Iter2. High Fidelity – Instructions

is211 Interaction Design and Prototyping
2019-20 T1

Due: *Lab study results due in class on week 11*
3 days (72 hours) before class on week 13
Weight: *30% of final grade*
Collaboration: *This is a team assignment. You must work only with your project team.*

Assignment

In your second trip through the observe-prototype-evaluate loop, you will produce a high fidelity prototype and evaluate it with a laboratory study. You will run a pilot test on the lab study to quickly learn important points in your prototype. Then you will update your prototype with version A and B to conduct an experiment. Collect some data and do a qualitative and quantitative analysis.

Phase 1: Observe

Begin by studying your heuristic evaluation results. If evaluators found a lot of severe problems, then perhaps you didn't understand your high-level problem well enough, or perhaps your solution doesn't make sense. These could be signs that you need to do more observations. (Time is short, however, so talk to your mentor before you do this.) If you can't do more observations, you can at least look at your observation notes again. If necessary, **revise your problem and solution statements** in light of what you discover.

Also, you should **revise your scenarios** to make sure they are accurate and complete. You will use them again as voice-overs for the optional walkthrough videos at the end of this iteration. You will also use these scenarios (or modified versions of them) as tasks in your laboratory study. **Add details to your scenarios or add more scenarios so that all the functionality you want to prototype is used at least once.** Be sure to include all the details a user would need to perform the scenarios on your prototype (including usernames and passwords, if necessary). Also, highlight the scenarios (or parts of scenarios) that changed from Iteration 1.

Finally, **make a list of the five most important changes you will make to your design** for Iteration 2. If you will make less than five changes, then simply list all of your changes. For each change, give a short description and justification (one sentence for each is enough). And note that we expect high severity (3 or 4) usability problems from Iter1 to be given highest priority. If you fix lower severity problems and neglect to fix higher severity ones, then you need to give an explanation.

Phase 2: Prototype

With your revised scenarios and your list of changes, you should have a clear idea of what your high-fidelity prototype will have to do. Now you need to **create a detailed and comprehensive plan for how your high-fidelity prototype will be implemented**. This plan will guide your work for the next few weeks.

As you decide how to implement your prototype, keep in mind that you only have to *give an impression* of how a final system would work. Use your scenarios as a guide: by the time you run your laboratory study, you should be able to walk through all of them. It's great if your prototype is like a working system, because this allows users to discover all of your functionality by exploring on their own. If that's too hard, then you can simulate features of your prototype without fully implementing them. For example, you can pre-load data that is needed for a scenario, or you can use local storage or session storage. Do **NOT** store data in a database (for web apps). You can also assume that users will follow certain steps exactly as written in your scenario (but make sure to warn users if they leave the "safe" path). If you need complex technology (like image recognition), you can fake this with a wizard-of-oz approach (e.g., showing the image on a "wizard's" screen for classification).

Choose Test Setup and Tools

Start the implementation process by choosing the test setup and tools you will use for your prototype. The test setup you use for demonstrations and user studies can be anything that you possess. You may build either a web application that runs in a web browser or a native application that can be installed on a desktop, laptop, or mobile device. If you wish, you may also separate your prototype into more than one ***app*** (application). Providing a link to your deployed web app(s) or native app installer(s) is optional, but you must still tell us what test setup you choose.

You may use any development tools (prototyping tool e.g. Axure, toolkits, frameworks, or IDEs), and you may use any web server you wish if you need one. We advise you to use tools that you are already familiar with and prototyping tools that are easy to use. Refer to our list of recommended tools and talk to your mentor. In fact, when building prototypes, it is often a good idea to use tools that are easier to work with.

Keep a Journal

Make an entry in your journal that describes the progress you have made and decisions made. Keeping this journal will help you to track what you have done and what changes you have made to your and prototype. It is good to list out your brainstorm ideas, alternative designs, plans, etc. It will also help your mentor to advise you as they will be checking it the week before class to find out your team progress.

