design is done frequently in decentralized fashion, with a common, centrally defined, web structure and responsibilities for content distributed to individual organizational units. We challenge the effectiveness of this method, based on the empirical website analysis for a large state university. Using a scenario based approach, we analyzed the website’s structure (static effectiveness) as well as navigational properties (dynamic effectiveness). Findings show that when the website content and navigation are created by a number of designers using a site-of-sites distributed approach, significant differences may be observed especially in dynamic effectiveness, leading to overall different user perceptions of effectiveness. Furthermore, differences in design between units will lead to an overall inconsistent user experience. Meanwhile, the results from static effectiveness do not reveal any significance. This observable difference indirectly reinforces the importance of dynamic effectiveness.

Keywords
User experience, scenario based approach, static effectiveness, dynamic effectiveness

INTRODUCTION
As online communication becomes a common form of interaction, many organizations use their corporate website for intra-interpersonal exchange with their stakeholders. Yet designing web pages to fit stakeholder demands is not without challenge. The design must allow users to find needed information, and to do so with reasonable ease, so as to facilitate information requests and possible website transactions. The design task increases in challenge, as the organization and thus its website grows. It further increases when the institution is highly distributed. A frequent coping strategy in that case is to provide a common web structure (e.g., through a content management system) for all organizational units, while giving them authority and responsibility for the content. The result may be considered a site-of-sites, where each organizational unit creates its “own” website, however under a common website structure. This strategy appears meaningful as it creates consistency of structure, while allowing those with best content knowledge to select the most relevant content. This approach, while widely practiced, creates dual concerns. First, content designers may be so immersed in the content they seek to present that the resulting web pages are not user-centric, but designer-centric. Second, decentralized decision making at the content level, together with different degrees of user-centricity may lead to an inconsistent user experience.
As website design plays a critical role in influencing visitors' decision-making and revisit intentions (Klein, 1998), understanding what contributes to effective website performance for users is essential. Numerous prior studies have proposed design criteria. For example, Nielsen (2000) claims that navigability and website organization explain performance. Floyd and Santiago (2007) mentions the importance of an accessible webpage format that is usable by all ages and abilities. Beyond these broad areas, Liu and Arnett (2000) found that information service quality, system use, interactivity and system design affect website success. These effectiveness characteristics focus predominantly on “structural effectiveness”, that is the availability of the relevant information within the web design and the possibility to navigate to relevant web pages through the pre-defined access structures (e.g., menus and links). Yet as far as users are concerned, the theoretical ability to reach desired pages is of little importance, if the navigation is non-intuitive or takes so long that users give up (e.g., because of loss of interest, or because of doubt that a solution can be found). According to Kendall and Kendall (2011), a 3-click rule applies to measuring website usability. Preece (1993) argues that to determine effectiveness, a website must undergo a process of evaluation that is capable to provide suggestions for improvement. Thus, in measuring effectiveness and user perceptions of site quality, both a structural and dynamic effectiveness must be determined, and thus the evaluation must be both structural (e.g., evaluating the site map) and dynamic (evaluating the performance in completing actual queries). In addition, Carlos et al. (2008) explain that visual cues such as layout, color, photos are essential to attain positive user response in a web environment. On similar grounds, Aladwani and Palvia (2002) suggest that web quality includes content specificity, content quality and appearance. This article reports on a multi-dimensional evaluation of the website for a large university which includes multiple layers of sites from colleges, departments, and programmes. In doing so, it seeks to answer several design related questions, namely (1) how users perceive structural vs. dynamic characteristics of an organizational site; (2) the design choices made by site developers; (3) the impact of decentralized content design decisions on overall site consistency and user experience; (4) and how evaluations of effectiveness compare to assessments of website appearance.

The remainder of the article is organized as follows. The next section provides the research background for our website analysis. We then explain the study design, report its findings, discuss the studies contributions and limitations, and finally draw conclusions.

RESEARCH BACKGROUND
Website Evaluation
Preece (1993) argues that to determine effectiveness, a website must undergo a process of evaluation that is capable to provide suggestions for improvement. Typical evaluation approaches used focus groups, questionnaires and scenario-setting to measure user experience; in particular, scenario-based questions have been a common mechanism to assess website design as they help to conceptualize the activity (Turner, 1998). The process of envisioning and interpreting scenarios allows designers to unfold an average user’s behavior patterns which then improve design and evaluation decisions (Carroll, 1995; Turner, 1998).

Scenario-Based Design
If technological devices are meant to simplify tasks for ordinary users, designers should address the needs of users. Designs thus should take into account of an average user’s behavior pattern to create a user-friendly system (Turner, 1998). In the past user-centered approaches mainly focused on end users and failed to look at technological aspects of a system artifact (Norman and Draper, 1986). As technology has become an integral part of life, usability and user needs have become increasingly important.

