National IISE Website

www.iise.org

Group 14:

Rhett Broz

Aaryan Jain

Claire Konz

Sebastian Rengifo

Konstandinou Onwuaduegbo

Table of Contents

Introduction:

The National Institute of Industrial and Systems Engineer (IISE) is an essential organization for Industrial Engineering (IE) students. A large majority of IEs use the website as a source of information for things such as conferences, job opportunities and much more. Because of IISE's influence on the vast IE community, it is important for them to have an updated system that will satisfy the needs of their users. In this project, multiple evaluation methods were used to assess the current usability of the national IISE website and make suggestions to fix any uncovered issues through both an evolutionary and revolutionary redesign.

System Users

The system users can include anyone that is seeking information about the field of industrial engineering or Institute of Industrial and System Engineers(IISE). These tend to be IISE members but can also include non-IISE members since there is valuable information posted on the website. IISE members include college students and working professionals who pay a registration fee to receive regular updates about the field of industrial engineering. Non-IISE members that visit the site are more likely to be solely working professionals looking for professional development events, networking opportunities, or research articles in the field of industrial engineering.

Site Traffic

While the website's traffic is not freely available online, it can be estimated by its visible traffic on social media. The IISE facebook page has 10,500 likes. This means that around 10,500 people like to receive regular updates about the Industrial Engineering community. The average person visits the IISE website about once a month. Therefore the daily traffic can be estimated to be 340. This accounts for users who like to view content on a regular basis.

System Development History & Developer Information

The IISE Website was developed and is currently maintained by a team of about 25 members, who represent the National IISE headquarters in Norcross, Georgia. To run the site efficiently and smoothly, the team has varying roles and responsibilities ranging from Finance & Internal Office Services to Member and Customer Service. Though no specific developer

information is available, it seems that the Information Technology (IT) team is responsible for managing the website and the system. They work in conjunction with the rest of the teams to publish and maintain the contents of the website. Additionally, no concrete development history is available, however, copyright markings show that the website is updated on a regular basis.

System Operations

IISE website operations as a whole are managed by a single Senior Manager of Digital Strategy and Production who is employed full-time by the national IISE organization. This manager is additionally supported by other media specialists such as the Communications Director of Design and Production. The system operations are managed from IISE headquarters in Norcross, GA. Funding for operations is supported by donations to IISE as well as membership dues.

Information Entry

Many parts of the website require users to enter information, most often in a search field. Most of the search bars accept keyword searches. In addition to search fields, when signing up for a membership, users provide basic information such as their name, home address, and phone number that can be used in association with their member benefits. Additionally, to pay for the membership, users must fill in credit card fields so that their payment can be processed through IISE's online processing.

System Management

The National IISE website is monitored by a group of people that make sure to keep the information of the user private. There are certain things that are being monitored, but in the Privacy Policy section, there is an extensive list of things that are done in order to maintain the user's trust.

System Formats & Purchase

National IISE has a website used as a way for people to interact with information that is relevant to their career. In this website, they have sections such as Membership, Communities, Training, Conferences, Publications, Career Center, and Advertise. They are focused on

providing information on how one could benefit with being part of the IISE family. In order to have full access to the benefits that come from joining IISE, one would have to purchase either a professional membership at $169 or a student membership which is $39. A few of these benefits include providing a place where members of IISE can network with each other, holding training for certificates related to Industrial or Systems Engineering, conferences for them to attend, and a center for members to look for jobs related to their major. So although IISE is shown as just a website, when trying to find information on conferences that you are attending you can download the IISE Annual app on IOS or Android.

System Stakeholders

National IISE website stakeholders are invested in reaching a larger population with the goal of providing greater knowledge about the organization and services that are rendered. The main stakeholders can be grouped into students, young professionals, corporate recruiters and IISE. The students are able to use information from the website to help them with their future careers plans and achieve their goals. Young professionals are able to further their career through the services offered by the website. The corporate recruiters use the IISE website as a method to find potential candidates for various roles in their organizations. Also, they help the other stakeholders by adding knowledge about the different things that the corporate world may be looking for. IISE uses the website as a method to reach out to a greater population. They are invested in creating a better future for the stakeholders of the organization.

