Customer Research for NCSU CSC Website

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Abstract

The user interface product chosen for the customer research is the NCSU CSC website (https://www.csc.ncsu.edu/) .The main aim of this paper is to perform customer research on the NCSU CSC website with prospective, current and past graduate students using several HCI methods, generate results and provide necessary design recommendations to the website.

1 Introduction

The NCSU CSC website is operated by the department of computer science of the North Carolina State University. The website provides information about academics, research areas, faculty and general contact information. The home page of the website provides information about all the computer science related news and events. There are links which direct to admission applications, corporate relations, donations and also information required for the current and future students.

2 Methods

The computer science website is evaluated using a combination of the HCI methods involving customer research and feedback from the graduate students. The methods used are heuristic evaluations, Competitive Analysis, Contextual Design (including interviews, interpretations, affinity diagramming) and Survey to get a holistic view of the website from the data collected and then suggest an improved version of the design using a prototype. Each of the applied methods is discussed as follows.

2.1 Heuristic Evaluation

Heuristic Evaluations is one of the methods to evaluate the user experience of the website. This method allows us to consider different use cases and personas to evaluate different aspects of the websites to give the point view of the users in different scenarios. Each one of the team members performed the heuristic evaluation methods considering different personas and scenarios to identify the problems within the website and also know the severity of these problems. (Refer (I) of appendix for UAR forms associated with initial heuristic evaluation)

2.2 Competitive Analysis

Competitive analysis is a way of comparing the given website with other websites of similar kind to understand the gaps and opportunities and find features worth emulating. In this method we compared the NCSU CSC website with the CSC websites of other universities such as University of Southern California (https://www.cs.usc.edu/) , University of Maryland Baltimore county (https://www.csee.umbc.edu/), Massachusetts Institute of

Technology(https://www.eecs.mit.edu/), Carnegie Mellon University (https://www.csd.cs.cmu.edu/), The Ohio State University (https://cse.osu.edu/),The Rutgers School of Arts and Sciences(https://www.cs.rutgers.edu/) and The University of Massachusetts ,Amherst(https://www.cics.umass.edu/)with the persona of current, prospective and future students on various factors such as Aesthetic Appeal, Navigation within the Website, Time Taken in Information Retrieval, Website Structure and Layout, Availability of Information. (Refer (II) of appendix for competitive analysis table)

2.3 Contextual Design

The contextual design involved the process of interviews, interpretation followed by the affinity diagramming session. We interviewed a total of 30 students (each team member interviewed 5 students) of computer science department including the current, prospective and past students. The responses from students were collected through notes which were interpreted to generate an affinity diagram having specific design issues. (Refer (III) of appendix for some of the interview questions and responses).

2.4 Survey

A web survey was conducted to better understand the customer (students) preferences. The survey included questions about basic demographic features, purpose of using the CSC website, the features liked about the website, the problems faced while using the website satisfaction levels on various aspects such as navigation, ascetics, the website layout to name a few to understand the general activity on the website and the common problems faced. A to link to the survey form is provided as follows (https://docs.google.com/forms/d/e/1FAIpQLSffOLZunj6KZATZsT4UtadBwAOOpoUvLtARmgUdLix1ksympQ/viewform)

2.5 Prototyping

Prototyping was used to provide the design recommendations of the website by analysing all the problems from different methods of evaluations. Balsamiq was used to generate a low fidelity wireframe models. We preferred wireframes to paper prototypes as Low fidelity wireframes are easy and quick to create and adjust with each design iteration making them efficient and low cost.

3 Data Collection and Generation

For each of HCI methods mentioned above (Heuristic Evaluation, Competitive Analysis, Contextual design and Survey) the data was collected and used in different ways.

3.1 Heuristic Evaluation

In this method the NCSU CSC website was used and analyzed with different personas. Some of the personas used were

- Prospective student looking out for information about the courses
- Current student looking out for more information about the graduate program
- Prospective students searching for general information within the website

For each persona case we considered some scenarios such as trying to find professor details, research topics etc. and generated the Usability aspect reports(UAR) .Each UAR form (added

to appendix) discusses a particular problem with the website, the heuristic being violated along with the intensity of the problem. They are represented in the following table

Sl.No	Problem	Heuristic Violated	Severity
1)	Navigating through the website	HE 3 Flexibility and Efficiency	Major Usability Problem
2)	Unable to navigate away from search page	HE 3 5 10 Consistency and Standards, Visibility of the System Status,User Control and Freedom	Usability Catastrophe Problem
3)	Obtaining information about graduate program	HE1052Consistency and Standards, Aesthetics and Minimalist Design	Cosmetic Problem
4)	Indicator for current page on navigation bar missing	HE 1 Visibility of the System Status	Major Usability Problem
5)	Redirection to home page of the website is not easily discoverable for novice user	HE 6 Recognition	Minor Usability Problem
6)	Faculty search	HE 6 Recognition	Minor Usability Problem

Table 1: Heuristic Evaluations with problems and severity

3.2 Competitive Analysis

In case of competitive analysis the data was collected in the form of an excel sheet where the websites were compared of different characteristics and for each of the feature we mentioned it is was good or bad .For example the aesthetic appeal of UMBC website was good ,however applications links were difficult to find, in case of MIT website although the layout was simple and professional there was too much information available on the page making it look cluttered(Refer (II) of appendix for competitive analysis complete table) . This method helps to identify the good features of other websites.

3.3 Contextual Design

Initially we conducted interviews of 24 people who were either current, prospective or past students most of whom were current graduate students. The interview process involved some basic questions about the interviewee , time spend on the website ,things they found difficult with the website(Refer (III) of the appendix for some responses).Most of the prospective students responded that the found it difficult to find the course information and the faculty handling a particular course. Some of the current students mentioned that the course grades statistics should be included within in the CSC website. The affinity notes were generated from the responses collected (Refer (IV) of appendix for the list of affinity notes) using which the affinity diagram is produced. The affinity notes are represented in yellow.

3.4 Survey

We conducted an online survey using the Google forms and send across the customers to fill in. The survey was made such that it takes five minutes or less to complete so that the respondent doesn't leave in middle .We had responses from 28 participants and these were collected in the Google forms which made it much easier for comparing and analyzing the results.

4 Data Analysis

4.1 Heuristic Analysis

The data collected from the heuristic evaluation was analyzed and the suggested solutions for each of the problem were looked upon some of which includes adding a home button ,improving the existing search and navigation systems ,modifying the people page of the website and also maintaining consistency within all pages.

4.2 Competitive Analysis

The Competitive Analysis method helped us understand different features (both good and bad) of the Computer Science websites of different universities and we found that the USC website had a faculty directory page which was much more efficient in terms of usability than the NCSU CSC website as it had features like search by faculty type, search faculty by research area. The UMBC website had a grid like structure in the research page with professors and research areas along rows and columns which are both visually appealing and easy to understand especially for novice users.

4.3 Affinity Diagramming

The affinity diagram is generated by analyzing the affinity notes obtained from the interview. In the affinity diagram we grouped all the yellow notes (affinity notes) under the blue notes (common headings).Each blue note gives a higher level insight of the data derived from the affinity notes. Based on the similarity the blues notes were grouped into pink and the pink were grouped into green. The two major groups were the design issues and the information requirements and higher level information about the green, pink and the blue notes is represented below (Refer (V) of the appendix for detailed affinity diagram).

- Design issues
  - General Search Issues
    - Search issues I faced on Research page
    - Search issues I faced on website
  - UX issues
    - I could not discover the links
    - Navigation issues I faced
    - Aesthetic issues
- Information requirements of prospective students

- General information I was looking for about Masters in CS
- Information I wanted from CSC website
  - Academic Infromation I wanted from the website
  - General infromation I wanted from the website.

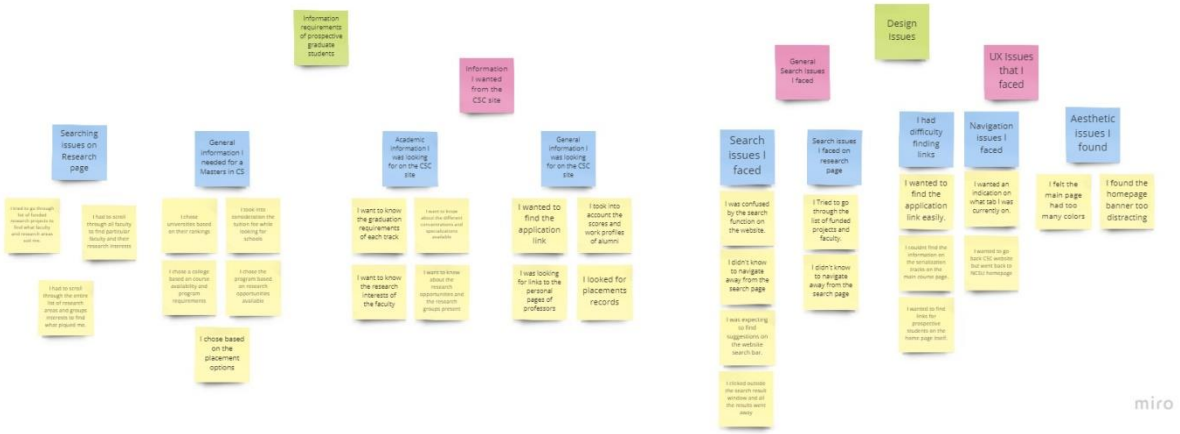


Figure 1: Zoomed out view of Affinity Diagram

4.4 Survey Analysis

The responses from the survey were analysed using google forms .The survey incorporated both qualitative(textual Description questions) and quantitative questions(ratings) .The Quantitative data was analyzed using the pie charts and the bar graphs in the google forms using frequency measure.The average rating of the website was obatined using the weighted mean.The qualitative data was analysed using the code and count method where the responses were grouped based on the similarity in content into common sections such as courses or professors etc and each section had related information.