Document your Prototype

You will document your Iteration 2 prototype in much the same way as in Iteration 1. Prepare a **navigation diagram** that shows how the major views of your prototype are connected. If your navigation hasn't changed, then this could be a copy of the diagram you submitted in iteration 1. Just remember to include only those views that actually appear in your prototype. Also, capture **at least one screenshot of each view** shown in your navigation diagram. Note that you will update the prototype and revised your prototype document later.

(**Optional**) Then film a video walk-through of the easy scenario. Your walk-through video will be very similar to the video you made for iteration 1, but they will show your high-fidelity prototype. Again, speak only the words written in the scenario, or you will be penalized. You should also know that we will interpret cuts in your video as long pauses, so don't record your video in multiple clips unless pauses are necessary. Note that you will edit this again after updating your prototype, so keep your video footage and keep your effort here to minimum (1 hour), assume you will throw away this video walk-through for a better version later.

Phase 3: Evaluate

By the start of class on week 9, you should have an **initial prototype** (Hi-Fi). Focus on building a prototype that works correctly and is easy to understand. Then you are ready to evaluate.

- You'll start by creating a laboratory study plan and piloting it. Then you'll run your lab study. Your lab result is due early and can be discussed in class.

- Identify an important part of your prototype that you want to conduct an experiment which compares two versions, an AB testing. Conduct an AB testing experiment. This can be done as a lab study or a web experiment.

Step 1: Plan Your Study

First, **develop a plan for your laboratory study.** Think about what you want to learn, and then design your test plan based on that. This plan should specify the following:

- **Goals**: Your high-level goal is to evaluate and improve your prototype, but you need to translate this into 1-3 lower-level goals. A common goal for a first user study is that **users should be able to complete a basic task without guidance from a test facilitator**. This goal is so common that we require it to be your first goal. The remaining two goals are up to you. ***Note that the task to sign up for an account or login to the application may not be a good task for measuring the goal as it may not be related to your breakdown or problem.*** You may want users to accomplish a certain task quickly, or you may want users to accomplish the task without making any mistakes. Or maybe you just want your design to give users a pleasing experience. Use your problem and solution statements as a guide, and list up to three goals in decreasing order of priority.
- **Data:** Next to each goal, you should list 1-3 types of data that you will collect to judge whether or not you have achieved your goal. Your first goal (users can complete a basic task without guidance) should be judged based on think aloud data and critical incidents. The remaining goals may be judged based on any data you choose. For each type of data, state whether it is qualitative or quantitative, and state whether it will be obtained through observation or a question. Also state any specific targets you set. For example, you may want average task time for one task to be less that 30 seconds, or you may want 80% of users to complete a task without making any mistakes.
- **Recruiting**: Describe the participants you will recruit and how you will recruit them.
- **Environment**: Describe the place(s) where the study will take place and the computer system(s) that will run your prototype.
- **Script:** This outlines how you will run your laboratory study with each participant. Use this as a reference when you run the experiments. The script will also help the grader to understand how you run your study.
- **Tasks:** Choosing the tasks that your participants will perform is critically important. Above all, your tasks should be realistic. If you wrote your scenarios well, they will be a big help here. Your study tasks may be exactly the same as your scenarios, but it is often necessary to modify them to fit the study participants or environment. It may also be helpful to make your study tasks shorter than your scenarios if you want to focus your study on one part of your process. If your study tasks are different from your scenarios in any way, record additional walk-through videos that show how a study participant would perform the tasks on your prototype. (If your study tasks are exactly the same as your scenarios, then you may simply link to your scenario videos.) *Note: do not record actual participants as they do your study, as this will be disruptive. The purpose of these videos is to help the grader understand your study design.*

After you have made your plan, **prepare the documents you need to run your study**. One of the most important documents is the informed consent form you will give to participants. Your submission template includes a guideline for a consent form to make this easy. Another important document will be the task instructions that you give to participants. Like your scenarios, these instructions should give participants all the details they need to perform tasks, but they should ***not*** explain how to do the tasks step-by-step. This means **you should not show your task walk-through videos to your participants!** Rather, you want to see if participants can figure out how to use your prototype all by themselves. Give them high-level goals in writing and see what happens. If they get lost, you'll need to find out why!