System Uniqueness

The National IISE website offers a variety of services for its members. These services include a training center, conferences/seminars and career center. The training center is used to provide the users with methods to expand their knowledge about different aspects of Industrial engineering. It is divided up into the online classroom, classroom training and corporate training. The conferences provide insights about different conferences that are upcoming. The career center has all kinds of information about jobs. It includes applying for jobs, posting of jobs and much more. All these services are unique to the IISE website and make the site even more attractable to its users.

Methods:

Heuristic Evaluation

The Heuristic evaluation was used to test the interface of the National IISE website. The various methods used to analyze the problem in the user interface design are:

1. Design-induced error evaluation
2. Schneidermans' design principle evaluation
3. Nielsen heuristic evaluation
4. Wickens evaluation
5. Display/Controls design evaluation

Each evaluation helped to better understand the issues that surround the interface of the National IISE webpage and helped in the creation of redesigns.

Usability Testing

Five different individuals will be picked to perform the usability testing(5 novices). The various tasks that the five(5) novices are expected to complete are discussed below. These tasks were created to get a better understanding of the problems that novices face when interacting with the website. A few requirements for the usability test:

- Use zoom and record session to get the screen recording as well as them speaking through the thought process
- Search bar cannot be used
- Each group member picks an individual to do the test
- The search cannot be used while accomplishing a task

Assigned Task:

1. How to be a student member
2. How to get a Lean Six Sigma Green Belt certification
3. How to get more information about the IISE at Purdue
4. How do you get to the "Discounted Insurance Coverage" page
5. How to get to the IISE Diversity and Inclusion page

Evaluation:

- Number of Clicks
- Time to complete task (in seconds)
- Qualitative feedback from each user

Survey

For the third system evaluation method for the semester project, the team created a survey. The survey was conducted using Google Forms so that all team members had easy access to the survey results. Additionally, Google Forms is a commonly used survey platform with which participants were likely already familiar. The survey was distributed via email and private messages as deemed appropriate based on the contact. The survey was open for approximately one week to ensure participants had time to complete the survey at their convenience.

By utilizing different distribution mediums the goal was to receive responses from a variety of age groups who have a range of experience levels with the National IISE website. This includes but is not limited to: students, industry professionals, and IE professors. To gain experienced student participants the team distributed the survey to the Purdue IISE chapter. Other participants were contacted and asked to take the survey through our team's personal networks.

Survey questions primarily focused on the user's perception of the website and its intended functionalities. The survey asked questions pertaining to the overall aesthetic of the website as well as questions regarding where users would expect to look to find particular information. Additionally, a sample of the website was provided so that the survey could ask questions about page design and how it enhances or hinders the functionality of the system. These survey questions were written in formats that allow for short response times (such as multiple choice, multiple select, scales, etc.) to decrease the time commitment for the participant. The final survey can be viewed via this link: https://forms.gle/1ufcXBbFhYCwNTZN7.

Upon completion of survey data collection the team used pre-made summaries available from analytics performed in Google Forms to perform data analysis. Open-ended responses were evaluated by hand for common themes and main ideas.

Findings:

Heuristic Evaluation

1. *Design- Induced Error Evaluation*

Gulfs of execution and evaluation are mismatches between a person's goal and the result produced from their execution of a task that they thought would result in that goal. Reviewing gulfs of execution and evaluation help to identify design induced error. To identify design induced error on the IISE website, the website was tested as if there was a user trying to accomplish certain tasks.

For example, it was imagined that a user was clicking on the membership tab that wanted to view their profile information. When "My Profile" was clicked through, the information and links that were expected were not received. The screenshot below displays what is shown after clicking the "My Profile" tab under the "Membership" section of the IISE website.