5 Results of the Data Analysis

Analyzing the data collected from the survey I observed the following results
The distribution of role of the students and the activity (number of times the CSC website was used) are as follows

1) Role - Around 69.7% of the participants who took the survey were the current students followed by prospective students(around 14.3%) and the rest were alumni and other students
2) Activity – Most of the participants (75%) visited the website around 1-10 times over the last month ,17.9% people visited around 11-30 times .The percent of people who visited the website more than 30 times is very less (less than 10%)

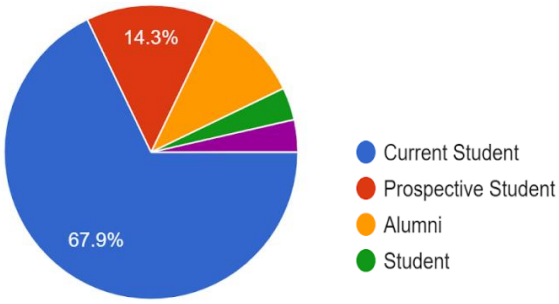


Figure 2: Pie chart showing distribution of role

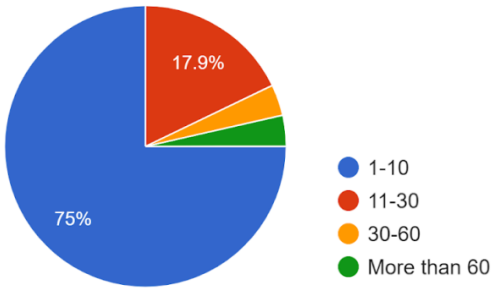


Figure 3 : Pie chart showing the distribution number of times the website was used in the last month

Analyzing the responses about the purpose of visiting the website I found that most of the students visited the website to get information about the courses either trying to find a course catalog or searching for prerequisite courses and secondly participants were also looking for the professors to get their office hours and room numbers

On observing the satisfaction levels I found that most of the students were satisfied with the aesthetic appeal, website structure and layout, information and its retrieval however many were not satisfied with the navigation which indicates the clear problem within the website.

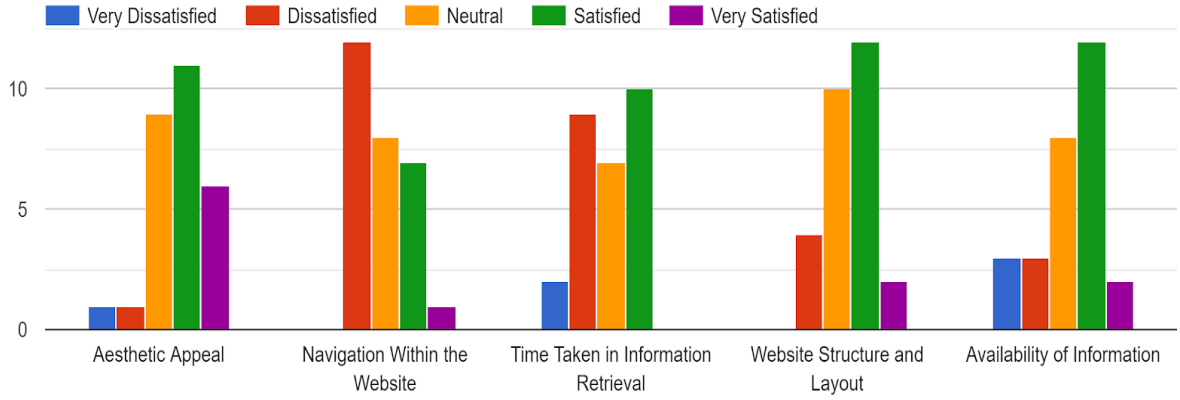


Figure 4: Bar graph comaring the satisfaction levels of various aspects of the website

On carefully observing the results of the aspects people liked the most I found that maximum number of the people liked the colour scheme,General Aesthetics ,Information and Organization within the website.
However analysing the difficulties faced they faced the following difficulties

- Navigation within the website
- Search bar and home button glitches
- Unable to access the course catalog and fing the course information,
- Faculty information was not proper organized
- Research areas were not clear

The average rating of the website was 6.67 with 32.1 % of the people rating the website 7 and around 25 % of the people rating the website 6 which indicates that people are not greatly satisfied with the website and changes are necessary.

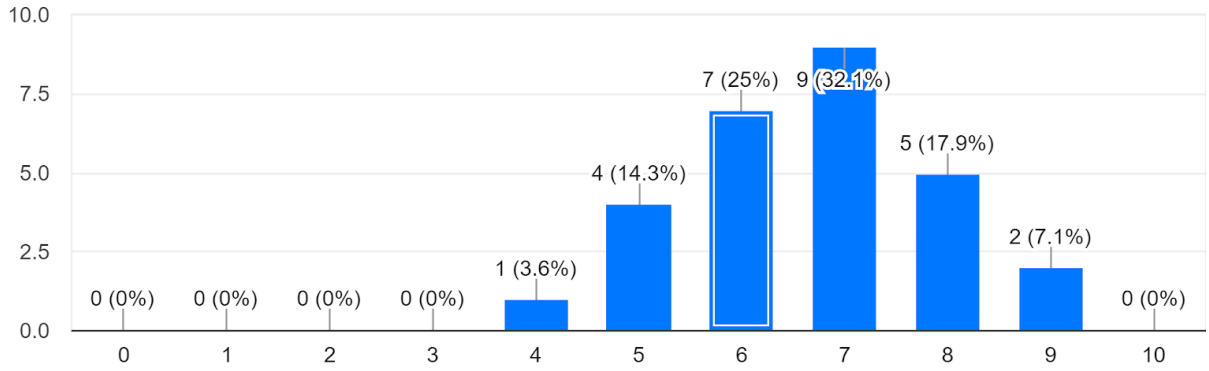


Figure 5: Bar graph showing the distribution of Overall rating of the website

6 Design Recommendations

After applying the HCI methods, collecting the data and analyzing the results for each method a set of common problems were identified which include search bar issues, Absence of Direct links, Absence of home button, No filter search in people page, No highlighting of selected page in the Navigation bar at the top, Lack of proper organization in the research page.

Small insight into the problems before proposing the design recommendations

Absence of Direct links: The CSC home page do not provide direct links to the courses and to know about the courses we need to follow a series of links Academics→Graduate Program→Track→Courses

Absence of Home button: The home page of the website does not have a home button but the functionality is of redirection is provided to the Computer Science word at the top which is hard to recognize at first.

Visibility of the chosen Page : The CSC website does not highlight the chosen page in the Navigation bar (For example if we choose the people page we get to the page, but there is no indication of that this page is selected)

No filtering in peoples page : In the people page the professor's information is listed in a random order and only search by the name is possible which makes it difficult for people who want to search by course or research topic.

Search Bar glitch: The search bar in the NCSU CSC website is actually a part of the NCSU website so as we use the search bar we come out of the CSC site and there is no redirection to the CSC site

Lack of Proper Organization within the research page :The research page has multiple links by professors and by area however no proper grouping is done to given an overview

For each of the above discussed problems a design modification is proposed with a low fidelity wireframe model.

Design 1

This design address three of the problems-Absence of home button ,Visibilty of the chosen page and Absence of direct links.The is homebutton added to the navigation bar with the about ,academics etc so that the user can come to home page from any page which is better than the redirection link camoflauged in the Computer Science keyword Also the current page (homepage) is highlighted.The academics tab has a course catalog which will directly get to course page.

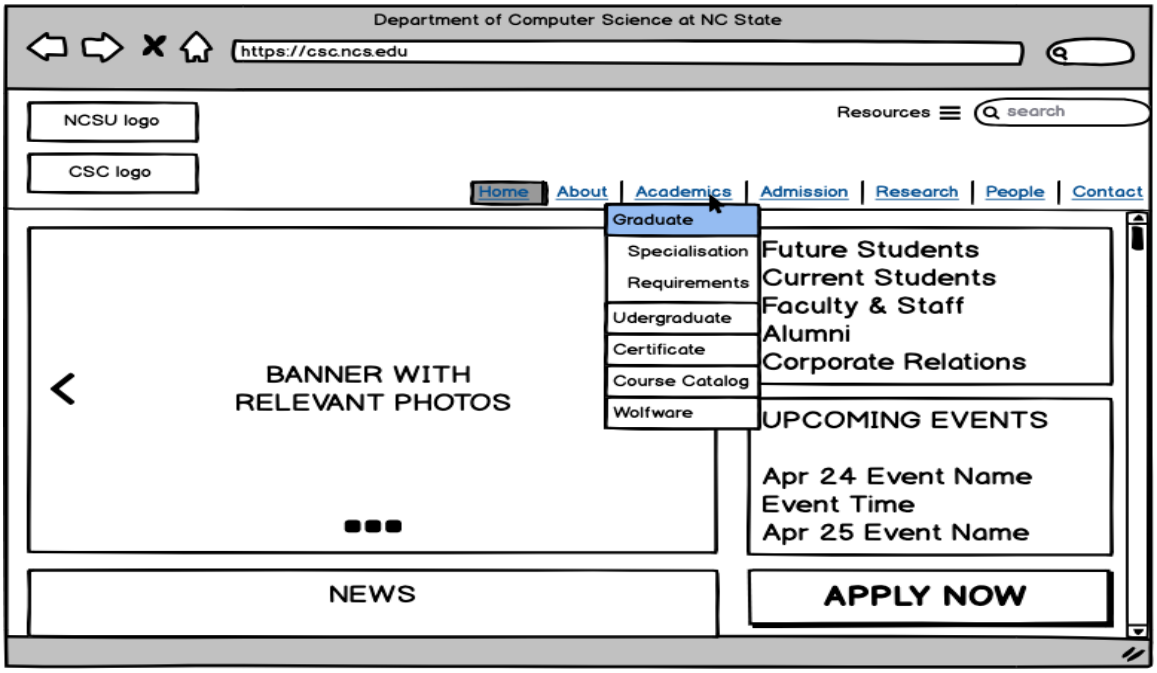


Figure 6: Wireframe for Design 1

Design 2

This design addresses the search problem and provides an improved solution where now the search is added within the CSC website instead of the NCSU website so that after the search is done using the home button we can get back to the CSC page .