Other documents that you may need include questionnaires (forms that you ask participants to fill out) and data sheets (forms that you fill out while observing or interviewing your participants). Depending on how you run your study, you may need other documents as well. For example, if users would normally need training before using your system, you might give your participants a tutorial or user manual.

Step 2: Run Your Study

Pilot your test plan with **at least one person** (not a member of your team) to work out any problems. Try to use real users for your pilot test, someone who will face the problem and use your solution. Learn from your pilot tests to improve your prototype. Then run your laboratory study on your interactive prototype with **at least three different people**.

As with your Heuristic Evaluation, each team member will have their own role during testing. One person will be the facilitator, and one will be in charge of taking notes/photos/videos/etc. Any other team member who is present should observe and take notes. This time, your user will not be writing down the problems they find for you. It's your job to learn what your users are thinking: the feedback they provide you will be invaluable to improve your prototype.

Since your high-level goal is to improve your interface, you should look for breakdowns and pain points that your users experience. Try to understand what the problems are and how you might fix them.

After pilot test, if there is a major problem, modify or update your prototype. (Note: this would invalidate your results if you were running an experiment, do **NOT** use the pilot test data in your study and experiment results)

Apart from prototype updates, you should keep things as consistent as possible between your user tests. Use the same script, follow the same protocol, answer questions in the same way. Immediately after each test, do a quick debrief with your team and write down any reactions or thoughts that came up. You will most likely forget them, so it's important to write them down right after the user test.

Step 3: Compile Study Results

After running your study, compile your results into the **lab study spreadsheet**. The first sheet of Study Results must list your goals and state whether or not you reached each goal (according to the data). The first sheet must also state how many participants you recruited and summarize the most interesting data you collected. (Charts and graphs are helpful here.) The remaining sheets should contain all the data that you collected in this study. Make sure that you assign a number to each participant; do not refer to them by name.

Update your navigation diagram and screenshots based on your **updated prototype.** We will use these as a reference when marking your project. Your screenshots should include all the views listed in your navigation diagram (use the same names in both).

(**Optional**) Update your YouTube video walk-through of the easy scenario with the **prototype**. See these guidelines for tips on how to make a simple and clear walk-through video. There are no requirements for the audio track in this video, but it is helpful to explain what you are doing to help viewers follow it.

After the lab study, do I need to update the prototype with the results I got from the study? Not necessary.

Step 4: Prepare experiment

Refer to the lecture slides on web experiments. **Choose one experiment goal**, and then design a simple experiment with **one independent variable**. Your independent variable will be your prototype, and you must compare two versions (A and B). Version A can be your **control prototype** before the experiment and Version B can be your **updated prototype** after your experiment, or you can make both versions after your experiment. Your Experiment Design must explain how the two versions are different. Also, state whether you will use a within-subjects or between-subjects design.

Then you must decide how you will determine whether A or B is better. **Choose one or at most two dependent variables.** How you collect these variables is up to you. You can instrument your code to automatically record some variables, like task time. (If you do this, then mention it where you list the variable, and explain how you do it.) There are also numerous online resources you can use to run your experiment. The following resources all are free with unlimited participants for at least one project:

1. SMU Qualtrics
2. Solidify (Helio)
3. Loop11 (Recommended)
4. GAE Bingo or Big Bingo
5. Google Analytics

You are welcome to use any web experiment tools that you can think of (Facebook, Google ads, surveys, etc.). Just be careful if you use commercial tools other than those listed above, because some systems have hidden costs or limits on the number of participants. You may use whatever is at your disposal during the experiment. Instead of using a web experiment to collect data, you can do a lab study for your experiment using stopwatch, video surveillance, voice recording, interviews, etc. Note that you have limited time to compile and analyse the data.