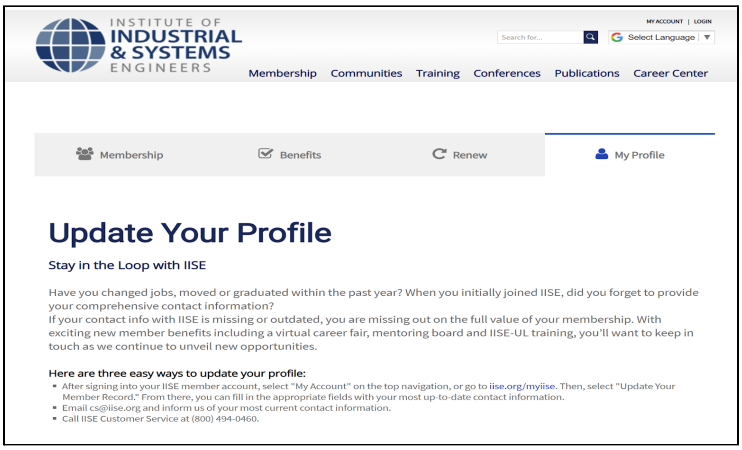

***Figure 1**: IISE My Profile page*

In the next example, it was imagined that a user was trying to reach the home page after viewing the training center. Past knowledge of clicking the IISE logo was used to get to the homepage, to execute this task. However, after clicking the IISE logo below, the website went to the same page (IISE Training Center). Although there is a "HOME" button, it was thought that the IISE official logo would serve as a way to the IISE home page since it does on most other pages. This issue is a design induced error that is a result from lack of consistency. Not only is this not intuitive but it violates the patterns demonstrated in other areas of the sight.

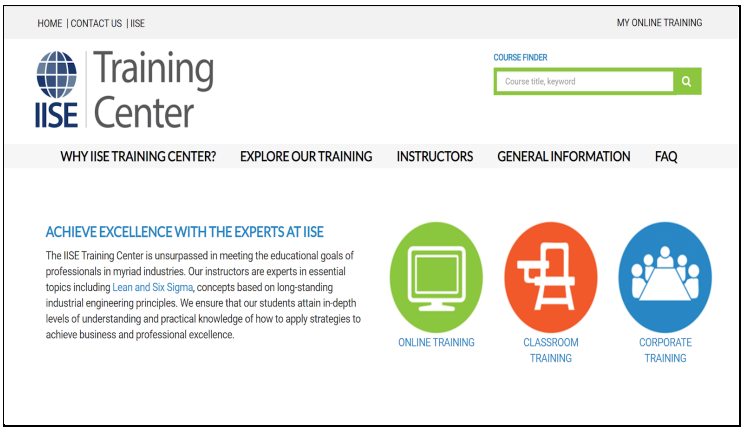

***Figure 2**: IISE Training Center page*

Overall, design induced errors that are apparent in the IISE website are a result from improper naming of tabs or lack of consistency which can lead a user to navigate to a part of the website they didn't intend to.

2. *Schneiderman's Design Principle Evaluation*

A Schneiderman's Design Principles that the IISE website violates is that it does not reduce short term memory load. As shown in Figure 3 below, "job" is searched using the search box on the homepage. The image below shows the results, however, a new query does not autofill the box with previously searched results. To reduce short term memory load, the website should use functionality similar to that of Google search where the interface can recall most recent searches to aid user's navigation and site experience.