A meaningful approach to understand human-computer interaction is to create a setting, which allows for the action to take place. User-interaction scenarios, which are also known as narratives, are claimed to be the key that bridges humans and technology (Carroll, 1995). Erickson (1995) explains that familiar processes such as narrations help users to engage in tasks. In other words, scenarios are adopted as a communication tool between users and designers. A similar approach has been taken in systems analysis with the creation of “use cases”, describing the key interactions users may have with a system. Use cases reveal functions visible to users to achieve their system related goals. Although regarded as users, also known as “actors”, the focus is placed on their roles with the system (Fowler, 1997). Roles are defined by characteristic needs,
Shum et al. Measuring the Effectiveness of an Organizational Website to Stakeholders

interests, expectations, behavior and responsibilities (Wirfs-Brock, 1994). The scenario-based approach to use case design, appropriately done, should focus on user observation or in-depth interviews to attain narratives of the interaction as well as quantitative data (West Pole, 2005). Without scenario based design and use case analysis, the design may become too designer centric. In that case, an after-the-fact scenario based system audit can reveal effectiveness bottlenecks. Such an audit is the focus of this article.

STUDY DESIGN

Site

The site explored for this research was the extranet of a large state university. The website itself actually consisted of multiple sites (site of sites), where designers could use the same infrastructure to develop content, but within the shared “template” (content management system) were able to make a range of decisions including what content to include or omit, and how to structure the site navigability. In total, the overall site consisted of more than 20 departmental sites and thousands of pages of relevant content.

The overall website design structure had recently undergone significant redesign, so as to standardize design features, make it multiple browser friendly, and to render web pages accurately for both PCs and mobile devices. Underlying the design was a content management system, which enabled end-users to change content without requiring programming knowledge. Technically, therefore, the site was in many ways well developed and followed good practices for website design. Within the technical constraints, individual departments had the opportunity to shape their own designs, choose content, both text and other materials, and define the navigation. It was this aspect of the site design that the research was most interested in.

Evaluation Process

The task selected for the analysis was chosen based on organizational context. Several stakeholder groups had been identified, together with their website related interests. Highly important among them were students and potential students, who would make their choice of programmes. We discuss the analysis from their perspective here. The student user perspective became particularly important for the dynamic website analysis, which assessed how effective the site would be to respond to information needs of student stakeholders. Thus, a student led design team was formed to first determine a set of 10 scenario-based queries, expressing key information needs (e.g., “what financial support is available?”) in students’ decision-making processes. The design team also arranged the questions in a logical meaningful sequence. Sequencing was potentially an important issue, as it would determine the overall query flow and thus the overall lengths and difficulty of the interaction.

Sets of queries were then given to evaluators, who had to answer the questions based on website search. This was a considerable task, as the university offered more than 60 programmes at the undergraduate level, all of which were included in the analysis. Evaluators were asked to find the result for each query, or if not, report failure. Either way, they were to report the number of navigational steps (i.e., “clicks”) performed, and were asked to note their user experience in qualitative terms while searching through the site. As this task required evaluators to self-report the results and process of finding the answers, they were trained prior to the official analysis. Each evaluator completed a minimum of 2 trial tasks and maximum of 5. Two evaluators were assigned to each task whose results were averaged, so as to lessen any personal bias in the navigation. More evaluators could have been used, but it was expected that the informational queries were relatively easy to answer, and thus not exceedingly prone to differences in navigational ability. At any rate, a researcher overlooked the navigation results of the trial tasks with evaluators and discussed any idiosyncrasies in outcomes with them.

A static website analysis was also carried out to assess the static effectiveness of the website, to determine its overall information richness (number of page “tabs”), and site structure (defined by levels and sub-levels in the “tab” arrangement). Evaluators were asked to identify the different numbers and levels of tabs.

Finally, as content design involves also visual features, such as photos, videos, plus stylistic elements such as font size and theme color, evaluators were asked to comment on these items as well. Finally, evaluators were also asked to report their preference for all departmental sites they evaluated, together with reasons for their liking or disliking. Both qualitative comments and site ratings were recorded.
FINDINGS

The focus of the analysis with respect to this article was not the effectiveness (or lack thereof) for any particular department, but to determine significant differences in effectiveness, which would identify improvement potential in the design, and would also indicate inconsistencies in the user experience. For reporting purposes, all data was aggregated at highest level academic unit level, i.e., the college or faculty level.

Static Effectiveness of Website Design

Differences in structural effectiveness were measured based on differences in tab numbers, based on tab level (main menu and lower levels), assessed through an analysis of variance. Results of the ANOVA did not reveal significantly different tab structures between academic units, as demonstrated by significance values ranging from .244 to .573, based on tab level.

Dynamic Effectiveness of Website Design

Whereas the previous analysis showed departmental websites structurally similar, the number of clicks collected from the scenario-based questionnaire, indicate considerable difference in the dynamic effectiveness of different organizational units, as illustrated by the ANOVA results in Table 1 (p=0.000; F = 100.954, DF = 3).

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Academic Units</td>
<td>71.902</td>
<td>3</td>
<td>23.967</td>
<td>100.954</td>
</tr>
<tr>
<td>Within Academic Units</td>
<td>13.532</td>
<td>57</td>
<td>.237</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>85.434</td>
<td>60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Analysis of Dynamic Effectiveness Differences

Academic units essentially fell into two groups, namely those with comparably low dynamic effectiveness (3 academic units) and those with comparably high effectiveness (2 academic units), as depicted in Table 2. For the low effectiveness group, evaluators averaged 3.50 or more clicks (\( \bar{e} \)) to answer a query, compared to 2.28 or less clicks on average for the high effectiveness group.

