



# EVALUATION ASSIGNMENT 2

CS5760 – Graduate Human-Computer Interaction

## Abstract

An investigation of the user interface domain, heuristic principles, and critical usability concerns for the current design and walkthrough of the undergraduate application

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# Description of Undergraduate Design

The undergraduate team known as Team 2 is designing an application for water treatment facility staff across Wisconsin. This application's purpose is to provide an easier process for the staff inspecting these facilities to note changes in the condition of the system with regards to regulations.

The goal is that this application's interface will allow easier completion of necessary information, and result in a form that is familiar to those who review and process this paperwork. To this end, the team's design choices reflect in the interface as the application's screens map to the utility of the original paper form, and after completion are converted to a filled-out version of the original paper form for printing and processing. This choice allows the existing systems and process to not be entirely disrupted by the introduction of technology, which ensures the learning curve is kept in check for veterans of the old system as this new system would be implemented.

## Identification of UI Domain

This UI exists in the domain of survey applications, but more pointedly in the domain of process documentation survey applications. These types of applications must be filled out by the user, but typically have a very rigid structure and style to them as they must be processed by a larger governing body. Examples of such surveys include I9 and W2 forms, college departmental forms such as advisor selection, driver's license applications, and the like. While they are at their heart surveys, the forms adhere to specific protocols and are less designed for qualitative feedback, and more for a specific style of information processing and triage.

This distinction means that while the application may take on many of the UI domain characteristics of a general survey application, it also has its own unique set of considerations. A general survey may ask whatever questions it likes in whatever order it comes up with (common sense dictates some cohesive order of course). Process documentation may need to be filled out in a very specific order, and must map to the specific information and at times, exact form layout expected of workers and machines at the processing center. This means a mapping to existing protocols and understanding of existing process must exist when designing a survey application in this specific domain of survey applications.

## Heuristic Principles Applying to UI Domain

Within this application, the following heuristics based upon Nielsen's seem most applicable, along with the rationale for their application.

**Sufficient Information Design:** The application must provide at least as much information as the paper form in order to ensure the user has the same materials available to them as the original survey. Design for interactive technologies does allow for certain information to be "pocketed away" behind help icons,

accordions, and sliders, meaning more or less information can be shown and hidden at any time. This balance allows for this application to be even more informative than the original paper while also being less cluttered. However, a balance must be struck to ensure the user knows where information is and is required minimal interactions with maximal success.

**Consistent and Intuitive Mapping:** Given the area of process documentation surveys, mapping is critically important to user success, especially in veteran users of the pre-existing system. The application must map to the existing process in a meaningful way, and work not only with the users filling out the documentation, but also with the processing system that must triage and sort it.

**Visibility of State:** When completing a section of the form, submitting form for printing, cancelling responses, or missing a required section, it is critical that a user is aware at all times that the system is doing what is anticipated. When filling out a paper form, a user knows the work has been “saved” as it is in their hands, and knows it is submitted when they bring it to their local office. With technology, work users believe is saved may have been discarded due to loss of connection or a system glitch, and submission may fail due to similar issues. Given this potential for ambiguity, making users aware of successes and failures is pertinent to their use of the application.

**Error Prevention:** By noting when submissions fail due to a user error (such as omission of information required), the user gains a timelier feedback they would not have had in the real-world equivalent, adding a value to the shift toward a technologically mapped replacement. It also ensures information being sent for processing is of value and complete, which saves time and frustration of returning forms that are not correctly filled out and must be redone.

**User Control and Freedom:** A user must be able to fill out the survey with the freedom a paper form gives them. They must be able to “check” a box (do), “erase” a box (undo), and refill it in again if needed (redo). If the form allows for additional written notes by the user, they must have space to type their thoughts in a technological form just the same. If a user needs to completely restart their form, they should be able to “throw it out” and begin anew. They should have a choice to complete and submit their work or to revise it. While a process documentation survey does not give “full freedom” in that it has bounds on its process, it must allow users choices that ensure their ability to complete the survey in a meaningful and correct way.

**Aesthetic and Pleasing Design:** While not as critical as the above, it is vital that the application be easy to read and not uncomfortable for a user to view in order to ensure users continue to utilize the application.

## Usability Problems Found in Heuristic Analysis

Heuristic Concern	Severity	Comments on Concern
<i>Sufficient Information Design</i>		

Form options have at times confusing terminology	2	Some form options and their meaning could be better elaborated on with information in the application or in a tooltip available to users - eg, "noncomplying flowing" - what is noncomplying in this scenario? This has less severity as expert inspectors are likely to use this application, but may still be of benefit in a way that allows more information to exist should users need it
<b>Consistent and Intuitive Mapping</b>		
Form mapping on mobile not shown	5	The average case was shown as a mobile phone, but all screens at present are desktop. Responsive design of course allows squishing and stretching, but this may cause the mapping of the paper form to the digital form to be compromised if the responsive phone design is not actively considered.
Accordion Dropdown Arrow Mapping Confusing	3	Accordion arrows often toggle between a downward and up or a downward and right pointing arrow. The mapping between these as to what is open and closed is sometimes debated, but the most natural mapping appears to be clicking a right arrow to expand content downward, at which point the arrow changes to the downward arrow directing you to look at the opened content. Left arrows are rarely if ever used, and appear confusing and out of place, which may result in user confusion.
<b>Visibility of State</b>		
Review and Print does not specify if all changes were properly saved	4	Review and Print takes the user to a screen showing the paper printout version of the form - however, without any dialogue assuring that the printout has mapped all changes made on the previous page, this form may seem confusing or incorrect. Some form of dialogue assuring the user their changes mapped (or letting them know if an error occurred) on this screen would be beneficial to the user feeling ready to print the document.
<b>Error Prevention</b>		