Finally, keep in mind that you will get a higher grade if your experiment produces valuable insights. That means you should choose a goal that really helps you improve your design! It also means that it shouldn't be obvious what the result of the experiment will be.

Preparing and Documenting Your Experiment

Explain how you will recruit participants, and write a brief script for your experiment that explains what the participants will see and do. This script should include the task(s) users will perform. Your experiment will not run the entire tasks in your original lab study in step 1. Design the experiment script to include only task(s) users will perform for the experiment. The experiment tasks must be specific to collecting the values for the dependent variable. If the tasks are too long and it does not show the difference of using A or B, then your data may not get the statistical significance you desire. Do your best to make your experiment internally and externally valid.

When you have finished setting up your experiment, **collect screenshots that show what participants will see**. Don't bother showing every view of your prototype (that comes later); focus instead on the things that appear only in your experiment.

Special Instructions

- If your participants will see screenshots of a ***mobile*** application (e.g., using SMU Qualtrics or Solidify for something that would normally be seen on an Android phone or an iPhone), **add a frame around the screen shot that looks like an actual device.** It's ok to assume that your participants will use a desktop or laptop computer browser to access the test, but they will need an image of the mobile device to help them find special buttons (like the back button or the menu button on Android devices). One of the easiest ways to get such screenshots is to capture images of your app while it is running in an emulator.
- If you are doing experiments with a ***mobile web*** application (e.g., using Loop11), **you should ensure that the users are testing your application on the appropriate mobile device.** The easy way to do this is to specify it clearly in your instructions. If you're really motivated, you can automatically filter your participants based on the device they are using (e.g., by checking the browser's user agent. (Don't know what this is? Click here to check yours.) In some cases, it may be acceptable to run your experiment through a desktop web page with the UI inside a frame that looks like a mobile device. Think before you do this, though. Depending on how you design your experiment, it could threaten the validity of your results. For example, if you are testing how quickly

people can accomplish tasks that involve pressing buttons or entering data, then you should use a mobile web browser, because using a mouse and keyboard would be very different!

Step 5: Run Experiment and Analyze Data

After you have set up your web experiment, **get at least 20 people to participate.** and compile your results into a spreadsheet.

Compile your experimental results into the **experiment spreadsheet**, put a **summary of any conclusions you can draw from your experiment.** In the best case, your study will be both internally and externally valid, and you will have strongly significant results showing whether Version A or Version B is better. However, many experiments fall short in some way. What solid conclusions can you draw from your experiment? If you can't draw many, then how might you modify your test to get more compelling results? Also write a sentence or two about how many participants you got, and present a short summary of the data you collected for each variable.

On another sheet, present **a statistical analysis of your dependent variable.** First, compute descriptive statistics, including the mean and standard deviation for your dependent variable. Then analyze your dependent variable to assess the strength of your data. For many variables, a good choice is the t-test: *paired* t-test for within subjects experiments or standard t-test *(two-sample unequal variance)* for between subjects experiments. Some variables require a different sort of test, like Wilcoxon, Mann-Whitney U, Fisher's exact, or binomial. See the Quantitative Analysis slides for guidance on the right test to use, and ask the instructor if you wish to use a different test. Whatever test you choose, state clearly what analysis tools you use (providing links to them), and show all of the work for your statistical calculation (use screen shots if necessary). Since many tests (like the t-test) assume that your data is ***normally distributed***, include histograms of your data (one for each interval or ordinal variable in each condition). If your histograms don't look *normal* it means that you should not be using the t-test. Finally, remember that you are limited to a single task, a single independent variable, and one or at most two dependent variables. Don't analyze more dependent variables or you will be penalized!