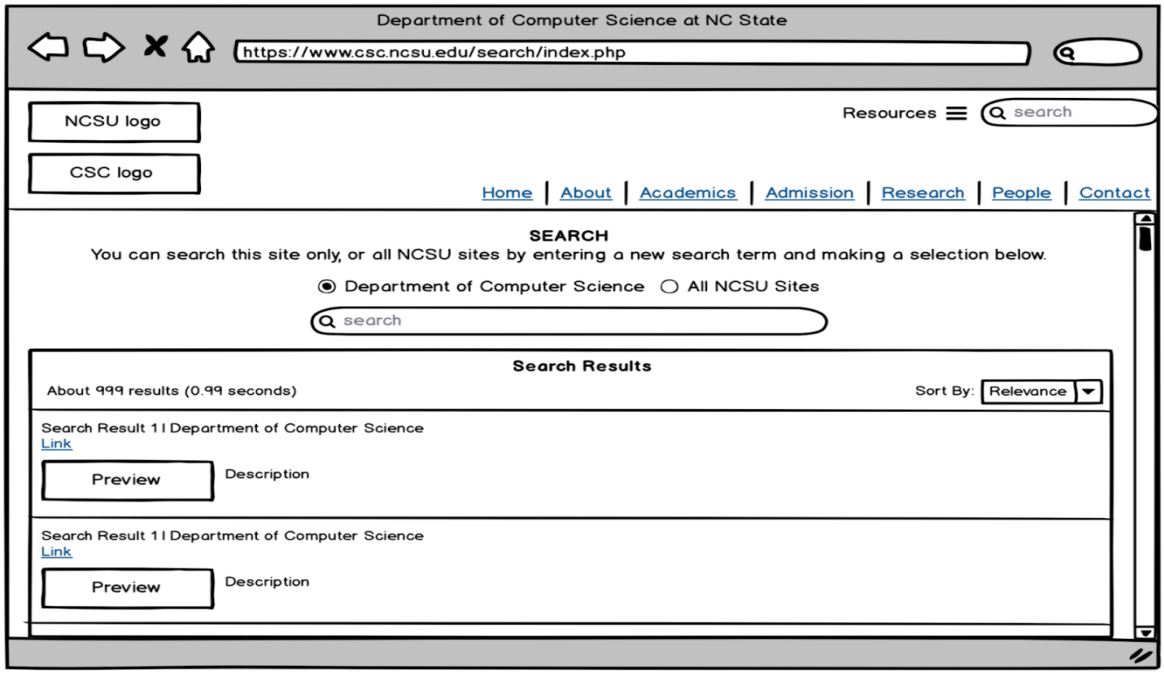


Figure 7: Wireframe for Design 2

Design 3

This design provides filering options on the peoples page .Here we have provided filtering based on the name and on the keyword (which can be a research area).After entering the search data ,on clicking the “Find Faculty” button displays a list of all the faculty corresponding to the search value.Similarly by selecting a combination of or eithe rof “By

Affiliation" and "By Course" and clicking the "Find faculty" will provide the list of faculty having the given values.

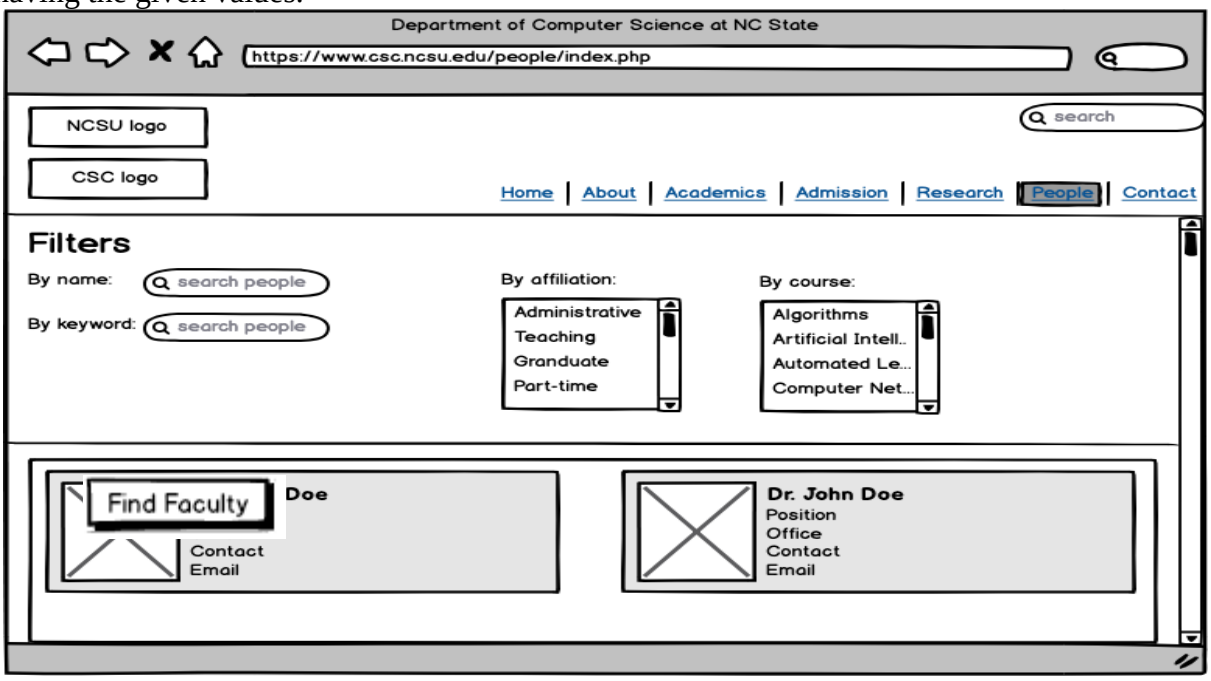


Figure 8: Wireframe for Design 3

Design 4

The design -4 proposes a better visual display of the research areas of the faculty in the form a grid with all the facutly along the rows and all the reaseach divisions along the columsn and highlighting the commom blocks.This display is quite easy to understand at the first look it self.Clicking on any facutly takes to their page with all their research work ,Clicking the Research area give all the faculty who are working in that field and selecting the "black blocks" will take to the particular research done by a particular faculty.These are the design recommendations suggested to improve the usabilty and user experience

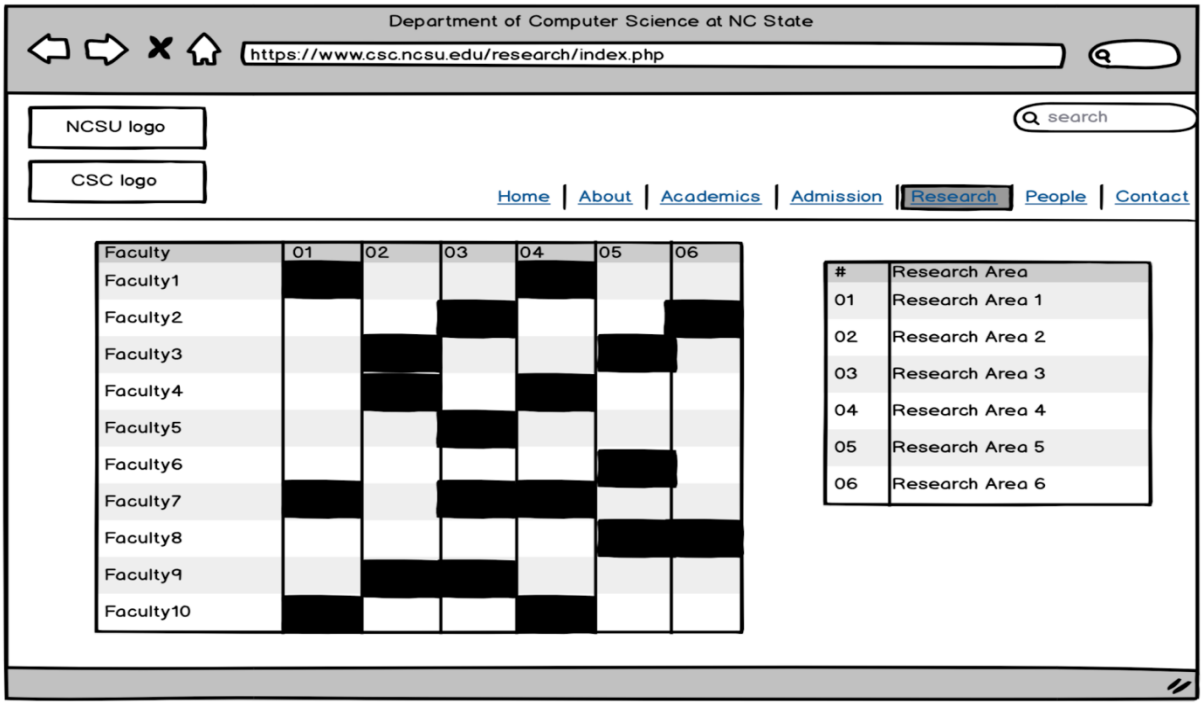


Figure 9: Wireframe for Design

7 Heuristic Evaluation for Design Recommandations

The heuristic evaluation method was conducted for the recommended designs using two different personas one of the current student and one of the prospective student and different senarios were considered which include searching for professor by course, getting information about research areas , visiting the website for general purpose.Seven UAR reports were generated out of which six were related to good aspects and one was a problem (Refer (VI) of appendix for UAR forms associated with heuristic evaluation on Recommended designs).

8 Results of the Heuristic Evaluation

The heuristic evaluation method conducted on the new design recommantations had the following good aspects and a problem

No	Good Aspect/Problem	Heuristic observed /violated
1	Direct link to course catalog Good Aspect	HE 6,7 Flexibility and Efficiency, Recognition observed
2	Highlighting the current page Good Aspect	HE 1 Visibility of system status observed
3	Presence of home button Good Aspect	HE 6 Recognition observed
4	Filtered search in the people page Good Aspect	HE 7 Flexibility and efficiency of use observed
5	Implementing the research grid with faulty and research areas Good Aspect	HE 7 8 Flexibility and efficiency of use, Aesthetic and minimal design observed.
6	Search bar within CSC homepage Good Aspect	HE 7 5 Flexibility and efficiency of use, error prevention observed
7	Layout of the home page is not minimal Problem	HE 8 Aesthetics and minimal design violated

Table 2: Heuristic Evaluation with problems and Good Aspects

The results of the heuristic evaluation show that some of the problems faced in the original CSC website design are overcomed with the new design satsisfying those heuristics.This will enable in creating much more flexible and efficient website interface for both current,prospective and past students .Also the heuristic evaluation pointed out a layout problem which was not met by the new design suggesting some iterative modifications to be made.

9 Reflection

The Human Computer interaction course was very helpful class for me as I was always interested in this field and through this course I learned about several HCI methods such as Heuristic Evaluation, interviewing, interpretation, affinity diagramming, Competitive analysis, Surveys, Paper prototyping , storyboarding and internationiztion. I not only gained the conceptual knowledge through lectures and readings but also gained hands-on experience through the in class sessions and activities.The brainstorming sessions were also quite useful.Overall , I gained a lot of knowlegde through the coursework and valuable hands on experience with the course project.

