Engineering for Change (E4C) Heuristic Evaluation
TCOM 4120/IDC 6120 - Usability Testing

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Executive Summary

This report details iUG’s heuristic evaluation (HE) of the Engineering for Change (E4C) website. The four iUG team members viewed the site independently from the persona of Michael, an undergraduate engineering student. Using the same scenario, each reviewer compared the site elements and experience to Quesenbery’s 5Es heuristic set. We combined and analyzed our results to identify, group, and rank the E4C website’s strengths and weaknesses. We ranked the findings using two organization methods: affinity matching and card sorting. The combined findings will provide areas of focus for the usability test plan and participant scenarios. We focused on the following tasks for this evaluation:

- Visiting and becoming familiar with E4C site
- Researching and identifying projects/areas of interest
- Determining how to become involved
- Registering and logging into site
- Reviewing membership details
- Contributing to site activities such as Workspaces
- Using social media and other linked sites for additional information/research

Our HE found great content in the E4C News, Solutions Library, and in their social media channels. The collaborative support of leading engineering associations provided reputation and credibility. The site’s well-defined mission demonstrated E4C’s commitment to humanitarian engineering through support for solution sharing and community building. These strengths support E4C’s opportunity to encourage positive change through collective knowledge and efforts.

The top issues identified through our evaluation include:

- Navigation confusion
- Content organization
- User frustrations that affect the site experience and ease of use, such as a difficult registration process and confusion about what is possible in each section.

The issues identified through the evaluation could be considered into E4C’s web design strategy moving forward. Our team will design usability tasks that seek to address and validate the findings throughout this report.
Introduction

In user experience research, a heuristic evaluation provides usability information through inspection of a system or interface. Typically, three to five reviewers independently examine the system and compare their findings to commonly accepted principles (heuristics). As an early step in usability assessment, HEs can locate potential errors or issues with user experience and system operation.

The iUG team was originally going to evaluate the E4C website with both Jakob Nielsen’s 10 heuristics and Whitney Quesenbery’s 5Es. After careful consideration, we decided to use Whitney Quesenbery’s 5Es, as well as affinity matching and card sorting.

We approached the site with Whitney Quesenbery’s usability characteristics known as the “5Es.” Because of the breadth of the E4C content and multiple paths available to users, we felt the broad categories in the 5Es provide flexibility in assessing the site elements and functions. Quesenbery defines the 5Es as:

**Effective:** How completely and accurately the work or experience is completed or goals reached
- quality of the user assistance
- presentation of choices in a way that is clearly understandable
- good interface terminology
- redundant navigation

**Efficient:** How quickly this work can be completed
- number of clicks or keystrokes required or the total “time on task”
- define the task from the user’s point of view, rather than as a single, granular interaction
- navigation design elements
- keyboard shortcuts, menus, links and other buttons
- well-designed with clearly expressed actions

**Engaging:** How well the interface draws the user into the interaction and how pleasant and satisfying it is to use
- number, functions and types of graphic images or colors
- use of any multimedia elements
• design and readability of the text
• style of the interaction

Error Tolerant: How well the product prevents errors and can help the user recover from mistakes that do occur
• treat error messages as part of the interface
• clear description of the problem
• direct links to choices for a path to correct the problem
• make it difficult to take incorrect actions.
• design links and buttons to be distinctive
• use clear language, avoiding technical jargon
• dependent fields or choices appear together
• limit choices, provide back-track, undo, or reverse options

Easy to Learn: How well the product supports both the initial orientation and continued learning throughout the complete lifetime of use
• build on prior knowledge of computer systems
• incorporate interaction patterns learned through use in a predictable way
• implement consistent interface and behaviors
• place information or controls where expected

These five heuristics are the basis of our research and are referenced in the sections that follow. This report will cover:
• our methodology for conducting the heuristic evaluation;
• a presentation of findings based on user tasks; and
• a table of findings by severity rankings.