<table>
<thead>
<tr>
<th>Low Dynamic Effectiveness</th>
<th>High Dynamic Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Unit A, ( \bar{e} = 4.03 )</td>
<td>Academic Unit B, ( \bar{e} = 1.7 )</td>
</tr>
<tr>
<td>Academic Unit D, ( \bar{e} = 3.75 )</td>
<td>Academic Unit C, ( \bar{e} = 2.28 )</td>
</tr>
<tr>
<td>Academic Unit E, ( \bar{e} = 3.50 )</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Dynamic Effectiveness Compared

Failure to Complete Queries

We also collected data on the number of queries that evaluators were unable to complete (approximately 8.8% of all queries). Differences between academic units were highly significant (p=0.000, \( \chi^2 = 23.386, DF=4 \), with academic units A and C showing more than expected failures and academic units B and E less than expected failures.
Qualitative Assessment of Academic Unit Websites

We further asked evaluators for their qualitative assessment of the different academic units’ websites. Each evaluator ranked three sites they had worked on, with 1 being best and 3 being worst. Rankings were then averaged across all evaluators, yielding the results shown in Table 3.

<table>
<thead>
<tr>
<th>Academic Unit</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Rank</td>
<td>1.00</td>
<td>2.78</td>
<td>2.00</td>
<td>3.00</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Table 3. Average Ranking of Academic Units

Academic Unit A, was overall ranked highest, despite previously scoring lowest in dynamic effectiveness.

INTERPRETATION, CONTRIBUTION AND LIMITATIONS

The results of our analysis confirmed several expectations about decentralized design of organizational web pages. (a) As a positive we found that the overall approach of a design template for academic units resulted in a website of high structural similarity, with similar tab numbers. (b) Despite the structural similarity, the freedom provided by the decentralized design approach with a content management system allowed different academic units to create significantly different navigational experiences. Some of the units clearly chose a more user centric design than others, resulting in significant differences in the search effort. In fact, we learned from evaluators that if the click effort was too long, they were inclined to give up and report an inability to answer a query, and that the willingness to spend effort was affected by the overall experience, including the visual experience, as well as the information quality and recency (“up-to-date-ness”) of the content. (c) Different navigational experiences not only can lead to experiences of ineffectiveness for individual departmental websites (leading users to give up on queries), they can also result in an overall inconsistent navigational experience that leaves users confused. (d) Navigational experience and site appeal differ from each other. Users are apparently willing to forego some effectiveness of navigation if a website is content rich and visually appealing, as was demonstrated by Academic Unit A that was less dynamically effective, but rated as most appealing overall. Evaluators specifically pointed out that the appeal (visual appeal, information quality, information recency) was important in attracting their attention and influencing their length of stay.

Our study makes several contributions. First, it re-iterates the need for user-centric design, and the value of a scenario-based approach to achieve such design. Second, it demonstrates the value of templates and content management to achieve structural similarity in a decentralized website design, but also illustrates that autonomy at the content level can lead to significant navigational experiences and inconsistencies. It thus suggests that consistency of navigation will require additional central design guidelines, such as recommended organizational routines, navigation benchmarks, or even templated navigational paths. Finally our study stresses the importance of a site’s visual appeal, which is important for visitors to remain and to overcome the burden of possible navigational ineffectiveness.

There are several limitations to this research. Our measures for structural and dynamic effectiveness were both unidimensional, although the failure-to-complete measure could be considered as a second metric for dynamic effectiveness. In our collected data, some of the evaluators pointed out that normally if they were to search for information they would use the search function directly. However, in this experiment we did not allow our evaluators to select this option as we wanted all the evaluators to evaluate the site on various levels. We relied on evaluator self reports, which allowed for missing details and bias, although we adopted methods to reduce subjectivity, including training and multiple raters for each task. We also limited our analysis to one organization’s website and one stakeholder group.

CONCLUSIONS

Our analysis suggests that organizational website designers, many of whom may not be technical experts, approach the effort at multiple layers: technical, static, dynamic, informational, visual, and consistency-wise. The technical level, best left to technical experts, should provide a consistent platform for content creation and representation. The static level design should focus on adding all relevant information with a balanced structure so that items that belong together are connected, those that do not are not, and that navigational paths are overall relatively short and ideally follow overall organizational guidelines, developed in a scenario-based, user-centric approach. At the informational (content) level, departments should be unique and
able to display their distinctiveness through elements such as photos, videos, and narratives. Although differences suggest inconsistency, diversity is important and will result in a different kind of appeal that ultimately will determine overall attractiveness. In the end, for a website to have the ability to draw the attention of its stakeholders, organizations should take advantage of collective wisdom, encouraging stakeholders’ participation in designing websites. Finally, an audit of the content produced by multiple content creators within the larger organization, as described here, is useful to assess whether a decentralized website still behaves as a single entity despite its intra-organizational differences so that user expectations are consistently met.

REFERENCES