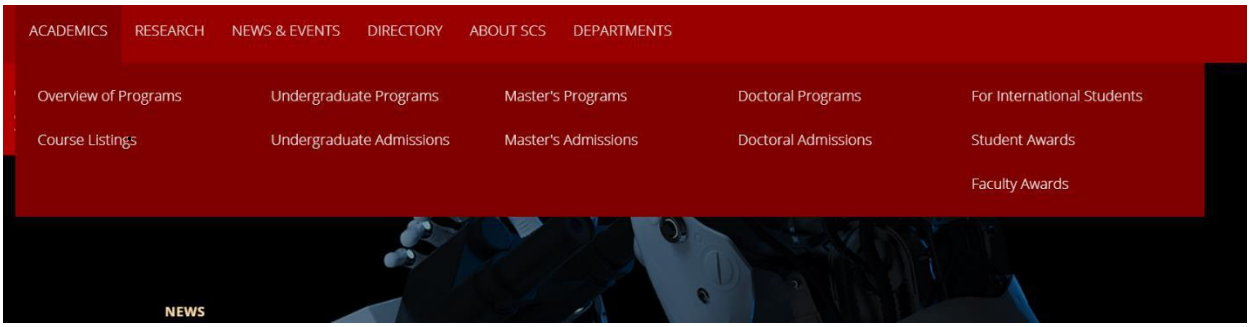
Appendix (Contains Data Common to all Team members of team -1)

(I) Initial Heuristic Evaluation -UAR Forms

UAR -1

No. HE3	**Problem/Good Aspect** Problem
Name: Navigating through the website	
Evidence: Heuristic: Flexibility and Efficiency Interface Aspect: The tabs at the top of the home page. 	
Explanation: The navigation through the website is mainly through the tabs at the top of the website. The tabs do not give a dropdown of shortcuts. This may make the model less intuitive and comprehensive to the users. A user who is trying to see all the courses offered by the departments may be confused regarding the option they may have to choose. He may go to academics then to graduate program and hence course list. This is not optimal for the user. Heuristic – Flexibility and efficiency tries to go for more efficient navigation involving shortcuts and minimalistic action from the users, this is being broken here so we need to modify this.	
Severity or Benefit: ***Rating:*** 3 Major usability issue **Justification (Frequency, Impact, Persistence, Weights):** Frequency: common Impact: Difficult Persistence: onetime Issue How I weighted. A first time user may not know which info is available where as the options are mosty one word, not being comprehensive is a flaw easily visible here. The user may have to navigate through dozen page to get to the info they want. Thus this is a major usability issue wasting users time and increasing their frustration	

Possible solution and/or Trade-offs:



possible solution is to make the tabs into dropdows as given in the diagram below. This would make navigation easier as shortcuts and important frequent choices are seen easily

Relationships:
Can help in partially solving HE1

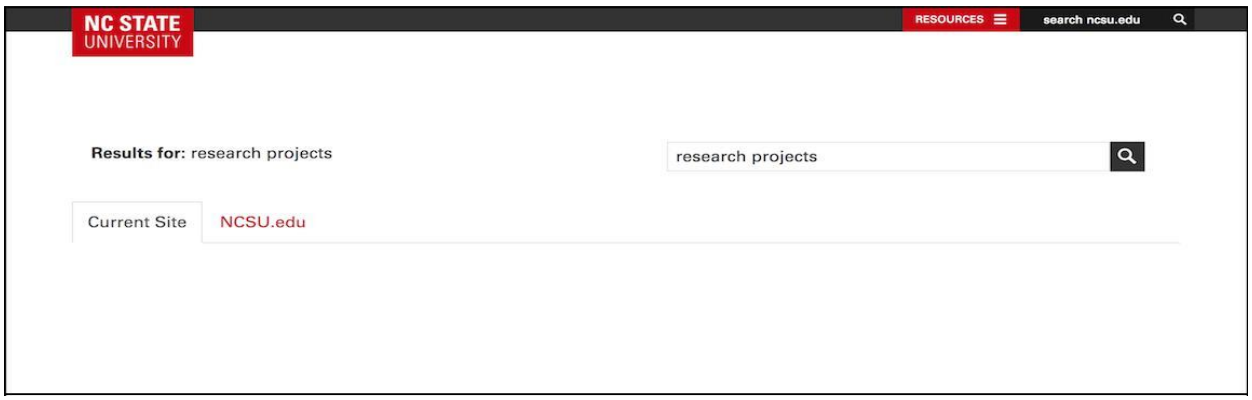
UAR -2

No. HE3 5 10	**Problem/Good Aspect** Problem

Name:
Search Result Glitch

Evidence:
Heuristic : Consistency and Standards, Visibility of the System Status, User Control and Freedom
Interface Aspect :

User redirected to ncsu.edu. Any subsequent search will only occur on ncsu.edu rather than csc.ncsu.edu



The search result page is completely different from every other page on the csc.ncsu.edu website.
The user has no way to go back to the original website i.e. csc.ncsu.edu.
The font and font size of the search results is completely different from the font used on every other page of the website.

Explanation:
A first time user trying to explore the various tracks available in the graduate Computer Science program lands on a completely different website namely ncsu.edu when he misspells the keyword he is trying to search for. He may find no way to return back to the page. Neither does the page indicate where the user currently is nor does it give any option to the user to navigate to the home page of csc, since it completely lacks a navbar. Hence, the website lacks in terms of visibility of the system status and consistency and standards. Further the search results appear as a pop up dialog box and the user has no control or freedom. He has no option but to lose the search results in order to see or do anything else on the page. Even the most experienced user may find this glitch annoying and frustrating since he lands on a completely different page and has no option but to type the name the website in the address bar in order to go back to it. A novice user might find it easier to explore the entire website in order to look for the information he wants rather than using the search bar since its functionality is not at par.

Severity or Benefit:
Rating: 4 Usability Catastrophe
Justification (Frequency, Impact, Persistence, Weights):
Frequency :

The problem is common. It occurs every time the user tries to search for something. Even the most experienced user might not be able to figure out a way to get past the glitch, let alone first time, inexperienced users.

Impact :

The problem is very difficult to overcome. It must be fixed from the backend. No amount of experience will help overcome the problem. The average user might find it easier to explore the entire website in order to find what he is looking for leading to major delays and a waste of time.

Persistence :

It is not a one time problem. It is a recurring problem and the most experienced user might not be able to find a fix to this. It will lead to large amount of delays and will cause frustration to get back to csc.ncsu.edu every time the user tries to search for something via the search bar.

Weights :

The problem occurs every time a user tries to search for something. The user has no control or fix to it no matter how hard he tries. The popup dialog box display of the search results take away the control and freedom of the user. The problem is very difficult to overcome and is a recurring one. Hence it is a major catastrophe and it would be unadvisable to continue without fixing it.

Possible solution and/or Trade-offs:
Possible solutions to this problem are to make the search result page just like any other page by including a navbar and using same font size and style. Further the search results could be displayed on the same page rather than in a popup dialog box. Lastly, the backend could be reengineered to display not only the first search result from csc.ncsu.edu but even subsequent results from csc.ncsu.edu and preventing the redirection of the user to ncsu.edu permanently.

Relationship:
HE1051 :- The visibility problem is related to HE1051 in a way that the Home button is absent and also the user does not know which page he currently is on.

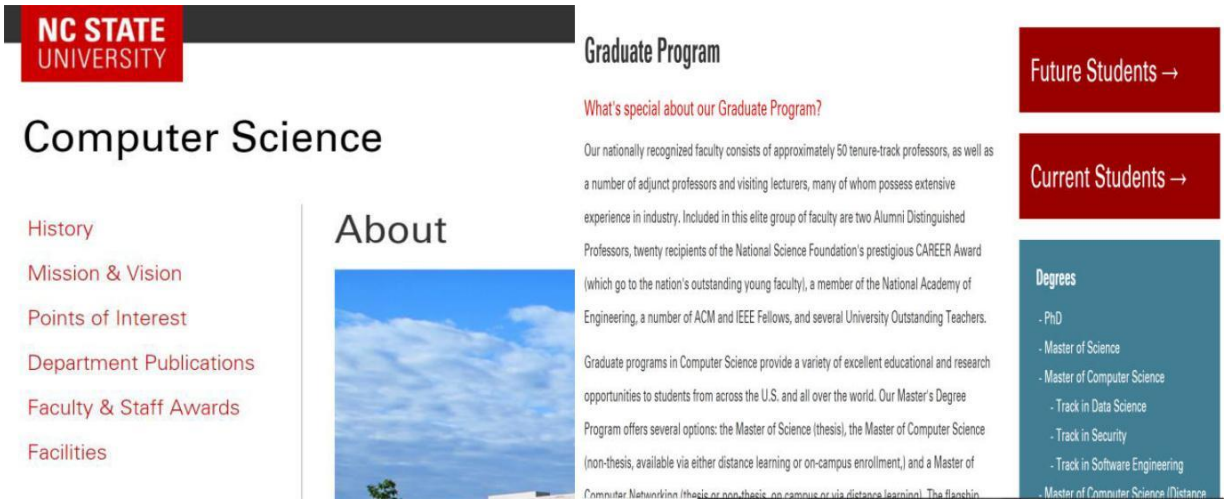
UAR -3

No. HE1052	**Problem/Good Aspect** Problem

Name:
Obtaining information about the Graduate Program

Evidence:
Heuristic : Consistency and Standards, Aesthetics and Minimalist Design
Interface Aspect :

1) The positioning and style of the sidebar is not consistent on every page of the website



Explanation:
The website does not meet the consistency standards. Say a new/casual user is trying to obtain information about the graduate program after exploring the rest of the website. Since, most pages on the website have the side bar on the left side of the page, he looks for the side bar on the left side. However, he fails to find it. It causes inconvenience to the user and he has to scroll down and look for the sidebar which is on the right side of the page. Further, the style used for the side bar is not consistent. The style used for the sidebar on the graduate programs page is different from the style used on every other page. Even the location of the sidebar on the page is not fixed. One has to scroll down to access it. Lastly, the graduate program page and the undergraduate program page, both look exactly like the home page i.e. it has the same photo gallery widget with the same pictures at the top and the user may get confused and think he has reached the wrong page. Hence, the page lacks consistency and standards.

Severity or Benefit:
Rating: 1
Justification (Frequency, Impact, Persistence, Weights):
Frequency :

The problem is rare. It only occurs on pages that result from the Academics page. The experienced user will easily figure out the location of the sidebar. However, the new user will take tame to figure out where to look for the sidebar and this will delay the goal that the user is trying to achieve.

Impact :

The problem is easy to overcome. The average user will eventually figure out where the sidebar is located when he scrolls. The different design has no effect on its accessibility. Hence, the problem might not really affect the achievement of the goal of the user. It may only delay it.

Persistence :

It is a one time problem. The user can easily figure it out. It is more of a cosmetic and aesthetic based problem and does not affect the user much.

Weights :

The problem is rare since it does not occur on every page of the website. It is easy to overcome since a new or casual user might just scroll down instinctively and come across the sidebar. Also the problem is a one time problem. Once the user has explored the page, he will never face the same problem again. Hence, a rating of 1 is justifiable

Possible solution and/or Trade-offs:
Possible solutions to this problem are to make the appropriate style changes and provide the sidebar on the left hand side of every page. Further, the 'Academics' section on the nav bar can be highlighted to avoid the user from getting confused. Also the photos in the photo gallery can be more related to the page on which it is present to indicate a distinction between different pages.