Our goal in conducting a heuristic evaluation of the E4C website is to improve the overall user experience by identifying areas for improvement.
Methodology

For the initial review, all four iUG team members examined the E4C website independently. We noted our findings for the site’s positive elements and possible issues using the following assumptions:

Heuristics

Based on Quesenbery’s 5 E’s described in the section above, we set expectations for Michael in each area:

- **Efficient** – Michael expects a learning curve since he has never used the E4C website, so there is some level of exploration time to expect. If he does not learn quickly or does not have help, then he will likely get frustrated.
- **Effective** – From what he has heard about E4C, he expects the website to be very comprehensive and include everything he is looking for.
- **Engaging** – Again, based on what he has heard from professionals, there is a high level of expectation. The website should be professional and easy to use. Navigation should be self-explanatory and social elements engaging.
- **Error Tolerant** – Since the site is relatively new and content is dynamic and driven by user interaction, some errors are to be expected.
- **Easy to Learn** – With so many different competing elements (content libraries, workspaces, etc.) it is important to be able to pick up on everything and be able to reference help guides/tutorials along the way.
Ranking System

Although we liked the broad categories in the 5 Es, we also felt they needed some focus to effectively describe major areas of concern. Many of the issues we found relate to more than one of the 5Es, so we considered other options for presenting our findings. We ultimately decided to compile our findings by conducting a card-sort through an affinity matching process.

Affinity Matching

Affinity matching is one method for organizing findings for an evaluation. It is a bottom-up technique, which starts with the findings and determines appropriate affinity groups through sorting by common characteristics. After comparing all of our findings we created six categories related to areas of concern for the website:

1. Navigation/Information Architecture
2. User Experience
3. System Problems
4. Content
5. Social Media
6. Aesthetics

Card Sorting

We then compiled all of our findings and arranged them through a card sort. Card sort applications involve matching individual items to the appropriate categories or headings determined through the affinity matching process. We used an online sorting tool on a website called WebSort.net.

Severity Rankings

We included severity ratings as a subgroup of our card sort activity, which helped us see where the highest-level issues exist. We determined a basic severity of low, medium, and high:

- Low – Minor issues with little to no impact on user experience
- Medium – Recurring or more noticeable issues with significant impact on user experience
- High – Major issues that may stop the user’s progress within the system or lead to high user frustration
Persona

As a basis for the heuristic evaluation, the team reviewed the site through the eyes of Michael, an undergraduate student (see Appendix A). His characteristics guided our examination of the E4C site. Below is a list of some of the primary characteristics that were considered:

- Civil Engineering major
- Likes to travel
- Technically savvy
- Does social networking – Twitter, Facebook, LinkedIn
- Interested in helping the less fortunate
- Spent summer helping build canals – water sources in Guatemala, Central America
- Frustrated if cannot find information quickly
- Likes to use search to find information

Scenario

Michael received an assignment for one of his courses to identify an area of interest and a related project on the E4C website. Once he locates a target project, he should become a member of the E4C community and then contribute and improve on existing project information. Alternately, he could use his research in developing a new project, including proposal and requests for assistance.

We determined a probable task list Michael may take through the site:

- Visit and become familiar with E4C site
- Research and identify projects/areas of interest
- Determine how to become involved
- Register and log into site
- Review membership details
- Begin contributing to site activities such as Workspaces
- Use social media and other linked sites for additional information/research
Task Flow Chart

The chart below displays the typical path that a new user such as Michael might take to complete tasks on the E4C website.

New User: Michael

About E4C

Area of Interest
Water Project

Register at E4C
School Project/Group Project

Set up a Workspace for individual/group project for collaborating, invite friends, post ideas, seek advice on a project or job search post.

Use social media
Twitter, Facebook, Linkedin – (connect with friends and share water project info, job search, collaborate on)

Scenario 1 – Red
Scenario 2 - Dark Blue
Scenario 3 – Purple
Findings

This section documents the findings and highlights positive and negative aspects of the heuristic evaluation. It is organized in two parts:

1. **Tasks** – describes Michael’s encounter while performing the tasks. This is done through a series of screenshots that show a walkthrough of Michael’s experience.