Error dialogue options confusing	5	The dialogue within the error message is ambiguous as to what "Back" and "Continue" do and the repercussions. If I Continue is my form still processable? Is this error really an error or just something I may want to be aware of? Will Back take me to edit, or will all my form changes be discarded? More informative button text and more informative in the dialogue would be beneficial.
Detail options can be selected in opposition of required options	5	In the current design, a user may select 'no' for a required question such as "is this issue present?" but check boxes for related issues. While this is a user error, it is one a user could easily forget to change as they edit the form through their inspection. A way of not allowing conflicting information to be selected, or to auto choose "yes" if options related to yes are checked, would likely be beneficial to prevent these errors.
<b>User Control and Freedom</b>		
Understanding of Required versus Optional/Detail Information Missing	5	Users cannot at present distinguish from the options which must be filled out, and which may not be. As a result, error dialogues of missing information also do not convey if the information is allowed to be missing, or if it must be filled in. A '*' or other indication of required information may help users ensure that all necessary information has been filled in prior to reaching the review screen - as a state message can appear indicating that required fields have not been selected.
<b>Aesthetic and Pleasing Design</b>		
Contrast on Informational Labels Low	4	The vivid blue backdrop with black text makes it more difficult to read the labels, which may result in difficulty for the user or in certain lighting, a completely unreadable label
Typography Weight Static Across Application	3	Headers, Buttons, Options, and Informational Text all contain the same typographical weight, size, and decoration. This forces users to rely solely on color, context, and grouping to discern order, which can remove some of the intuition of information hierarchy.

# Critical Usability Concerns

Of the usability concerns discussed above, those with a “critical” rating of 5 are as follows:

- Form mapping on mobile not shown (*Consistent and Intuitive Mapping*)
- Error dialogue options confusing (*Error Prevention*)
- Detail options can be selected in opposition of required options (*Error Prevention*)
- Understanding of Required versus Optional/Detail Information Missing (*User Control and Freedom*)

## Illustration of Critical Concern Scenarios:

**Form Mapping on Mobile Not Shown:** Donna Johnson goes out to the DNR site in order to complete her inspection. She opens the application on her phone, but notices that the information is very squished together and the text is tiny. On her desktop computer, everything looked great, but her mobile phone is not displaying the page as intended. As a result, she is unable to fill out the form on her phone because she cannot properly see and select the information. She drives back to her office to pick up one of the original paper forms, and heads back to the inspection site again. Obviously frustrated, she plans to warn all of her colleagues about the application issues she had on her phone.

**Error dialogue options confusing:** Lenny has completed his water site inspection and goes to print his completed form. However, soon after the warning message pops up that Element 2 is empty. Lenny is confused by what this means – he knows nothing was wrong with the Pumps. Is he expected to find something wrong? Did he forget to check something? Lenny is anxious about what the error means, and even more anxious about his options. If he continues will his form be able to be processed? This error popping up has him worried. If he goes back, will he lose the rest of his inspection notes? Element 2 is covered up by the warning, so Lenny can’t double check to see what the final form will look like. He isn’t sure what to do, and debates calling his home office to ask what should be done in a situation like this, but doesn’t want to seem dumb. Frustrated, Lenny choose to go back and plans to restart the form and triple check his work before selecting print again.

**Detail options can be selected in opposition of required options:** As Donna was completing her inspections, she initially notices no problems with the pipes and marks her form as such. However, on her last sweep through she notices a rust spot, and quickly goes to revise her form with this observation. She forgets however that she initially checked no problems with the pipes. She finishes her work and prints out her form, only to realize the error after the fact. She has to recomplete the whole form in order to check the box from a no to a yes for this observation. She wishes she could have had a reminder during this last-minute change to switch her answer from before – or better yet, that it could have been done for her to save her time.

**Understanding of Required versus Optional/Detail Information Missing:** Lenny is completing his inspection form and is on Element 2. He sees no issues present, and then views the additional options.

The site has a sampling faucet and buried piping, but none of elements in the second grouping of observations he needs to concern himself with. NA is an option present, but he is confused – should he select NA despite saying no issues were present? Elements that could have issues exist on the site, so the issues are still applicable, just not present. Lenny isn't positive if he needs to select a choice from every grouping, or which choices must be selected and which choices are related to other choices he has made. He thinks about how his tax forms direct him to different sections depending on his answers, and how other surveys he's taken give him questions based on his previous responses. He wishes to himself this application had a similar feature, because at present he's not sure how to correctly fill out his form.