Relationships:
None

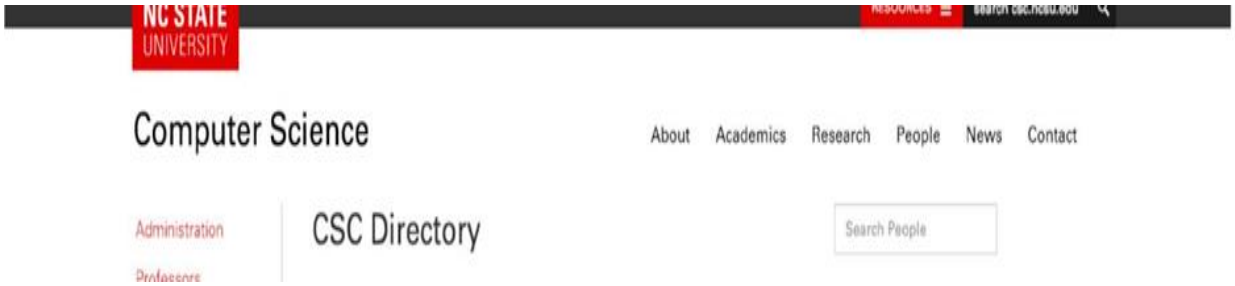
UAR -4

No. HE-1	**Problem/Good Aspect** Problem
Name: Indicator for current page on navigation bar missing	

Evidence:
Heuristic: Visibility of System Status.
When making use of a website, a navbar helps a user proficient with computers determine what pages are available to visit at their behest and are deemed as important by the organization. In the CSC website, the navbar 6 elements, each having its own page. When a user clicks on one of the elements, he/she is taken to the corresponding page. But this does not update the navbar and tell the user what element was selected on the previous page.

Figure 1: As can be seen above, the Academics element in the navbar remains unchanged.

Explanation:



This may lead to a disconnect for the user in terms of what was expected vs what happened, especially if the pages are titled differently that they were on the navbar. Take the example of the **People** page.
The element's name in the navbar is People, but when the new page is quite clearly titled CSC Directory, a marked change. For a user unfamiliar with how the department is structured, this may come off as confusing and introduce a disconnect

Severity or Benefit:
Rating: 3
Justification (Frequency, Impact, Persistence, Weights):
Frequency: Common, since the navbar is the most important navigation tool for a website. New and casual users may get stumped by the absence of an indicator and keep trying to access a page from the navbar without realizing that the page is already open, albeit differently named.

Impact: The problem is relatively easy to overcome, but it requires focus on the user's part. The user must be aware of the terminology used in the department if the page name changes, or must pay attention to the page content at all times just to keep a track of what page is currently open.

Persistence: This problem can be solved easily once users figure it out, but may become persistent if the user loses focus while using the website.

Weights: For this problem, when we consider the high frequency, medium impact and relatively low
persistence, we can assign a rating of 3: Major Usability Problem, mainly due to the occurrence of the problem and the focus it requires on the user's part to overcome.

Possible solution and/or Trade-offs:
The best solution for this problem is to highlight the element which is currently open, which does not take time to process on the server as well as the client. No trade -off exists as such since it requires a solution that is easy to implement and has high impact in terms of conveying the current status of the website to the user.

Relationships:
None

UAR -5

No.	**Problem/Good Aspect**
HE-1	Problem

Name:
Redirection to home page of the website is not easily discoverable for novice user

Evidence:
Heuristic: Recognition (H6)

Interface Aspects:
The CSC website does not have any home button highlighted to explicitly indicate the redirection to home page from other webpages within the website, but clicking on the Computer Science word written in the top left corner of every page within the CSC website will redirect to the home, which is difficult to find out for any novice user because it simply appears to be like a heading but not a clickable link or button.

Explanation:
The Computer Science keyword on the top left corner of every webpage of the CSC website is actually hidden link to redirect the user to homepage. But this violates the Recognition (H6) heuristic as this feature is not at all recognizable when the user first looks at the website. Also the user here is a student looking at the website for the first time and has an idea about the how the university website will be through the experience of his/her own departmental website during the bachelors. So he/she may find this CSC website has no option of directly going to home page from any other page as there is no explicit home button seen (like in the case of websites he used before). So a wrong conceptual model will be generated due to lack of discoverability as the user is not familiar with the website and it is only after two or three uses that he/she will understand hidden link to home page.

Severity or Benefit:

Rating:
2 = Minor usability problem: fixing this should be given low priority

Justification (Frequency, Impact, Persistence, Weights):

Frequency:
The problem is commonly experienced only by new users and also most users will want to use the feature of directly getting to the homepage from another other webpage within the site.

Impact:
It is somewhat easy for the users to overcome this problem as after two or three uses of the website they may find out or even in the first interaction if the user's cursor accidently moves on to the Computer Science word on the top left corner the word will be highlighted in red (initially black) so then the user can just click to figure out that it redirects to home page

Persistence:
This problem is a one-time problem as once the users find it out they will automatically get used to clicking on the Computer Science word on the top left corner to get to home page and it will be stored in their long time memory.

Weights:
It is relatively a common problem for the new users, however it is easy to overcome in just two or three uses and once the user figures out there would be problem in future. Having said that, we cannot consider this as cosmetic problem as there is a usability issue (lack of discoverability).Based on these factors this problem is treated as a lower level usability problem and hence a rating of 2 is justified.

Possible solution and/or Trade-offs:

Solution:
The solution for this problem is to provide a button as Home on the top right corner just below the search bar of every web page, with a link directing to the home page. This makes new user understand in the first look itself that clicking this button will take to home page and thus avoids any sort of recognition problems and the Computer Science word can be used just as a heading with no links.

Trade-offs:
I can't think of any trade-off for not adding the home button .It is very easy programmatically to add this button as there is only a few lines of code to modify and adding this would increase the discoverability of the website which is good.

Relationships:
The work is done individually without any cross reference.

UAR -6

No. HE-3	**Problem/Good Aspect** Problem

Name:
Information of the courses handled by the faculty against their name is not present and no grouping of faculty based on the common courses or related courses are observed in the people section.

Evidence:
Heuristic: Recognition(H6)

Interface Aspect:
The people section page of the CSC website provides a list of all the people involved with the CSC department like the program directors, managers, faculty(professors, associate professors, assistant professors),research scholars etc. with their name, picture, position held and contact information like phone number and email id but doesn't provide any information about the courses they taught (in case of faculty)and they have neither been grouped into categories based on their courses handled (Example : All the professors dealing with security courses or networks courses grouped into one category).New prospective students will face this problem as he/she will not have an idea about the names of the faculty so has to click on each faculty to know the courses they are dealing with.

Explanation:
This problem will violate the recognition heuristic as new prospective student who wants to check the people page and learn about the professors teaching a particular course should have to go through each and every professor by clicking on them and checking if they teach the particular course or not and what their research areas are. The student cannot directly recognize the course faculty as there is no course name or code provided with their name. Considerable amount of time will be spent by the user to get to the required faculty person employing this trial and error method. If there was grouping of the professors by course they offered it would have been convenient for the novice user to just select the particular group of his interest and learn about the faculty handling the courses but absence of such grouping system makes it difficult for the new student to easily find the professor without knowing their name and by just knowing the course name.

Severity or Benefit:
Rating :
2 = Minor usability problem: fixing this should be given low priority

Justification (Frequency, Impact, Persistence, Weights):

Frequency:
The problem is commonly experienced only by students who are just admitted and don't have any knowledge of the names of the professors and this is something which only students particularly newly admitted (few users) will be using.

Impact:
It is not very difficult for the users to overcome this problem as after clicking on each and every professor they will finally get to know which professor teaches which course and once they get to know this the next time they can directly click on the professor (of the concerned courses they are interested in) with the name of the professor itself as this information will be stored in the long time memory of the student after the first use.

Persistence:
This problem is a one-time problem as once the users find it out he/she will not make a mistake the next time and will be able to easily locate the professors without any time wastage.

Weights:
This problem is mostly faced by newly admitted students but once to get to know after the first trial the problem will be ended. There is no negative effect of this problem as at the maximum, there will be only a few minutes time loss. So it's not a major usability problem but none the less it causes a little inconvenience to the user with respect to usability. Hence this problem is regarded as a minor usability issue and given a rating 2.

Possible solution and/or Trade-offs:

Solutions:
There are possible improvements that can be made

1) Adding the name of the courses and course code (Example :Human Computer Interaction,CSC-554) taught by the professor along with their name, position held, and contact information (which are already provided) in the people webpage of the CSC website
2) Grouping or displaying all professors handling similar courses at one place so that it would be easy for the new user to see all those professors (along with their courses names) at one place instead of scrolling up and down constantly (Example : Grouping the professors teaching Foundation of Data Science, Automated Learning and Data Analytics, Educational Data Mining into one group as all these are related to data sciences).

Tradeoff:
I can't think of any bad trade off as adding the suggested improvements would not require much computation or programming or any major setback or compromise.

Relationships:
The work is done individually without any cross reference.

(II) Competitive Analysis

Website	Aesthetic Appeal	Navigation Within the Website	Time Taken in Information Retrieval	Website Structure and Layout	Availability of Information
University of Southern Californnia https://www.cs.usc.edu/	colour scheme is good ,not cluttered, easy on the eye	Easy navigation with separate admission tab but home button is absent	fast information retrieval due to filtered search ,quick links and	Decent Structure and quick access to frequently visited links	Abundant information which included introduction videos for courses
University of Maryland, Baltimore County https://www.csee.umbc.edu/	Good colour scheme. Nice flat design, not cluttered	Pro: Easy navigation. Clear and descriptive links to all pages | Con: Current page not highlighted in Navbar, Difficult to find application	Information easy accessible due to sub-menus in Navbar	Clear and consistent layout	Very easily available and accessible

		links			
Massachusetts Institute of Technology https://www.eecs.mit.edu/	irregular links, Cluttered	Simple, easy to toggle between tabs	Very responsive	Very simple and professional	Excess of information even on the home page
University of Massachusetts,Amherst https://www.cics.umass.edu/	Good, No excess of colours. Easy on the eyes.	Very good, easy to understand	A small delay to get the response	Descent structure with nothing in excess	Sufficient information found in appropriate pages
The Rutgers School of Arts and sciences https://www.cs.rutgers.edu/	Good colour scheme. Slightly cluttered	Pro: Easy navigation. Clear and descriptive links to all pages | Con: Current page not highlighted in Navbar, Extremely difficult to find application links	Fast information retrieval due to sub menus in Navbar	Clean and consistent Structure	Easily available and accessible
Carnegie Mellon University https://www.csd.cs.cmu.edu/	Single colour, flat and plain	too many links and too cluttered with all the links related to admissions at one place	time taking as links are not direct takes 2-3 steps to get to courses	The layout is different for every page within the website	Sufficient information but access to the information is not quick
The Ohio state University https://cse.osu.edu/	Excellent, Compact, minimalistic, easy to understand	The tab navigation is good, but search doesn't have suggestions and it overlaps other elements in in the webpage	Fast, responsive	Good, minimalistic	Sufficient, good font.