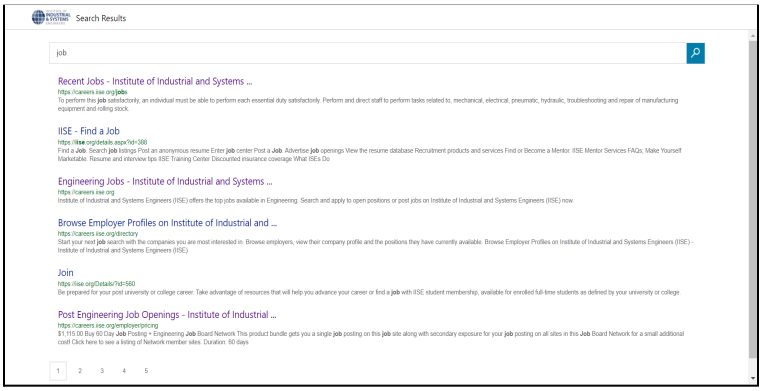

***Figure 3**: IISE "Job" Search Results*

3. *Nielsen Heuristic Evaluation*

Nielsen's Heuristics stress a variety of design principles, but the IISE website violates the "Consistency and Standards" heuristic most often. Essentially, the platform should adopt a cohesive design in which its pages/screens appear in approximately the same format regardless of content. As seen in lecture, one such example of a good implementation of consistency is the toolbar for the Office programs. Although each mini menu requires different types of content, they all take on the same design, colors, and overall look. Many pages of the IISE website adopt a format that includes a header, some amount of text, and relative links. It is obvious that this is intended to be the general design of IISE's pages given that nearly every page accessed from the navigation bar shares this aesthetic. This "standard" format is shown in Figure 4a below:

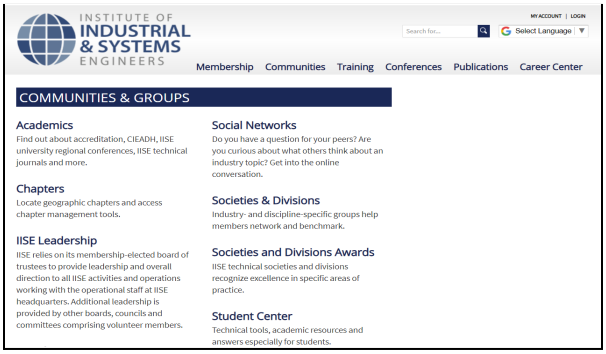

***Figure 4a**: Standard page format used for the majority of pages on the IISE site*

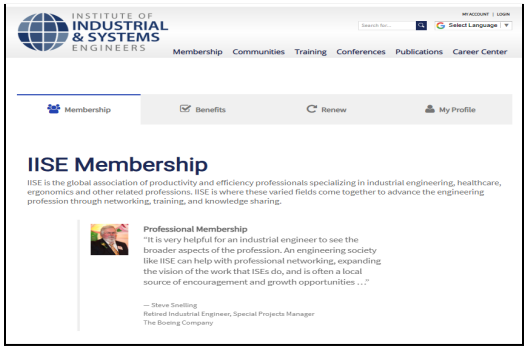

***Figure 4b**: unlike the rest of the website, the membership page utilizes tab structures*

Despite the obvious intention for uniformity, notable pieces of the website take an entirely new formatting approach. One such example is the Membership Home page, shown in Figure 4b above. This page adopts a tab-based structure rather than the list-of-links that is standard to most other website pages. This violates the consistency heuristic by introducing new user interaction structures that are not used elsewhere in the site.

4. *Wickens Evaluation*

Wicken's design principles contain 4 main sections which include Perceptual Principles, Mental Model Principles, Attention-based Principles, and Memory Principles. Perceptual Principles include things like how things are seen by the user and how the flow of the website works. IISE's website has some redundancy gains within the sections as some of them show multiple ways of

viewing some things, but they have a good top down approach starting from the headers and going down to the subheadings to get into specifics for each section. The principle of pictorialism says that things should look like the variable it represents which in IISE's case there aren't many pictures that show what something is and is just words most of the time. The flow of the website backs up the principle of moving parts as well. The Attention based principles are not really used in IISE's website as most of the website is in writing and words which doesn't allow for a quick look at something to know what it is that you are looking at. Lastly, Memory Principles are used well in IISE's website as they are organized in having headings and subheadings to allow for an easy transition to the information one would be looking for. Using consistency with their tabs on the top of the website to have an idea as to which tab you would have to select to obtain the information that is sought after is utilizing the Memory Principles.

5. *Display/Controls Design Evaluation*

The design and location heuristic focuses on the visual hierarchy. The figure below specifically has a problem with the location of the information given. Information should be presented in distinct(sub) sections that would allow the information to be clearly understandable. The sections need to be labeled clearly in order to identify the contents of the web pages. As shown in the figure below, the information is not presented in the central location but instead seems to be focused on the left hand side of the web page. There should be a clear division between the magazines, each individual magazine should be placed in hierarchical order from top to bottom with the information about the magazine at the side rather than beneath it.