2. **Rankings** – presents the findings evaluation in an easy-to-read table format. Potential user obstacles and areas for improvement are organized by the categories identified through the affinity sorting process and ranked according to severity level.
Tasks

Initial Reactions

Michael is a new user trying to learn about E4C.

Michael is distracted by the scrolling graphic image and unable to focus on the banner with the about information.

Michael is distracted by the floating box that keeps changing.
Michael scrolls down the whole website, and his attention is diverted as he looks at the map. He does not understand what the map does.
Learning about E4C

Michael goes back to the banner to the Find out more link.

He clicks on the Find out more link and goes to the About page and reads the information.
- Michael likes the typeface and blue color because it is easy to read. He scrolls down and reads all the E4C information. So far he likes the information on the About page – It is clear and concise.
• Michael looks at the logo and finds it interesting and pleasant.
He notices the Twitter, Facebook logos etc… social networking links.
Michael thinks of clicking on the social networking links, but wants to continue “checking out the website.”
Going back to the research, Michael now wants to look at the **Water project** that he is interested in.
He clicks the **Water** link, which takes him to the water page.
Michael briefly looks at the image, and the scrolling is distracting and irritating him.

Michael reads the banner and case study.
Michael sees too much information. He’s not sure where to start with finding about the water information and decides to look at Water.org subheading.

Michael clicks on the link “Go to site” and is immediately sent to another website outside of E4C. http://water.org/
http://water.org/ - water.org website

- No warning that he is being directed away from the site.
- Not sure of affiliation and does not have enough information yet to determine it.
- He wants to go back to E4C to focus on what he was researching.
- He closes the screen to go back to E4C website.
- He is starting to lose interest and attention.

Michael is not sure of the affiliation of this website to E4C.
Back on the E4C website, Michael decides to look at the articles and sees one that interests him.

http://water.org/2011/08/how-the-new-water-project-changed-my-life/ - Article in water project area on E4C website

Michael clicks on the article, and it takes him back to the water.org site again. He reads the article and closes the window again! He’s getting frustrated and ignores all the other information.

- He looks at the recent workspaces to see what is in there and view all workspaces.
- He’s thinking of a workspace individual or group project to collaborate or post ideas etc…
Exploring Workspaces to Find Information

Michael clicks on the link “View All” Workspaces
After clicking on the link, Michael gets an error.

https://www.engineeringforchange.org/internalServerError

Michael does not know what this means – Computer jargon!

Michael presses the back button arrow and goes back to the E4C website.

He tries again because he assumes that it is his internet server or service problem. After two attempts, he closes the window. He does not have any information telling him what to do. He starts to think about abandoning the whole project and takes a break.
Back on the E4C homepage:

- Michael wants to be a member but is not sure he wants to register at this point. Michael is required to register by his professor as an IEEE member for a school or group project requirement.
- He looks for the registration tab - wants to see what it entails to register

Michael clicks on the registration tab. It goes to the registration page with a form – looks like a standard form.
Considering Registration

- He wants to be a member of the E4C, but is still not sure yet.

**Standard registration form** – with name, email address etc. Michael is hesitant to fill out the information just yet. He has spent quite a while on the website and is thinking about doing something else.
Registration - **Map it area:**

Map showing when you enter the state or country. Michael is not sure the necessity of the map-it function. This can be confusing to international users that do not use state... etc. Michael is not sure what information to put there and the system does not allow him to move on without that information. He types in India, but it shows a map of Africa?

Types **India**, maps it and map of Africa comes up! – Michael is very confused – not sure the point of the map it function.
Exploring E4C’s Social Networks

Michael scrolls down and sees the social networking sites logos at the bottom of the registration page. He wants to look at some of the social network sites to see what is going on there.

Clicks on all of the social network sites’ logos and it looks good. Plans to review some of the information there and starts with Facebook.
Michael loses the Facebook page – no url to go back to E4C website.