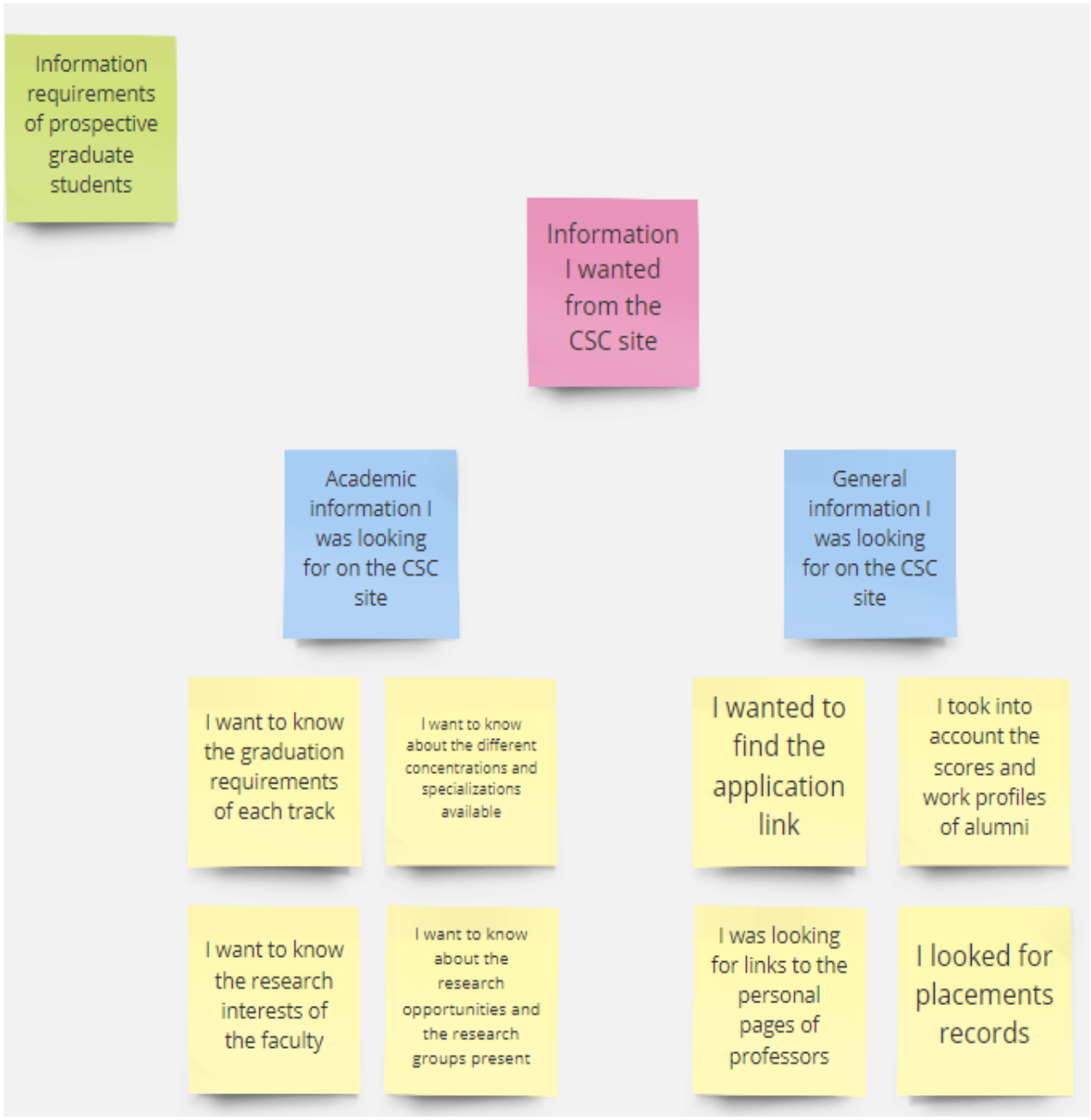
(III) Interview Questions and Some Responses

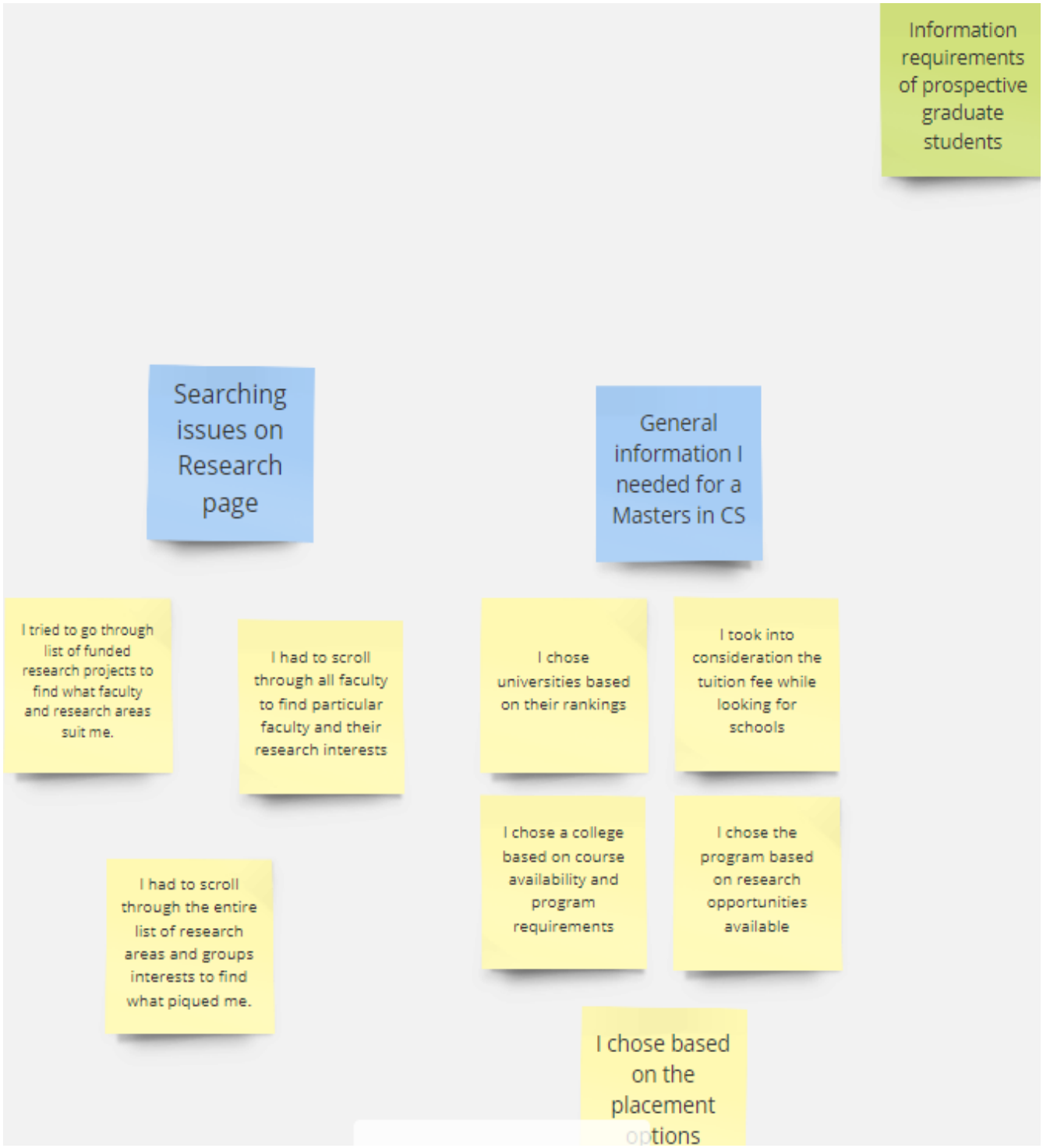
Questions	Responses
1) How did you get to know about the website?	Interviewee-1 I was searching for good University for Masters in Computer Science in Google and this was one of the suggestions. Interviewee-2 Looking for some good PhD programs in computer Science and came across the website
2) What are the things that you were looking for in the website?	Interviewee-1 I was looking for general information about the university their master's program and applications Interviewee-2 I was looking for information about PhD program like courses, research areas and also some fast facts about the university.
3) Did you face any trouble while looking for the information?	Interviewee-1 Yes, the information search was a bit difficult as it was scattered all over and not good navigation from one page to other. Also took time in figuring out the redirection to home page of the website. Interviewee-2 Some of the information like facts, application was easy to find but some other information like courses was difficult to locate in the first go.
4) Did you overcome the problems faced?	Interviewee-1 I could locate the application form and instructions etc the first time but it took a lot of time than usual but the next time I remembered the path and reached directly without any problem Interviewee-2 Yes, once I knew the location of particular information it seemed very easy to get there.
5) How often do you visit the website?	Interviewee-1 May be 4-5 times a week Interviewee-2 Almost every day
6) How was the feel of the website?	Interviewee-1 Initially I found it overwhelming with a very big banner at the centre and too many colours. Interviewee-2 It is ok but I felt the home page is a bit busy and future students might get lost in trying to find information.
7) Which part of the website do you feel is not good and require some improvement?	Interviewee-1 The navigation can be improved and some kind of direct cues can be added for future students to make it easy for them to get around the website. Interviewee-2 The courses can be made more evident and the home page less cluttered.

(IV) Some of the affinity Notes

He chose the NCSU CS program based on rankings from trusted website.
He looked for test score and GPA requirements
He wanted to find out the placement and career options in the website.
She wanted to know about the research interest of the faculty.
He looked for graduation requirements and credit hours
He felt the main page was too busy and had many colours.
The home page banner dazed him and found it distracting.
He wanted an indication of the current tab he was in.
She had to visit way to many pages to get to relevant information.
He wanted to go back to CSC homepage but went to NCSU homepage.
She could not find the information on the specialization tracks on the main course page.
He wanted a link for incoming graduate students on homepage.
She expected to find suggestions on the website search page.
He had to scroll through the entire faculty to find a particular faculty and their research interest.

