Engineeringforchange.org:

Heuristic Evaluation

Sponsored by IEEE and ASME:

Prepared for Dr. Carol Barnum, 6120-Usability Testing
Prepared by Hufflepuff Team: Nathan Atkins, Laurie Bennett, Brian Domit, Jeffrey Jones
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Executive Summary

This report contains the results from a heuristic evaluation of the Engineering for Change (E4C) Web site, completed by our team (Hufflepuff Team) on 9/25/11. The team mimicked basic tasks a new user might perform while evaluating the site based on Jakob Nielsen's *Ten Usability Heuristics*. We noted both positive and negative findings.

Using the profile of a typical user, developed previously, we found that although the E4C Web site conforms to Nielsen's heuristics in several areas, overall the site is difficult to navigate when attempting basic site tasks.

Positive findings--The E4C Web site conforms to Nielsen's heuristics in several areas, as highlighted in these top positive findings:

- **Visibility of system status**—When trying to participate in a workspace or discussion without logging in, a balloon appears informing the user they are not registered and points to the registration page.
- **Error prevention**—If users are not signed into the site they are taken to the registration page.
- **Help users recognize, diagnose, and recover from errors**—Error messages are written in plain language making them easy to understand.

Negative findings—We found the site contains 11 minor issues, 20 major issues, and 1 catastrophic issue. The catastrophic and major issues, listed below, interfere with a user's ability to navigate the site.

- **Flexibility and efficiency of use** (Catastrophic issue)—Limited ability exists for experienced users to find specific information; an Advanced Search function is needed.
- **Match between system and the real world** (Major issue) — Joining a workspace is not intuitive. Users may not understand they need to click "Help solve this challenge" to join.
- **Consistency and standards** (Major issue)—The top navigation menu lacks consistency with Web standards. The "Areas of Interest" menu hides the secondary E4C Resources.
- **Error prevention** (Major issue)—The registration process forces users to complete the entire process before notifying the user of unacceptable answers.
- **Recognition rather than recall** (Major issue) — Bulletin board graphics at the bottom of the interior pages are not clickable, which forces users to retrace steps to find their desired pages.
- **Aesthetic and minimalist design** (Major issue)—The E4C Web site is cluttered and the color palette does not create enough contrast between background and type to produce adequate legibility.
- **Help and documentation** (Major issue)—The Help function does not sufficiently explain how to navigate or find information on the Web site.

For each negative finding, we recommend improvements that adhere to Nielsen's criteria for usable sites. The most imperative improvements include integrating an advanced search function and modifying the process to join a workspace.

The E4C site contains useful, meaningful information and tools; it offers users beneficial features that adhere to Nielsen's usability heuristics. However, we recommend addressing the problem areas highlighted here and discussed in detail (along with additional issues) in this report to improve the overall user experience.

Introduction

As we approach formal usability testing of the Engineering for Change Web site (www.engineeringforchange.org), we performed a heuristic evaluation of E4C to better define our testing criteria. Heuristics are a set of principles, used by experts to inspect a Web site interface in search of violations of the heuristics (Barnum, 2011). The potential problems revealed during the heuristic evaluation are then emphasized during formal usability testing.

The Hufflepuff Team conducted the heuristic evaluation in a one-week period, 09/18/11—09/25/11. We used the Elise Manning persona, developed as a team last week, and created a scenario in which she performed the following tasks:

- Become a member
- Join/create a workspace
- Find another member
- Find a technical solution
- Post/reply to bulletin board

Elsie represents the profile of many users of the site. She is an engineer in her 50s who is looking to give back to society. Elsie spends several hours a day on the Web, and prefers sites that are simple with clear, logical paths to information she requires.

In this document, the Methods section describes the process used by our team to conduct the heuristic evaluation. The Evaluation Findings section, details the site rankings according to each of Nielsen's ten heuristics, and concludes with a Summary of Recommendations.

Our primary goal for the heuristic evaluation is to identify areas in which users may encounter problems while completing basic tasks on the site. We also provide recommendations for improving any issues we find. We will use the data collected in this evaluation to build realistic, effective scenarios for planned formal usability testing.

Methodology

Evaluation Process

To conduct this heuristic evaluation, each member of our team individually stepped through five common user tasks and evaluated the Engineering for Change (E4C) site according to Jakob Nielsen's *Ten Usability Heuristics*.