Opens Twitter
Twitter Page - http://twitter.com/#!/engineer4change

Michael reviews the Twitter page. He likes the page and clicks on the E4C url to go back to the E4C website. Michael likes that a lot instead of closing the page.
The address from Twitter takes him to the E4C homepage -[https://www.engineeringforchange.org/home](https://www.engineeringforchange.org/home).

Michael goes back to the E4C homepage.
Michael closes the E4C homepage window and clicks on the YouTube back on the registration page.

YouTube page - [http://www.youtube.com/user/engineeringforchange](http://www.youtube.com/user/engineeringforchange)

- This YouTube video should be at the E4C website either on the homepage or the about page. Very interesting and informative and gives all the information about E4C's mission and goals.
- He decides to leave the website and closes the window to return later.
- Michael still has to create a workspace and register for the school project as required for his class.
- Michael feels frustrated. He did not accomplish the goals the first time!

Michael finally returns to the E4C website to register.
Completing Registration

The registration process is far too difficult. Username and password requirements are too strict – after several attempts, many users, including Michael would simply abandon trying to register.
Using Workspaces

Michael decides to check out the Workspaces.

- When viewing a specific workspace, there is no consistent way to navigate back to the workspace homepage. Back button does not work.
- Browser’s back button does not work.
Workspaces have no function to search for specific projects of interest. Michael finds this long and tedious process to search for a water project.

- Workspaces have no function to search for specific projects of interest.
- The **sort function** available can be long and tedious if looking for a specific workspace.
Labels need to be more accurate. For example, the label to join a workspace – **Help solve this problem** – does not indicate that clicking will join a workspace.
The layout and design of the E4C website offers users many different paths to take in order to complete their tasks. Multiple organizational methods, such as links related to sector and links related to user goals, allow E4C users to navigate the site through a path that seems most natural to them.

### Rankings

#### Navigation/Information Architecture

<table>
<thead>
<tr>
<th>Obstacle</th>
<th>Severity Ranking</th>
<th>5 E’s Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization of top navigation bar by sector is not intuitive. It would be more helpful if E4C Resources was the default.</td>
<td>High</td>
<td>Engaging</td>
</tr>
<tr>
<td>Workspaces have no function to search for specific projects of interest. The sort function that is available can be long and tedious if looking for a specific workspace.</td>
<td>High</td>
<td>Efficiency, Easy to Use</td>
</tr>
<tr>
<td>When viewing a specific workspace there is no consistent way to navigate back to the workspaces homepage.</td>
<td>High</td>
<td>Efficiency, Effective</td>
</tr>
<tr>
<td>What appears to be breadcrumb navigation in the upper right hand corner of the screen is not. Breadcrumb navigation should be available so users can maintain perspective throughout their experience</td>
<td>Medium</td>
<td>Easy to Use, Effective, Efficiency</td>
</tr>
<tr>
<td>Links are inconsistent – some links are not-so-obvious text and some are pictures. Users are likely to click arbitrarily on the screen until they find a link.</td>
<td>Medium</td>
<td>Easy to Learn</td>
</tr>
<tr>
<td>Search function results pages are not clearly labeled. There is no indication of whether results are from workspaces, bulletins, news articles, etc.</td>
<td>Medium</td>
<td>Effective, Efficiency</td>
</tr>
<tr>
<td>The E4C page does not take advantage of keyboard shortcuts for quicker navigation.</td>
<td>Low</td>
<td>Efficiency</td>
</tr>
</tbody>
</table>
**User Experience**

Engineering for Change has a clear understanding of who the website’s target audience is and the website’s design reflects this. The many components of the site create a potentially rich and engaging user experience that is dynamic in nature.