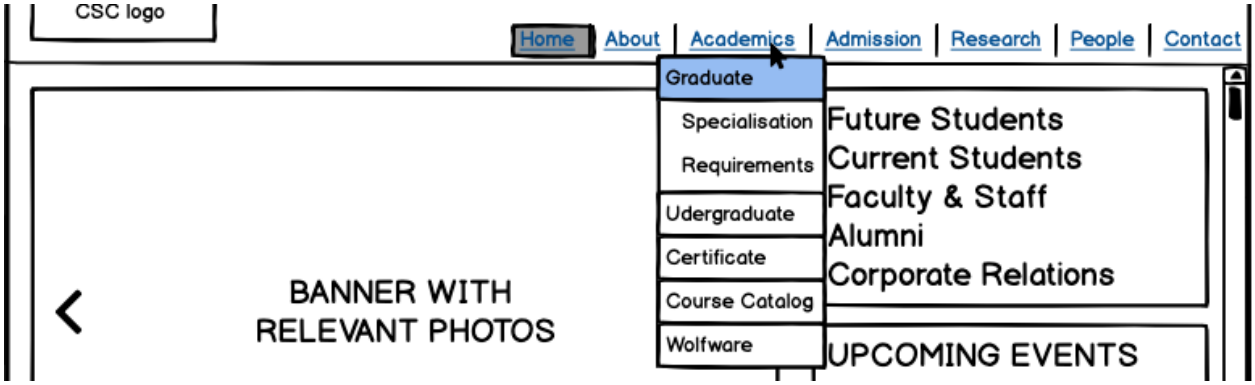
(V) Affinity Diagram


Information requirements of prospective graduate students
Information I wanted from the CSC site
Academic information I was looking for on the CSC site
General information I was looking for on the CSC site
I want to know the graduation requirements of each track
I want to know about the different concentrations and specializations available
I wanted to find the application link
I took into account the scores and work profiles of alumni
I want to know the research interests of the faculty
I want to know about the research opportunities and the research groups present
I was looking for links to the personal pages of professors
I looked for placements records

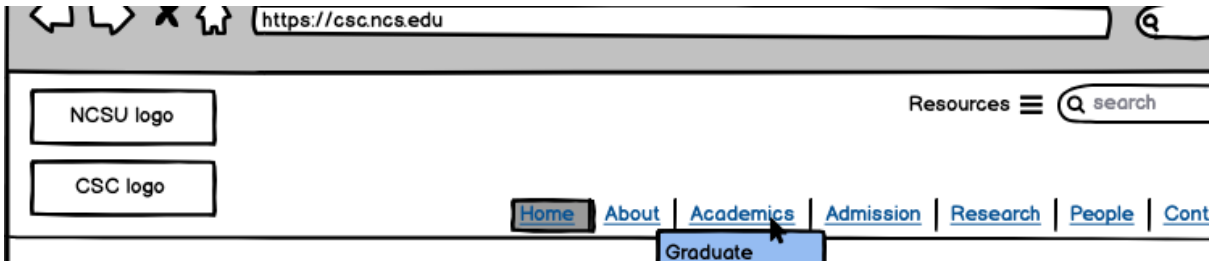

Information requirements of prospective graduate students
Searching issues on Research page
General information I needed for a Masters in CS
I tried to go through list of funded research projects to find what faculty and research areas suit me.
I had to scroll through all faculty to find particular faculty and their research interests
I chose universities based on their rankings
I took into consideration the tuition fee while looking for schools
I had to scroll through the entire list of research areas and groups interests to find what piqued me.
I chose a college based on course availability and program requirements
I chose the program based on research opportunities available
I chose based on the placement options

(VI) Design Recommendations –UAR forms

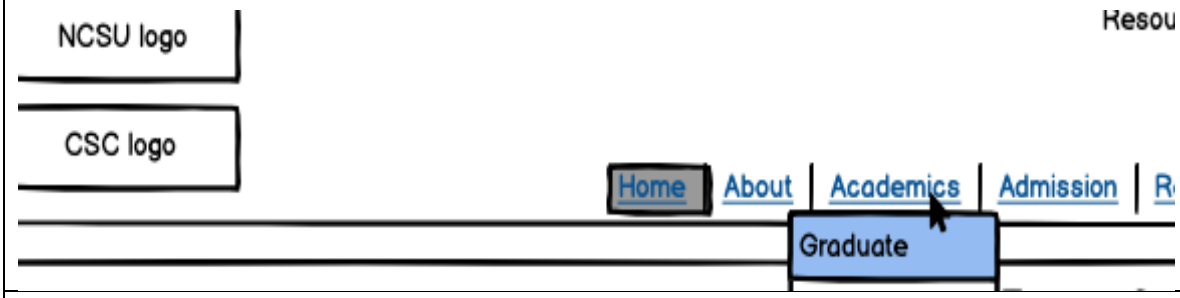
UAR-1

No. HE7 6	**Problem/Good Aspect** Good Aspect
Name: Direct link to course catalog	
Evidence: Heuristic: Flexibility and Efficiency, Recognition Interface Aspect:  	
Explanation: The Academics tab in the navigation bar is having a drop down menu which has the course catalog option which will intern take to the course page having a list of all the CSC courses offered. So the prospective student will find it much easier to get to the course page quickly .So this in turn save the time and is a good aspect.	
Severity or Benefit: ***Rating:*** N/A (good aspect) **Justification (Frequency, Impact, Persistence, Weights):** Frequency: Commonly used by the current and prospective students Impact: Has a good impact enabling quick access to information Persistence: Use repeatedly to get to course page and hence saves time How I weighted. Since it is a good feature rating of NA is given as all the factors are positive factors and the benefit of the feature is discussed below. Benefits : Addition of this feature makes the interface convenient and easy to use to get to course page	
Possible solution and/or Trade-offs: This is a good aspect so no need to add or modify this feature. Trade off: May need additional effort of changing the links.	
Relationships: None	

UAR-2

No. HE1	**Problem/Good Aspect** Good Aspect
Name: Highlighting the current page	
Evidence: Heuristic: Visibility of system status Interface Aspect:  	
Explanation: The Home button is highlighted to indicate that the current page is home page similarly when we are in other pages that button will be highlighted so it is quite convenient for a new prospective student especially if he is visiting the website the very first time.	
Severity or Benefit: ***Rating:*** N/A (good aspect) **Justification (Frequency, Impact, Persistence, Weights):** Frequency: Commonly used by the current and prospective students Impact: Has a good impact in highlighting the current page providing good visibility Persistence: Use repeatedly by all users How I weighted. Since it is a good feature rating of NA is given as all the factors are positive factors and the benefit of the feature is discussed below. Benefits : Addition of this feature improves the visibility within the website so it is very good for new users.	
Possible solution and/or Trade-offs: This is a good aspect so no need to add or modify this feature. Trade off: To add selections (highlighting) may involve some changes in the code.	
Relationships: None	

UAR-3

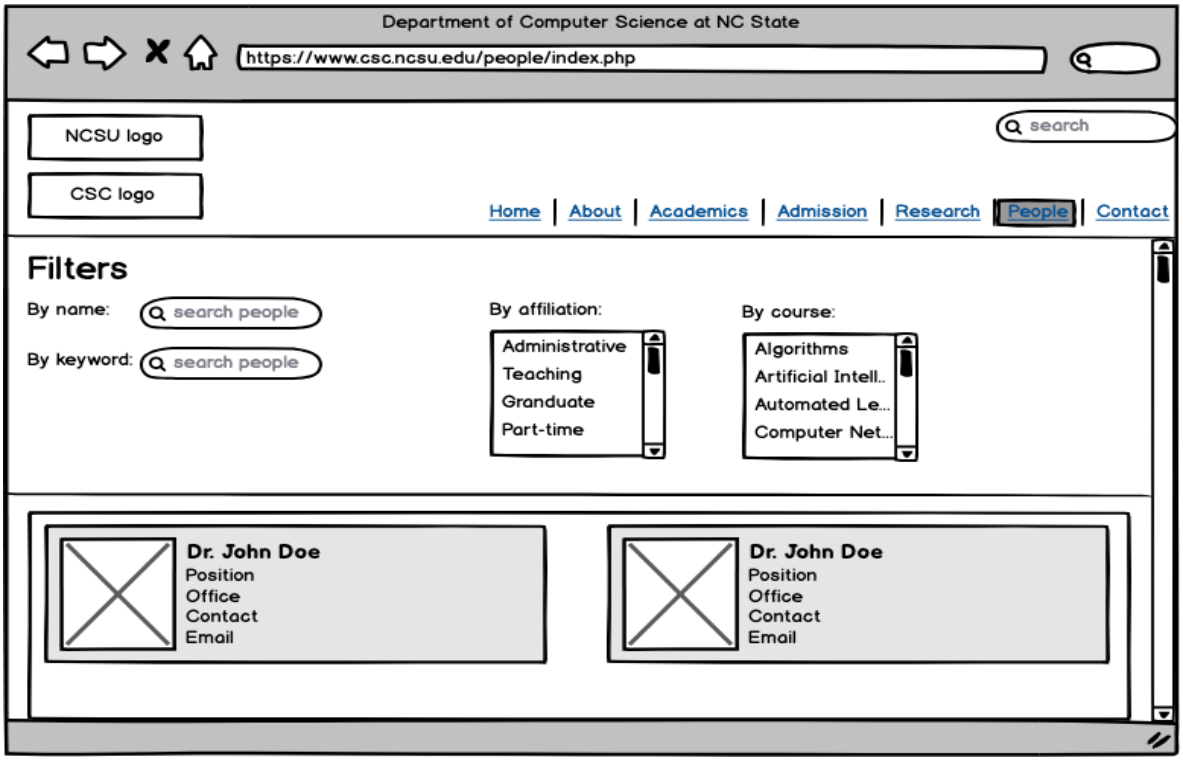
No. HE6	**Problem/Good Aspect** Good Aspect
Name: Presence of home button	
Evidence: Heuristic :Recognition Interface Aspect:  	
Explanation: The addition of the Home button enables easy redirection from any page back to the homepage and also it is very easy to discover and much more efficient rather than having a home link hidden in the CSC keyword. The new users will find this feature helpful.	
Severity or Benefit: ***Rating:*** N/A (good aspect) **Justification (Frequency, Impact, Persistence, Weights):** Frequency: Commonly used by the current and prospective students Impact: Has a good impact due to easy recognition Persistence: Use repeatedly by all users How I weighted. Since it is a good feature rating of NA is given as all the factors are positive factors and the benefit of the feature is discussed below. Benefits : Addition of this feature improves the promote the recognition and ease of use	
Possible solution and/or Trade-offs: This is a good aspect so no need to add or modify this feature. Trade off: Can't think of a trade-off for the home button.	
Relationships: None	