We identified five tasks that most E4C users frequently need. We chose these tasks based on feedback from our E4C sponsors during the kickoff meeting.

Prior to this evaluation phase, our team created two personas (typical users) for the site: an engineering student and a professional engineer. They were both informed by current E4C user profiles, personal interviews, Web analytics data, and information provided during the kickoff meeting. Of the two personas, we chose to perform the evaluation through the eyes of Elsie, our professional engineer persona. We chose her to offer our sponsor the perspective of their primary user community, professional engineers.

In order for each team member to independently evaluate the site, we created two scenarios to guide Elsie through her use of the E4C Web site. The scenarios are probable stories encompassing the tasks that Elsie needs to accomplish on the E4C site.

Our team had the option of choosing from various heuristics to perform the evaluation. We chose Jakob Nielsen's *Ten Usability Heuristics* for two reasons:

- They are well known in the usability community.
- They offer specific and objective criteria to help our team deliver consistent evaluations.

Nielsen's heuristics guided each team member through an independent evaluation of E4C as we ran through Elsie's two scenarios. We created a ranking system to report the severity of positive and negative issues encountered. This ranking system and Nielsen's heuristics are used throughout this report's results.

The tasks, persona, scenarios, heuristics, and rankings we used are detailed in the following subsections.

Tasks

The five main tasks used to evaluate the E4C site are common user activities:

- **Become a member**—The driving task that supports much of the activity on the site revolves around a user's ability to create a membership with E4C through the Web site registration process.
- **Join a workspace**—This task enables a user to offer or solicit help regarding a project or given area of interest.
- **Find another member**—Tasked with locating help or advice on the site concerning areas of interest, users frequently need to search for like-minded site members, geographic neighbors, and those members seeking solutions the user already possesses.
- **View a technical solution**—The E4C site is frequently a destination for users seeking answers to common and isolated engineering problems. The task of finding previously completed solutions is an important one.

- **Post and reply to bulletin board**—Community message boards provide a forum for members to request or offer materials, expertise, and other resources. The bulletin boards also foster communication and feedback. Users need to be able to perform this task on a regular basis in order to fulfill goals.

Personas

Elsie Manning is the professional engineer persona. She fits the following demographics:

- **Gender**—Female
- **Age**—52
- **Occupation**—Electrical Engineer
- **Income**—125k
- **Technical profile**—Product development, primarily in the NASA space program
- **Internet use**—four hours daily for work collaboration
- **Hobbies**—Gardening, ecology activities, hiking, traveling to see children
- **Motivation**—Interested in giving back to society and mentoring young engineers, especially woman engineers

Scenarios

The following two scenarios were used in conjunction with our five tasks to walk the persona of Elsie through the E4C Web site.

Scenario 1

Elsie is eager to use her knowledge of engineering and her experience in the field to mentor young engineers and engineering students. Elsie has mentored young engineers where she could, but is interested in reaching a larger number of up and coming engineers. She is equally interested in volunteering for an organization that can use her skills to help improve the quality of life for impoverished societies. While Elsie has helped with Habitat for Humanity before, she would like to find new opportunities to volunteer on a global scale. To accomplish these goals, Elsie wants to join the E4C community in order to contribute to workspaces, mentor aspiring and new engineers, and troubleshoot with other engineers through the bulletin board.

Scenario 2

Elsie is involved with a workspace on the E4C Web site that is trying to develop a solar energy solution for rural schools in Africa. She wants to find other E4C members who may be able to help, review previous technical solutions for help, and post a question where the entire E4C community can review the more difficult points of her case.

Heuristics

Jakob Nielsen's *Ten Usability Heuristics* are listed as follows with explanations of each (Nielsen, 1994):

- **Visibility of system status**—The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

- **Match between system and the real world**—The system should speak the users' language, with words, phrases, and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

- **User control and freedom**—Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

- **Consistency and standards**—Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

- **Error prevention**—Even better than good error messages is a careful design, which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

- **Recognition rather than recall**—Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

- **Flexibility and efficiency of use**—Accelerators, unseen by the novice user, may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

- **Aesthetic and minimalist design**—Dialogues should not contain information that is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

- **Help users recognize, diagnose, and recover from errors**—Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

- **Help and documentation**—Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

Ranking System

Throughout the evaluation process, we ranked each of the findings according to the five-stage progression as follows:

- **Positive**—Results in a beneficial effect on the user's ability to perform their given task
- **Cosmetic Issue**—Affects the appearance and should be fixed only if time permits
- **Minor Issue**—Hinders the user's ability to navigate and should be fixed when possible
- **Major Issue**—Frustrates or confuses users and requires repair as soon as possible
- **Catastrophic Issue**—Prohibits users from performing their given task and requires an immediate modification

Evaluation Findings

Positive Findings

The E4C Web site conforms to Nielsen's heuristics in several areas:

1. Visibility of system status

- The new user registration page immediately informs users when a problem with registration information occurs.
- When trying to participate in a workspace or discussion without logging in, a balloon appears to inform the user they are not registered and points to the registration page.