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<tr>
<td>The E4C website is difficult to learn for the first time user and it takes a long time to get oriented. All of the content, different sections, and lack of a clear path to execute goals lead to an overwhelming experience. Additionally it is difficult to build on knowledge learned if a user does not visit the site frequently.</td>
<td>High</td>
<td>Easy to Use</td>
</tr>
<tr>
<td>Registration process is far too difficult. Username and password requirements are too strict – after several attempts many users would simply abandon trying to register.</td>
<td>High</td>
<td>Efficiency, Error Tolerant</td>
</tr>
<tr>
<td>There is no email verification that registration is complete. This poses a potential security issue and does not instill a sense of trust with the E4C website.</td>
<td>Medium</td>
<td>Engaging, Effective, Error Tolerant</td>
</tr>
<tr>
<td>When filling out a profile, there is no indication of how information is going to be displayed. No incentive for filling out personal details is noted.</td>
<td>Medium</td>
<td>Engaging</td>
</tr>
<tr>
<td>Users that navigate with the scroll button on their mouse constantly get stuck zooming in and out of the map towards the bottom of the homepage.</td>
<td>Medium</td>
<td>Error Tolerant, Efficiency</td>
</tr>
<tr>
<td>The captcha requirement for registration is tedious and could potentially prevent users from registering.</td>
<td>Low</td>
<td>Efficiency</td>
</tr>
</tbody>
</table>
### System Problems

The E4C website uses many different tools that facilitate collaboration. Such a robust interface requires a strong database of information and back-end programming. E4C’s web development exceeds user expectations in many instances.

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<tr>
<td>An internal server error is encountered when users try to view all workspaces.</td>
<td>High</td>
<td>Error Tolerant</td>
</tr>
<tr>
<td>There are too many broken links throughout the site.</td>
<td>High</td>
<td>Error Tolerant, Efficiency</td>
</tr>
<tr>
<td>The links to critical email addresses appear to be broken.</td>
<td>High</td>
<td>Error Tolerant</td>
</tr>
<tr>
<td>The map that appears in the registration screen displays incorrect information when location information is entered.</td>
<td>Medium</td>
<td>Error Tolerant</td>
</tr>
<tr>
<td>The map on the homepage does not load in all browsers</td>
<td>Medium</td>
<td>Error Tolerant</td>
</tr>
<tr>
<td>Since there are so many different elements on the website, it is often slow and tedious to load. This poses a problem for users with slow connections.</td>
<td>Low</td>
<td>Efficiency</td>
</tr>
</tbody>
</table>
## Content

The E4C website offers a wealth of information, resources, and tools that support the mission and user goals. Each section is content-rich and the website appears to employ a content strategy that encourages a steady flow of new material from both users and expert sources.

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<tr>
<td>There is too much information on each page, especially the homepage. This leads to confusion and creates an overwhelming feel. Additionally, there is no indication of where to start a task.</td>
<td>High</td>
<td>Engaging, Efficiency, Easy to Learn</td>
</tr>
<tr>
<td>There is no explanation of the type of information to expect in each section of the site – workspaces, bulletin boards, solutions library, etc. First time users and even experienced users will have a difficult time becoming oriented to the site.</td>
<td>High</td>
<td>Easy to Learn</td>
</tr>
<tr>
<td>The Google map on the homepage takes up too much valuable real estate on the screen. This would be better served on a separate page or in a much smaller size.</td>
<td>Medium</td>
<td>Efficiency, Effective</td>
</tr>
<tr>
<td>Much of the content in each sector is links to external websites.</td>
<td>Medium</td>
<td>Effective</td>
</tr>
<tr>
<td>Labels need to be more accurate. For example, the label to join a workspace – Help solve this problem – does not indicate that clicking will join a workspace.</td>
<td>Medium</td>
<td>Efficiency</td>
</tr>
<tr>
<td>After clicking on the links for each sector, it is difficult to tell if the news section pertains to that specific sector or E4C as a whole.</td>
<td>Low</td>
<td>Engaging, Efficiency</td>
</tr>
<tr>
<td>The tagline on the main page is difficult to read – too much text, should be condensed. Users are going to skim for information and are unlikely to read long strings of text.</td>
<td>Low</td>
<td>Effective</td>
</tr>
</tbody>
</table>
Social Media

Social Media sites provide an outlet to broadcast an organization’s message. E4C is well connected and leverages these opportunities through its Twitter feed, Facebook page, LinkedIn network, and collection of YouTube videos.