UAR-4

No. HE7	**Problem/Good Aspect** Good Aspect

Name:
Filtered search in the people page

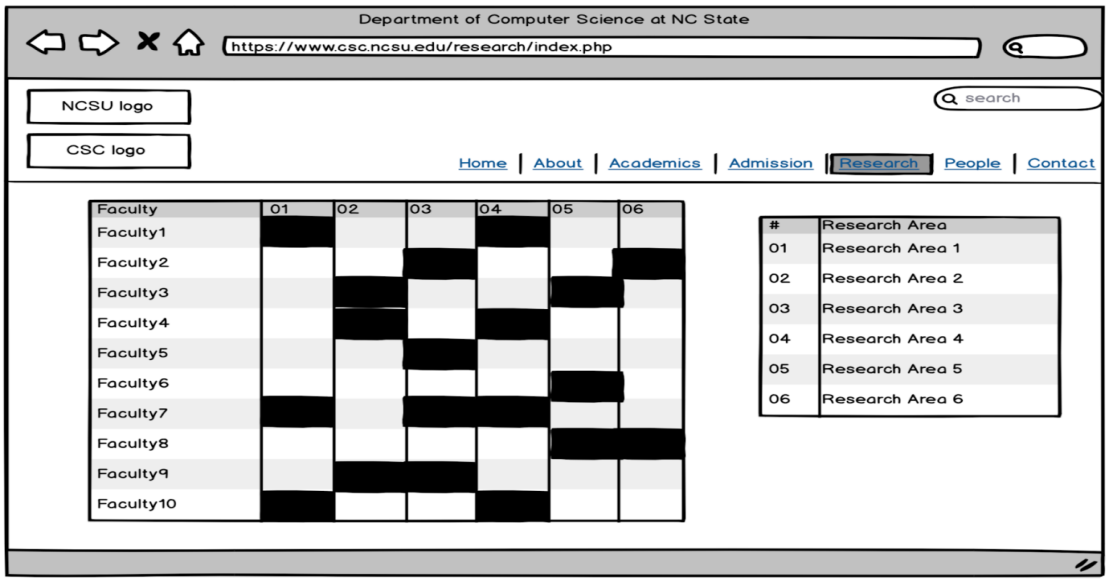
Evidence:
Heuristic: Flexibility and efficiency of use
Interface Aspect:



Explanation:
This design provides filering options on the peoples page .Here we have provided filtering based on the name and on the keyword (which can be a research area).After entering the search data ,on clicking the “Find Faculty” button displays a list of all the faculty corresponding to the search value.Similarly by selecting a combination of or eithe rof “By Affiliation” and “By Course” and clicking the “Find faculty“ will provide the list of faculty having the given values.

Severity or Benefit: ***Rating:*** N/A (good aspect) **Justification (Frequency, Impact, Persistence, Weights):** Frequency: Commonly used by the current and prospective students Impact: Has a good impact as it makes the process of searching the faculty much more easier and efficient Persistence: Use repeatedly by all users How I weighted. Since it is a good feature rating of NA is given as all the factors are positive factors and the benefit of the feature is discussed below. Benefits : Addition of this feature contributes to easy search and saves time in scrolling the entire list of professors
Possible solution and/or Trade-offs: This is a good aspect so no need to add or modify this feature. Trade off: Addition coding will be required at the application level
Relationships: None

UAR-5

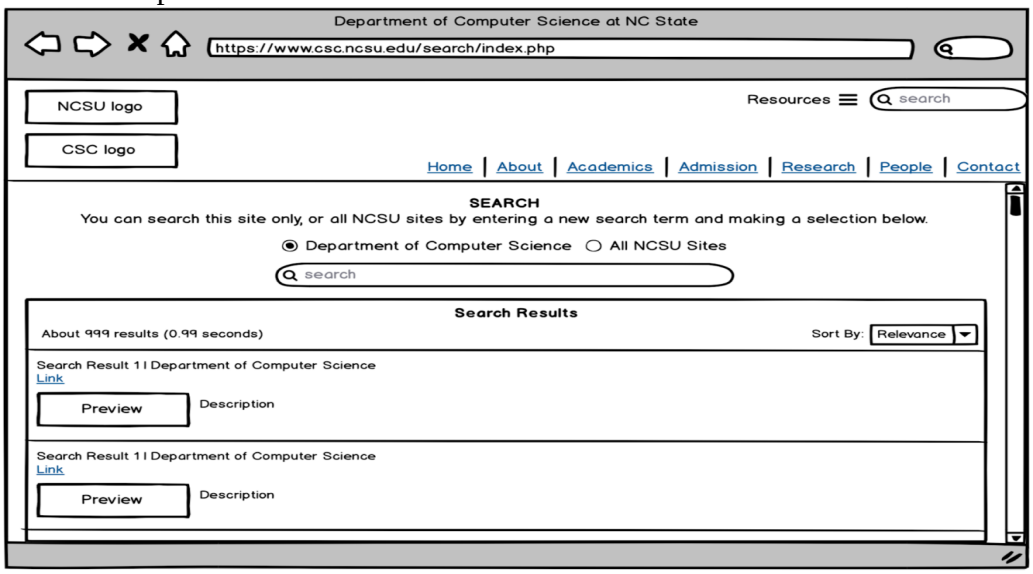
No. HE7 8	**Problem/Good Aspect** Good Aspect
Name: Implementing the research grid with faulty and research areas	
Evidence: Heuristic: Flexibility and efficiency of use, Aesthetic and minimal design Interface Aspect:  	

Explanation: The design -4 proposes a better visual display of the research areas of the faculty in the form a grid with all the facutly along the rows and all the reaseach divisions along the columsn and highlighting the commom blocks.This display is quite easy to understand at the first look it self.Clicking on any facutly takes to their page with all their research work ,Clicking the Research area give all the faculty who are working in that field and selecting the "black blocks" will take to the particular research done by a particular faculty.
Severity or Benefit: ***Rating:*** N/A (good aspect) **Justification (Frequency, Impact, Persistence, Weights):** Frequency: Occasionally used by the current and prospective students Impact: Has a good impact as it has good aesthetic appeal ,a minimal and effective design. Persistence: Use repeatedly by users in research field How I weighted. Since it is a good feature rating of NA is given as all the factors are positive factors and the benefit of the feature is discussed below. Benefits : Addition of this feature contributes to improving the aesthetics of the website and improves the mapping of the research areas to faculty using the grid
Possible solution and/or Trade-offs: This is a good aspect so no need to add or modify this feature. Trade off: Additional coding and modification of a set of links at the application level isrequired.
Relationships: None

UAR-6

No. HE 7 5	**Problem/Good Aspect** Good Aspect
Name: Search bar within CSC homepage	

Evidence:
Heuristic: Flexibility and efficiency of use, error prevention
Interface Aspect:



Explanation:
This design addresses the search problem and provides an improved solution where now the search is added within the CSC website instead of the NCSU website so that after the search is done using the home button we can get back to the CSC page

Severity or Benefit:
Rating: N/A (good aspect)
Justification (Frequency, Impact, Persistence, Weights):
Frequency:
Occasionally used by mostly prospective students
Impact:
Has a good impact as it has flexible design and prevents from going to the NCSU main page
Persistence:
Used repeatedly by new prospective students
How I weighted.
Since it is a good feature rating of NA is given as all the factors are positive factors and the benefit of the feature is discussed below.
Benefits :
Addition of this feature provides a flexible design and also contributes to error prevention

Possible solution and/or Trade-offs:
This is a good aspect so no need to add or modify this feature.
Trade off: Additional coding and modification of a set of links at the application level isrequired.

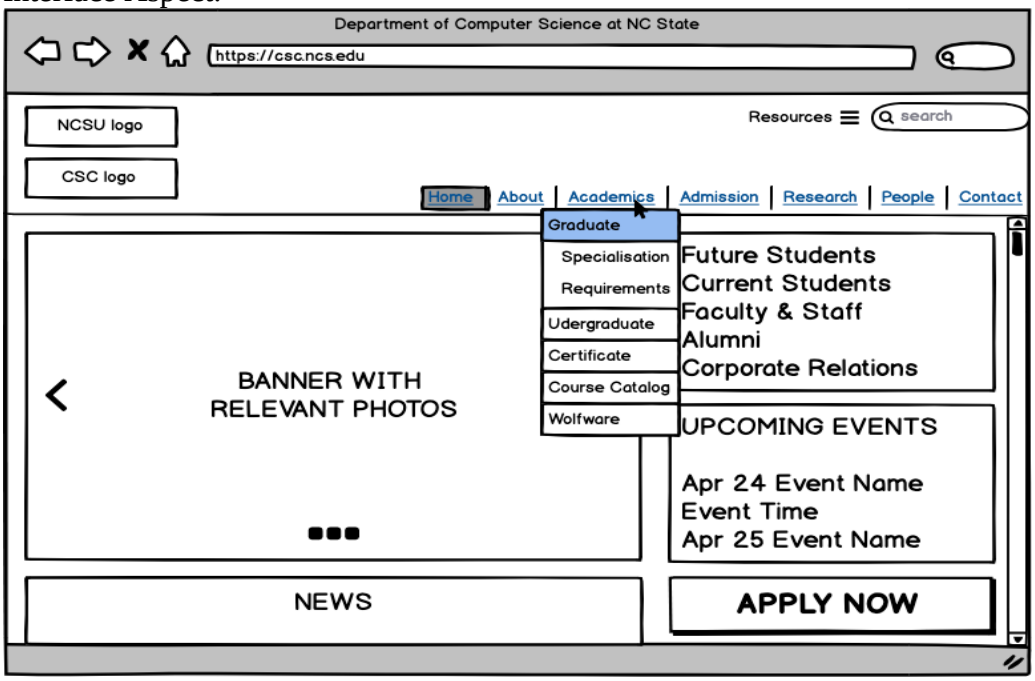
Relationships:
None

UAR -7

No. HE 8	Problem/Good Aspect Problem

Name:
Layout of the home page is not minimal

Evidence:
Heuristic: Aesthetics and minimal design
Interface Aspect:



Explanation:
This design address problem of home button ,direct links and visibility however the design is not minimal and can sometimes be visually unappealing.

Severity or Benefit:
Rating: 1 Cosmetic Problem
Justification (Frequency, Impact, Persistence, Weights):
Frequency: common
Impact: Somewhat easy for the users to overcome this problems as it does not effect the usability
Persistence:
This will be persistent but after a few uses the user will not be bothered much.
How I weighted.
Rating of 1 is provided as it is an aesthetic problem but not a usability problem. Although it is common the impact is quite less and user will not be bothered too much overtime. So rating of 1 is justified

Possible solution and/or Trade-offs:
Make the design minimal by removing some features from the homepage like news and providing a quick link to the new page
Trade off: Additional coding and modification of a set of links at the application level isrequired.

Relationships:
None