2. Match between system and the real world

- The site terminology is common among the intended audience.
- The E4C Web site follows traditional standards for registering.

3. User control and freedom

- Individual member profile pages have a "Back to all members" link.
- Technical Solutions have a "Return to all solutions" link.
- Users can click the E4C logo in the upper left-hand corner to return home.

4. Error prevention

- If a user is not signed into the site, they are taken to the registering page.

5. Help users recognize, diagnose, and recover from errors.
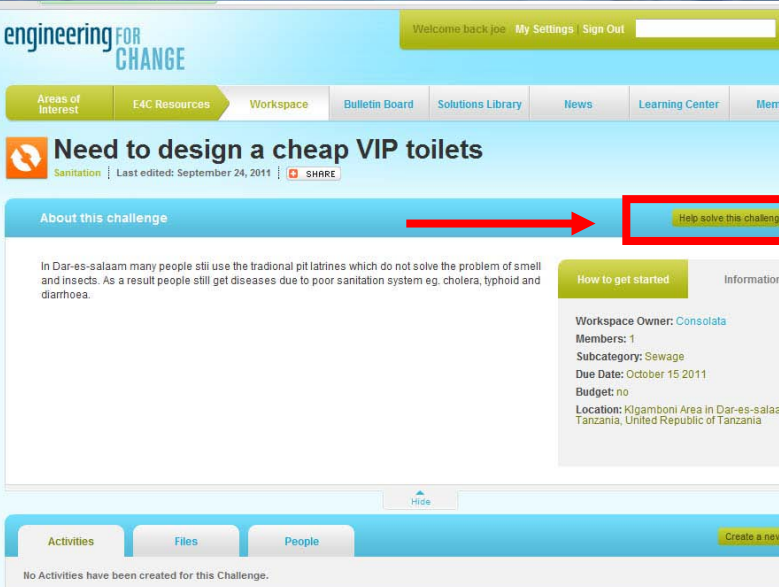
- Error messages are written in plain language and are easy to understand.

Negative Findings

There were several places where the E4C Web site did not conform to Nielsen's heuristics. We reviewed all five tasks for each heuristic but only report on those where an issue was found. Those problem areas are detailed below. For each heuristic, we've listed the task uncovering the issue, the severity of the issue, details of the issue, a recommendation for improvement, and where appropriate, a supporting screenshot.
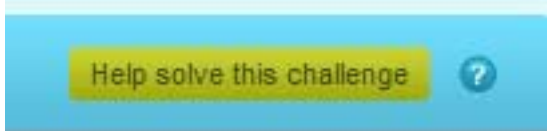
1. Visibility of system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

	Task/Issue/ Recommendation	Screen
1.1	**Become a member:** Minor issue—Verification that the site recognizes a user is in very faint type. The lack of contrast between the type and background reduces legibility. Recommendation— Choose a darker font color to create a stronger contrast against the green background.	
1.2	**Join/create a workspace:** Minor issue—Button for joining a workspace is too small and takes too much effort to find. Recommendation—Increase the size and color contrast of the "Help solve this challenge" button to make it stand out from the surrounding elements.	

2. Match between system and the real world

The system should speak the users' language, with words, phrases, and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

	Task/Issue/Recommendation	Screen
2.1	**Become a member:** ==Minor issue==—The button to become a member is titled "Register Now". Most users will look for a button titled "Join." Recommendation— Change "Register Now" button title to "Join E4C".	
2.2	**Join a workspace:** ==Major issue==—Joining a workspace is not an intuitive process. Users may not understand they need to click "Help solve this challenge" to join. Recommendation—Change "Help solve this challenge" button to "Join this workspace", relocate it closer to the workspace title, and increase the size and contrast of the button.	
2.3	**Find another member :** ==Minor issue==—From the home page, users must know to click "E4C Resources" in order to see the "Member" button. This takes too many clicks, is not intuitive, and the labeling does not correspond to real world verbiage. Recommendation— Instead of hiding the "E4C Resources" navigation menu, create a 2nd navigation row for the "E4C Resources" below the "Areas of Interest" navigation menu.	