Figure 5: *IISE Publication Webpage*

Usability Testing

The usability test was completed with five novice participants and the results are shown in Table 1 below, as well as the qualitative feedback that was obtained from the test. The information used was essential to the creation of both the evolutionary and revolutionary re-designs.

Clicks

Figure 6 shows the average clicks per task performed by the user compared against the actual clicks that it requires to complete a task. As shown in the figure task 4 required the largest number of clicks which was due to improper placement of information.

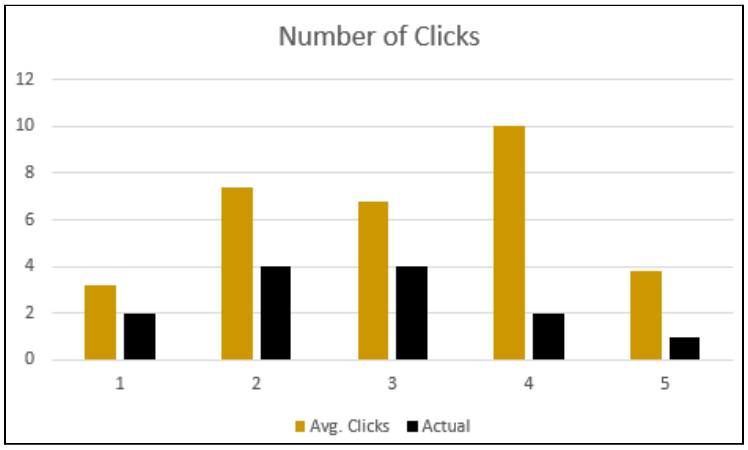

Figure 6: *Average number of clicks for each task*

Amount of Time (seconds)

The average time spent on each task is shown in Figure 7 below. The actual time is displayed in the graph as well. It shows the actual time that the individual is meant to spend on each task.

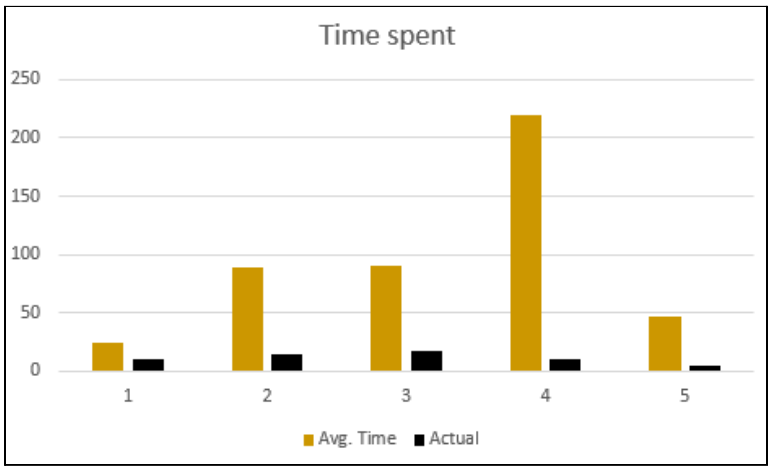

Figure 7: *Average completion time for each task*

Task Evaluation

Table 1: Summary of usability testing task metrics

Task	Avg. clicks	Avg. time (s)	Comments
1	3.2	24.916	Straight forward, except for knowing the difference between making an account versus joining IISE
2	7.4	89.458	Better location for Lean Six Sigma Certification, as there was confusion in where to find it. Events tab for in person vs online course, conferences vs training
3	6.8	90.068	Broken link to purdue page
4	10	219.25	Not in correct place or confusing to find
5	3.8	47.25	There are multiple places to find the diversity and inclusion page, it would be recommended to find the optimal place f

Overall Feedback

Most novices had similar comments while completing the task, the summary of the comments made are:

- Have working links under the various tabs
- Limit number of paths that can get to the same page by reducing the amount of tabs and be more informative about information under each tab
- Home button on each page

Usability testing enabled a better understanding of what the webpage lacked and the problems that users faced while using the IISE web page. Through the usability test, more information was obtained about specifics on the IISE interface that needed to be worked upon.