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<tr>
<td>YouTube video that describe E4C’s mission is buried on the organization’s YouTube page. This is the type of information that would be useful on the homepage.</td>
<td>High</td>
<td>Efficiency</td>
</tr>
<tr>
<td>Links to Social Media sites should be more prominent – especially if E4C intends to use these mediums to connect to users and foster collaboration.</td>
<td>High</td>
<td>Engaging</td>
</tr>
<tr>
<td>Some of the social media outlets do not include clear links back to the E4C page.</td>
<td>Medium</td>
<td>Efficiency, Error Tolerant</td>
</tr>
<tr>
<td>There is no explanation of the type of information to expect on E4C’s social media sites.</td>
<td>Medium</td>
<td>Effective</td>
</tr>
<tr>
<td>Potential exists for users to wander from the E4C site to explore connections within social media networks.</td>
<td>Low</td>
<td>Effective</td>
</tr>
</tbody>
</table>
Aesthetics

E4C has a clear and detailed design strategy as outlined by the web style guide. This has many advantages, including unique branding opportunities, unity in presentation, and an overall pleasing look to the user.

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</tr>
</thead>
<tbody>
<tr>
<td>The bold color scheme and many competing elements are a distraction. Minimalist designs take advantage of dropdown menus, intuitively placed web elements, and easily recognizable icons.</td>
<td>High</td>
<td>Engaging</td>
</tr>
<tr>
<td>The banner and scrolling images on the homepage are distracting and divert the user’s attention from the primary content.</td>
<td>Medium</td>
<td>Effective</td>
</tr>
<tr>
<td>The mission statement on the homepage is difficult to read because of bolded and italicized combined with the contrast between the text and body colors.</td>
<td>Medium</td>
<td>Engaging</td>
</tr>
<tr>
<td>On many pages, such as the “About Us” page, there is a large disparity between the font size of the headers and body text.</td>
<td>Low</td>
<td>Engaging</td>
</tr>
</tbody>
</table>
Conclusion

Conducting the heuristic evaluation brought to light many issues that can be immediately addressed and could be incorporated into E4C's development and content strategy moving forward. Specifically, issues that have only one solution, such as those regarding aesthetics or system problems, can be resolved without any additional input.

We were able to gain a great deal of knowledge and understanding of the site through our findings, particularly from the vantage point of a young, technologically savvy user. The information gained from the review and analysis provides direction for the next steps in performing user research on the E4C test – usability testing. We look forward to validating our findings and finding potential solutions by creating specific tasks designed to address some of the areas of improvement identified throughout the report.
Appendix A: Persona – Michael Samford, Engineering Student

Male 22 years old.
Undergraduate engineering student

Occupation: Full-time student; works part-time to earn extra spending money.

Technical Profile: Uses his computer on a daily basis. Quickly learns new software, but prefers web-based applications.

Organizations: IEEE, ASCE, Tau Beta Pi

Hobbies: traveling, photography, exploring nature

Michael is a civil engineering student in his junior year at Swarthmore College in Pennsylvania. He is particularly interested in civil engineering. He grew up in an upper-middle class neighborhood of Connecticut.

Michael is single and lives in an apartment off campus. He works part-time at a nearby pizza restaurant. His hobbies include photography, going to outdoor music festivals, hiking, and camping. He loves to travel and see new places, especially outside of the United States.

As an engineering student, Michael is technically savvy and relies on technology. He owns a computer, laptop that he uses for school, and an iPad for personal use. He stays connected with friends and family through social networks including Twitter, Facebook, Google Plus, and StumbleUpon. He recently created a LinkedIn account because he is beginning to think about potential career paths.

Michael has always had an interest in helping the less fortunate. These values were instilled through his family and staying active with a youth group in Connecticut. After his freshman year of college, he spent a summer helping build canals to create sustainable water sources in a remote village of Guatemala.

Motivators

- Likes to use technology to collaborate with those with similar interest.
- Does not have money to be philanthropic, but likes to help others in other ways.

Frustrations

- Easily frustrated when he cannot find information quickly.
- Uses search, but generally cannot find results.