2.4	**Find a technical solution:** ==Minor issue==—Users with interests not represented by the existing categories may feel undervalued. Recommendation—Areas of Interest menu in the Solutions Library, needs an "Additional Interest" button for users who do not see their area listed.	
2.5	**Post/reply to Bulletin board :** ==Major issue==—To create a post on the bulletin board, the user must click "New ___ Request". This is not an intuitive step. Recommendation— The term commonly used when writing on a Bulletin board is *Post*. Rename the button "Create a new post."	

3. User control and freedom

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

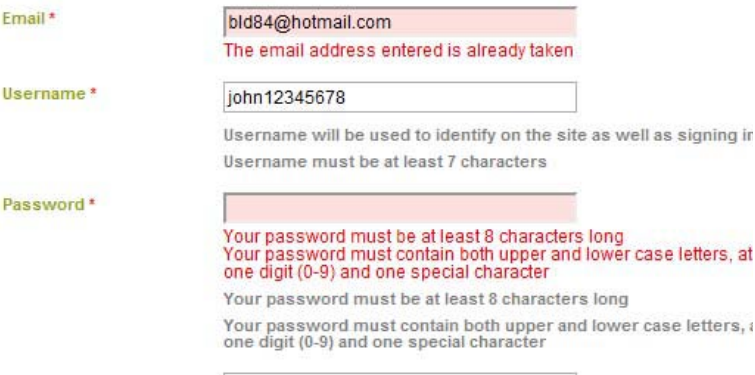|	Task/Issue/Recommendation	Screen
3.1 3.2 3.3 3.5	**Become a member :** **Join a workspace :** **Find another member:** **Post/reply to Bulletin board**: Minor issues—Each of these tasks require using the back button to leave an unwanted state. Recommendation— Create a button or link returning users to their previous page, similar to the Solutions Library link, "Return to all solutions". A link to the home page would also be helpful.	 **Gravity Fed Drinking Water**

4. Consistency and standards

Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

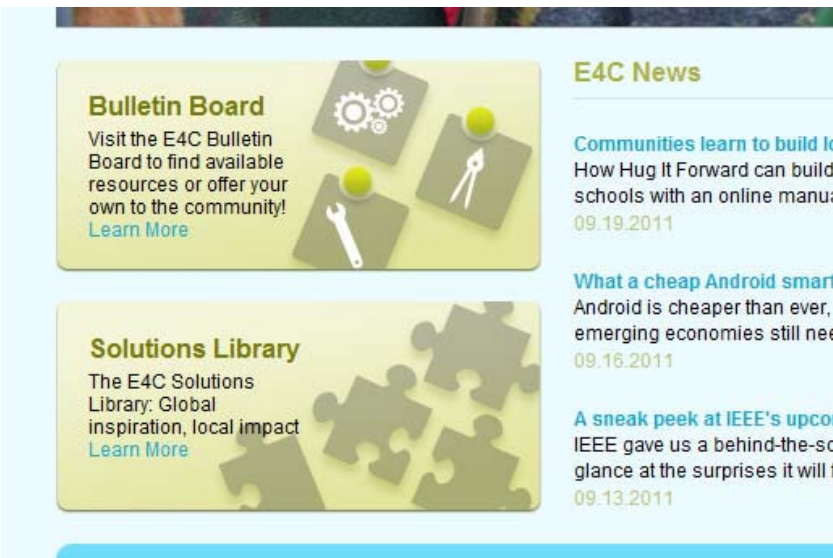|	Task/Issue/Recommendation	Screen
4.1	**Become a member :**	
4.2	**Join a workspace:**	
4.3	**Find another member:**	
4.4	**Find a technical solution:**	
4.5	**Post/reply to Bulletin board:**	
	Major issues—All tasks are affected by this issue. The top navigation menu lacks consistency with Web standards. The "Areas of Interest" menu hides the secondary "E4C Resources" menu unless the user clicks on "E4C Resources".	
	Recommendation—The navigation inconsistencies can be resolved by integrating the same solution as #2.3: Add a 2nd navigation row for "E4C Resources" below the Areas of Interest menu.	