Survey

Based on the survey results. The survey was completed by only students, an equal number of IISE members and non-IISE members. The majority of the students that completed the survey had never used the IISE webpage. An equal number of students that use the webpage, use it either on a weekly or yearly basis.

The average score that was given for the aesthetics of the website was 4, as shown in figure x. This value is significantly low, it is attributed to the fact that the website is cluttered, monotonous and lacks efficient utilization of the space. Most users found the website layout to be cluttered, as shown in figure 11.

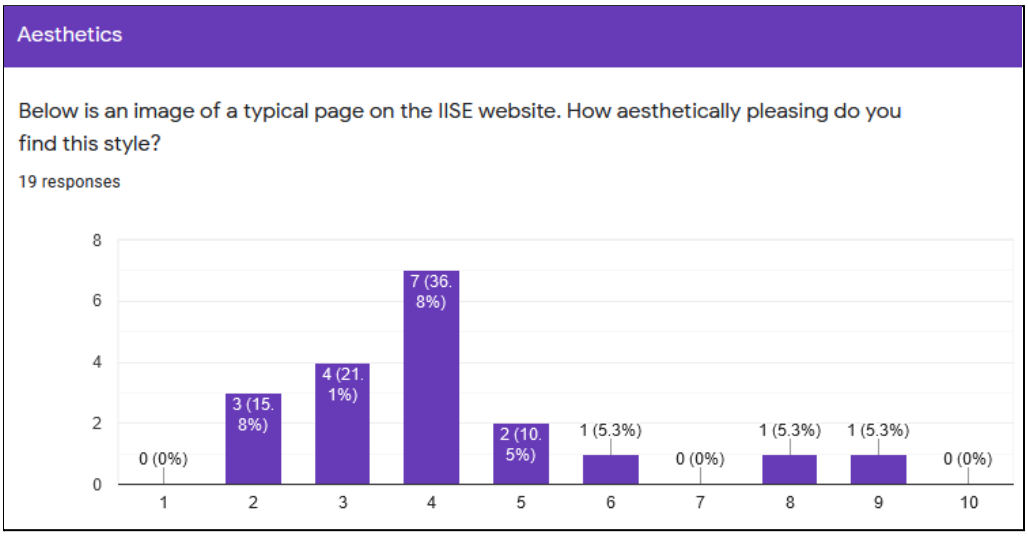

***Figure 8**: Aesthetics Survey Results*

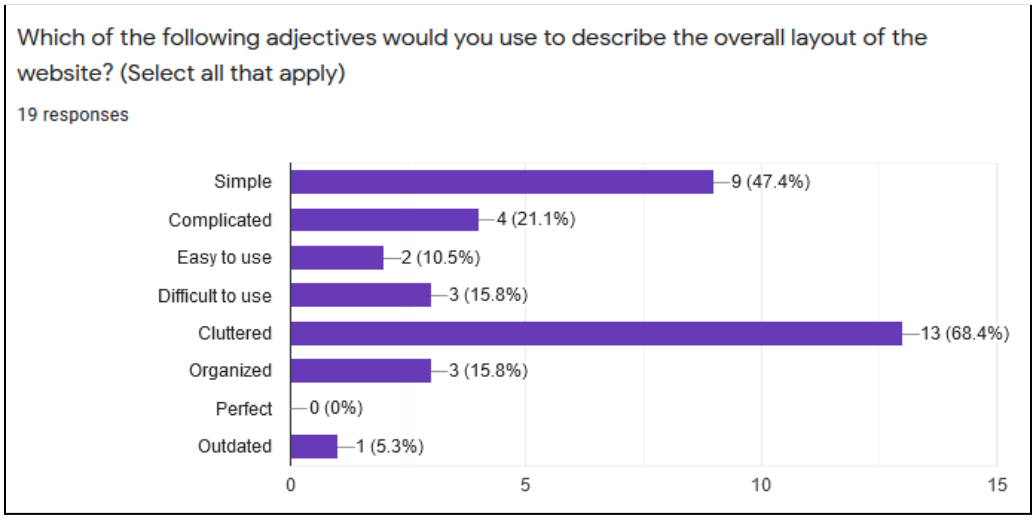

***Figure 9:** Survey Description Results*

Open ended observations:

- A lot of white spaces, boring, and uninviting

- Lacks pictures, and looks monotonous
- Very Cluttered

Open ended changes to be made:

- Make more fun
- Look more futuristic
- Add color
- Reduce clutter and repeated information

Discussion:

From the various system evaluation methods discussed above it is evident that the National IISE website has a variety of usability issues that hinder a user's ability to effectively utilize the website and its features. Many of these core issues can be addressed in either an evolutionary or revolutionary redesign as displayed below.

Evolutionary Redesign

The original student center page shown in Figure 10a is representative of many other similar pages on the IISE website, making its design and layout critical components of the site. From the Display and Controls Design Evaluation segment of the heuristic evaluation, it was determined from evaluation of a similar page that the location and layout heuristic is violated by the current design since the page's content is concentrated on the left side of the screen. Additionally, in usability testing one participant mentioned that it is not obvious that the subheadings are actually hyperlinks to other pages on the site. Finally, this image was used in the survey to collect participants' opinions on their impression of the website layout and overall aesthetic. As mentioned in the findings section, approximately 68% of survey participants found this page design to be cluttered.

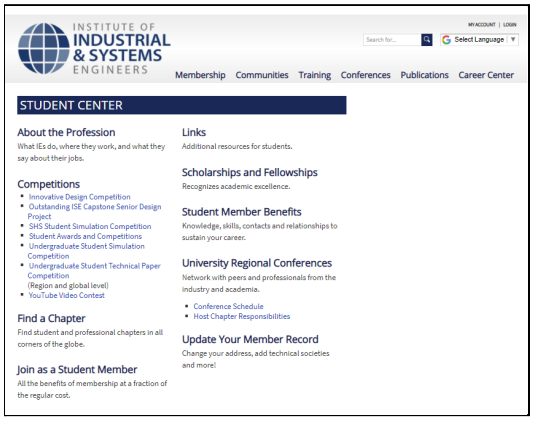

***Figure 10a**: original design of the student center page*

***Figure 10b**: evolutionary redesign of the student center page*

To address these usability concerns while making minimal changes to the website the team proposes the evolutionary redesign depicted in Figure 10b. In this design the navigation was moved beneath the IISE logo and stretched to take up the width of the page thereby reducing clutter in the heading. Additionally, much of this particular page's content concerned student

membership, so these items were grouped under a single “Student Membership” heading to eliminate clutter caused by redundant information. Next, all of the page content was redistributed over the entire width of the web page to address the design location and layout heuristic violation and reduce exorbitant white space (as was suggested in the survey results). Finally, since there were no other indicators that the subtitles are hyperlinks, underlining was added in alignment with the classic HTML hyperlink indicator. These changes all together reduce clutter on the page and make content more easily accessible to users.

Revolutionary Redesign

After evaluating the website and getting user feedback through multiple sources, the team decided to focus on improving layout and functionality in the redesign. As you can see in the original IISE homepage in Figure 11a, there exist quite a few problems. These include the unnecessary white space from the border and extraneous information such as IISE magazines and extra news that was filling up the previous interface. First, the team removed these things and consolidated a few of these sections to the top of the website, as shown in the redesign in Figure 11b. The new interface just contains the news slideshow, a current events schedule bar, and links to the IISE social media channels. By doing so, the website now has a cleaner and clearer layout while remaining visually appealing. Next, in order to ease the flow of information and access through the website, the team focused on the main header tabs. As shown in Figure 11a, the current interface has 6 main sections which include Membership, Communities, Training, Conferences, Publications, and Career Center. Through the heuristic evaluation, survey, and usability testing results, the team found that information was not organized well within each of these sections. The sub-links were duplicated across a few sections and users had to hover over each tab to visualize what information each section contained. This created a lot of inefficiencies as users reported they had to search through all the tabs before getting to the right information. In order to address this issue, the team first combined a few sections together: Membership & Communities, and Conferences & Publications. Next, as shown in the new interface in Figure 11b, the tabs are consolidated below the current events section and the important sub-links for each section are listed directly underneath. These changes not only improved the layout, but also improved overall functionality as users can now find information more easily and quickly. The new interface also does not contain the footer links as that information was repeated in the original website and can now be found under the headers of the