On the last sheet you should **collect your raw results and any demographics information** you collected for your participants (like age, occupation, or experience using computers or smartphones). Make sure that this sheet does not contain any personally identifiable information (such as participants' names).

After the experiment, do I need to integrate the selected A or B back into the prototype? Not necessary.

Step 6: Pitch Video Preparation

Prepare your pitch video by thinking about how you want to introduce your prototype. You will have at most one minute, and you should design this for someone who has never seen your application before.

You are free to go wild with your pitch video production, but remember that it does not need to be flashy. Even a single static image with audio narration is sufficient. What's most important is to communicate the core concepts of your project in a memorable way. A flashy video can be memorable, but a video that tells a convincing story is the most memorable.

Check the course web site for tips on how to make your pitch video. Make sure your video is **40 MB or less** and **between 30 and 60 seconds long**. Your video can be in any format accepted by YouTube. Make sure that the following text is visible for the first five seconds of your video:

- Project number and name
- Team name
- "IS211: Interaction Design and Prototyping"
- "2019-20 Term 1"

Put these items in the order shown. Also make sure that the project name and team number are clearly visible for the last three seconds of the video. Upload your video to YouTube AND Submit it to the Google folder so SMU can post it on our google site.

Suggested Schedule

You have seven weeks to work on this assignment. Here's a plan we suggest for you.

- **Before week 7 class:** Select and learn to use a hi-fidelity prototyping tool. Decide what changes you will make, create skeletons for your app with placeholders for each view. Start working on your prototype functionalities.
- **Before week 8 class**: Add enough functionality to your prototype so that you can navigate between the major views and finish the functionalities.
- **Before week 9 class**: Finish your prototype and plan your lab study. Start to pilot and execute your laboratory study.
- **Before week 10 class**: Analyze your laboratory study and recommend changes to your prototype based on your result.
- **Before week 11 class**: Be prepared to present your laboratory study results. Identify your experiment goal, design, prepare and execute your experiment and update your prototype.
- **Before week 12 class**: Prepare your pitch video and analyze your experiment.
- **Before week 13 class**: Prepare for your presentation.

Presenting In Class

Refer to assigned presentation slot online. Please present the following:

- Overview and Video Pitch (1 min): State your problem and solution. (***Quick Recap.***)

- Observation (1 min): Present your main persona and hard scenario (draw results from your observation and focus on the **two** most important changes). Changes may be explained together with prototype (show the changes in prototype instead of explaining in text)
- Prototype (4 mins): List the apps you are building (name and tools used). Also, explain what functionality is simulated (if any) and how you do it. Run the hard scenario on your prototype (or show the optional Youtube video walkthrough) and be ready for reviewers to ask you to deviate from the scenario. Be **prepared** to be asked to **deviate** from your scenario if necessary.
- Evaluation (7 mins):
    - Lab Study (3 mins): Summarize what you learn. State your **goals** and the data you collect. Summarize your **findings** and changes you made after the pilot.
    - Experiment (4 mins): Design-State the independent and dependent variables of your experiment and whether you are using a within-subjects or between-subjects design. Demonstrate your live experiment. Result-Describe your result and how you arrived at the insights you concluded.
- Reflection (3 mins): Lessons learnt. These could be conveyed during presentation above

If you have a navigation diagram and a prototype, then it's best to start by showing your navigation diagram on one screen while walking through your prototype on the other, highlighting any changes. Choose one speaker, so everything will run smoothly. You may use slides or refer to your submission documents (in whatever state they are in).