5. Error prevention

Even better than good error messages is a careful design, which prevents a problem from occurring in the first place.

	Task/Issue/Recommendation	Screen
5.1	**Become a member :** Major issue—The registration process forces users to complete the entire process before notifying the user of unacceptable answers, i.e., the email address is already in use, the password does not conform or is weak. Recommendation— During the registration process, notify users of errors at the collection point, before user clicks "Create profile."	Email * bld84@hotmail.com The email address entered is already taken Username * john12345678 Username will be used to identify on the site as well as signing in Username must be at least 7 characters Password * Your password must be at least 8 characters long Your password must contain both upper and lower case letters, at one digit (0-9) and one special character Your password must be at least 8 characters long Your password must contain both upper and lower case letters, one digit (0-9) and one special character

6. Recognition rather than recall

Make objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

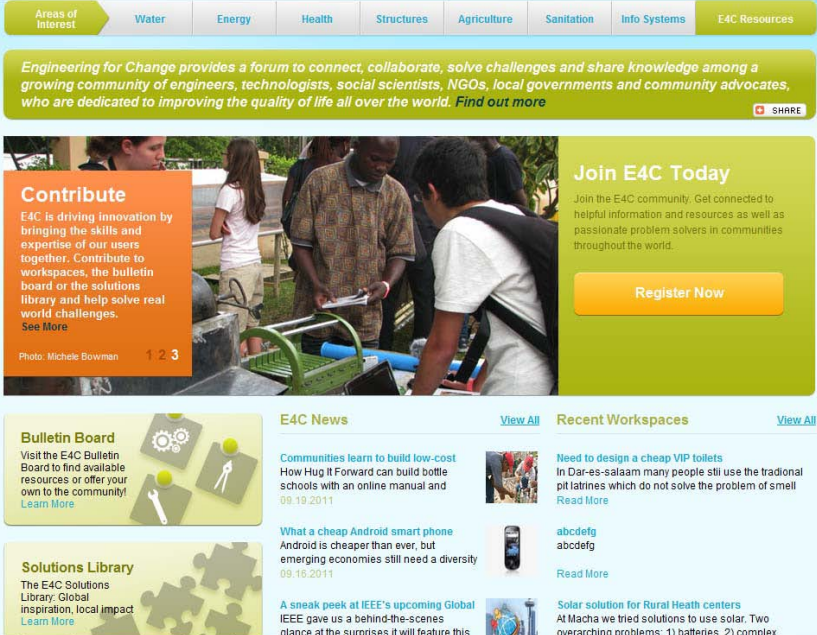|	Task/Issue/Recommendation	Screen
6.1	**Become a member:** Minor issue—After registration, there is no indication of what to do next. Is the next step to go to the "Members Area"? Recommendation— Create content encouraging users to explore different areas of the E4C site.	
6.2	**Post/reply to Bulletin board:** Major issue—The horizontal menu contains a 2nd menu, which causes users to overlook the bulletin board. Users may think they need to remember a different path to the bulletin board. The "Bulletin Board" box on the home page and at the bottom of the interior pages is not clickable. It has a clear call to action with no opportunity for users to do anything, and is unlikely to be seen at bottom of the page. Recommendation—Add a 2nd row menu for E4C Resources below the Areas of Interest menu. This will make links to the Bulletin Board and Solutions Library visible and easy to select. Remove Bulletin Board and Solutions Library boxes from home page.	

7. Flexibility and efficiency of use

Accelerators, unseen by the novice use, may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

	Task/Issue/Recommendation	Screen
7.1	**Join a workspace:** ==Minor issue==—Workspace filter "Least Recent" is confusing. Is that recent activity? Oldest created? This is not clear. Recommendation— It would be more conventional to search the workspace by the most recently created workspace. Use a more conventional filter such as "Newest workspaces".	Sort: Least Recent Most Members
7.2	**Find another member:** ==Catastrophic issue==— Experienced users need a way to quickly find the person they are looking for. It is very difficult and time consuming to find a specific member. Recommendation—Create a search function that allows users to search by member name, demographic, workspace title, workspace area of interest, etc.	