new website. In conclusion, the new redesign provides a simple, consistent, and minimalistic interface that allows for painless navigation and reduced clutter to aid the overall visual appeal.

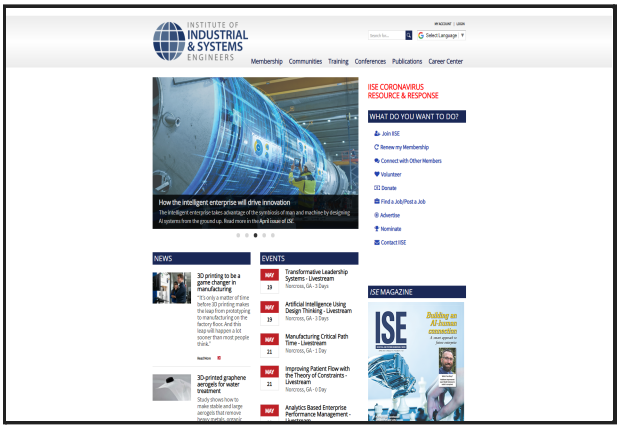

Figure 11a: *Original National IISE homepage*

Figure 11b: *Revolutionary Design*

Conclusion:

Overall, this project was very successful. Three different analyses were done in order to pick apart the Institute of Industrial and Systems Engineers and what kind of violations of design principles they had as well as what areas they have done a good job on. The three analyses that we used were Heuristic Evaluation, Usability Testing, and Survey. Each one had their respective uses that allowed for different aspects of the website to be tested so all three were very beneficial.

The first one being Heuristic Evaluation was split up into Design-induced error evaluation, Schneidermans' design principle evaluation, Nielsen heuristic evaluation, Wickens evaluation, and Display/Controls design evaluation. The violation for Design-induced error evaluation was Gulfs of execution and evaluation. The violation for Schneidermans' design principle evaluation reduced short term memory load. The violation for Nielsen heuristic evaluation was Consistency and Standards. The violations for Wickens evaluation included Perceptual Principles, Mental Model Principles, Attention-based Principles, and Memory Principles. Lastly, the violation for Display/Control design evaluation was design and location heuristic.

The next test done was the usability test. For the usability test, there were things done about the website that were discovered by the 5 people that were used for testing the tasks. The main 3 things that were gained by the users were to fix broken links in the page, add a home button to every page, and to reduce the number of paths to get to pages and improve the overall flow of the website. The website doesn't contain great labels that show where you would like to go so this would need fixed.

Lastly, a survey was conducted and sent out to students both in IE and not as well as those in IISE and not. This would make a spectrum of answers for the survey that include a variety of factors. The survey yielded different kinds of views towards the website which were more surface level thoughts. A lot of the common comments from the survey takers were how the website had a lot of white spaces without many images, it was very cluttered, and looked boring.

There were two designs proposed, evolutionary and revolutionary. The evolutionary design yielded the same layout of the website while removing a lot of the blank spaces and adding more color especially on the rest of the page apart from the tabs. The revolutionary

design had a completely new interface, including bigger icons, search bars, and a minimal number of tabs on the top. It also had very big tabs in the middle that included links to sub tabs that would make it very easy to find what you're looking at.

This was really neat to see how much could be improved on so that the website can be more user friendly and have a better flow throughout. There is a lot of room more improvement and it would be nice for the website of IISE be more ergonomically friendly to serve as an example for Industrial and Systems Engineers.

Appendix

References:

Institute of Industrial and Systems Engineers. (n.d.). https://www.iise.org/Home/. Retrieved April. 30. 2021