Submission Checklist

Submit your assignment by modifying the templates prepared for you on the submissions page. Your submission should contain the following:

1. **Overview**: Information about your team, your project, and links to your walk-through videos (optional) and apps. Highlight your team or project name if they changed since Iter1.
2. **Requirements**: Your personas and scenarios, with changes highlighted.
3. **Changes**: The most important changes you will make to your design.
4. **Journal**: Describes the progress you make each week and any changes to your plan. Provide alternative designs, decisions and reasons for them.
5. **Prototype**:
    - A **navigation diagram** that shows how views of your prototype are linked.
    - At least one **screenshot** of each view in your prototype.
6. **Lab Design**:
    - Goals and Data
    - Recruiting procedures
    - Environment: physical location and computer systems you will use
    - Script: a plan for what you will say and do with each participant
    - Tasks: new videos if tasks are different from scenarios in any way
7. **Lab Consent**: The informed consent form that your participants must sign.
8. **Lab Task Instructions**: What you give to participants in your study.

9. **Lab Results**: A summary of your findings plus all data collected in your study.
10. **Experiment Design**:
    - Goal
    - Independent Variable: the differences between version A and version B. Give screenshots of the differences
    - Within or Between Subjects: your choice
    - Dependent Variable(s): what you will measure.
    - Links: to your live experiment and optional walk-through video(s)
11. **Experiment Results**:
    - One sheet summarizing your conclusions, participants, and results.
    - One sheet showing a statistical analysis for each dependent variable.
    - One sheet showing the raw data you collected.

Pitch videos must be uploaded to the following Google Drive folders. (Click the *New* button in the upper-left corner and then *File upload* to do this.) Each file should be **less than 40 MB** in size. Use names of the form ***gxty-team-project-pitch***, where ***x*** is your section number, ***y*** is your team number, and ***team*** and ***project*** contain your own team and project names.

- **Pitch Video Submissions Folder**
    - Name format:gxty-teamname-projectname-pitch-video".
    - Use a format that can be uploaded to YouTube.
    - Must be at least 30 seconds and at most 60 seconds long.

Samples

The past projects include iterations 2 (sample submission) and 3 (sample solution).
The following are good examples of videos.

- Sample Pitch Video 1
- Sample Pitch Video 2

Grading Rubric

Make sure you complete everything listed in the **Submit** section. After checking that all required portions are complete, we'll use the following rubric to mark this assignment. Look here for more information on how to use the rubrics.

- Overview and Pitch Video: **10 pts**
    - Pitch video clearly communicates how system will solve users' problem.
    - Weekly journal progress
    - (+) Pitch video is especially memorable and creative.

- Observation, Requirements and Changes: **10 pts**
    - Breakdowns are grounded in observations & show clear design opportunities.
    - Personas and Scenarios changes are based on Heuristic Evaluation and Lab Studies
    - Changes to prototype are clear and well justified.

- Prototype: **30 pts**
    - Changes to prototype are clear and well justified.
    - Screenshots and prototype handles all scenarios.
    - (+) Prototype is especially detailed & polished, simulating a finished application.
- Study Design: **10 pts**
    - Goals and data collected are clear and sensible.
    - Study tasks are realistic and consistent with scenarios and rest of study design.
    - (+) Documents, environment, or recruiting were especially well done.
- Study Results: **10 pts**
    - Study results are presented clearly.
    - (+) Study resulted in especially valuable insights.
- Experiment Design: **10 pts**
    - Goal is clear and fits the project's problem and solution.
    - One independent and one or two dependent variables, both consistent with goal.
    - Script, screenshots, and video show that experiment was prepared well.
    - (+) Experiment is well-designed and especially ambitious.
- Experiment Results: **10 pts**
    - At least 20 participants were recruited.
    - Results are clear and include a sound statistical analysis.
    - Experiment is internally and externally valid, and data support conclusions.
    - (+) Experiment resulted in especially valuable insights.
- Presentation: **10 pts**
    - Presentation is clear and easy to understand team’s learning experience.
    - (+) Presentation is lively and design principles are communicated, especially in the learning reflection.

Appendix 1 - WorkFlow for Iteration 2, phase 2 and 3 (evaluation)