8. Aesthetic and minimalist design

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

	Task/Issue/Recommendation	Screen
8.1 8.2 8.3 8.4 8.5	**Become a member :** **Join a workspace:** **Find another member:** **Find a technical solution:** **Post/reply to Bulletin board:** Major issues— All tasks are affected by this issue. The E4C Web site is cluttered and difficult to read. The reduced legibility hinders users. A lack of contrast between shades of green affects those with color blindness or impaired vision. Recommendation— Simplify pages where possible to reduce visual noise. Ensure there is sufficient contrast between text and background color.	

9. Help users recognize, diagnose, and recover from errors

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

	Task/Issue/Recommendation	Screen
	No issues found	

10. Help and documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

	Task/Issue/Recommendation	Screen
10.1 10.2 10.3 10.4 10.5	**Become a member :** **Join a workspace:** **Find another member:** **Find a technical solution:** **Post/reply to Bulletin board:** Major issues—All tasks are affected by this issue. The Learning Center describes the different areas of interests that are available. It does not sufficiently explain how to navigate or find information on the Web site. There is insufficient help for each of the five tasks. Recommendation— Many of the issues discussed in the "Evaluation and Findings" section make navigating and locating information on the site difficult. Add a help button at the top of every screen or other help function to assist users.	

Summary of Recommendations

Issue #	Recommendations
1.1- User verification message is difficult to see	Choose a darker font color to create a stronger contrast against the green background.
1.2- Workspace participation button is too small, is overlooked	Increase the size and color contrast of the "Help solve this challenge" button to make it stand out from the surrounding elements.
2.1- Membership button wording is vague	Change "Register Now" button title to "Join E4C."
2.2 - Joining a workspace is not intuitive	Change "Help solve this challenge" button to "Join this workspace", relocate it closer to the workspace title, and increase the size and contrast of the button.
2.3 –"E4C Resources" menu hidden, content overlooked	Instead of a hidden "E4C Resources" navigation menu, create a 2nd navigation row for the "E4C Resources" below the "Areas of Interest" navigation menu.
2.4 – Users with unrepresented areas of interest are undervalued	Create a new button, "Additional Interest", under Areas of Interest.
2.5 - Bulletin board comment button wording is not intuitive	The term commonly used when writing on a Bulletin board is *Post*. Rename the button "Create a new post."
3.1-3.5 - Most pages provide no shortcut back to main E4C home page	Create a button or link returning users to their previous page, similar to the solutions library link, "Return to all solutions". A link to the home page would also be helpful.
4.1-4.5 – The dual navigation menu is inconsistent with Web standards and confuses users	The navigation inconsistencies can be resolved by integrating the same solution as #2.3: Add a 2nd navigation row for "E4C Resources" below the Areas of Interest menu.
5.1 – Registration process allows users to enter data after errors are made, then forces them to repeat entry	During the registration process, notify users of errors at the collection point, before user clicks "create profile".
6.1 – Users need help knowing what to do next after registering	Create content encouraging users to explore different areas of the E4C site.
6.2 –Bulletin Board and Solutions Library are difficult to find	Add a 2nd row menu for E4C Resources below the Areas of Interest menu. This reveals links to the Bulletin Board and Solutions Library. Remove Bulletin Board and Solutions Library boxes from home page.
7.1 – Workspaces sort filters are confusing	It would be more conventional to search the workspace by most recently created workspace. Change the filter to "Newest workspaces" or something of that nature. This would be more conventional and intuitive.
7.2 – Limited ability for experienced users to find specific information	Create a search function that allows users to search by member name, demographic, workspace title, workspace area of interest, etc.
8.1-8.5 - E4C site is difficult to read, pages are cluttered, background and font colors lack contrast	Simplify pages where possible to reduce visual noise. Ensure there is sufficient contrast between text and background color.
10.1-10.5 - Learning Center provides insufficient explanations	Many of the issues discussed in the "Evaluation and Findings" section make navigating and locating information on the site difficult. Add a "Help" button at the top of every screen or other help function to assist users.

Conclusion

Our evaluation reveals several issues preventing users from performing desired tasks on the EC4 site. We will incorporate the Catastrophic and Major issues into our formal usability testing. We expect that by identifying, analyzing, and using these issues as part of the testing, we will offer further recommendations for improving the experience for the site's users.

References

Barnum, C. (2011). *Usability testing essentials.* Burlington, MA: Morgan Kaufmann.

Nielsen, J. (1994). Retrieved from http://www.useit.com/papers/heuristic/heuristic_list.html