



Usability Test report for Field Form

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A web app in project Mobile
Environmental Citizen
Scientific
Workforce (CI-TEAM)

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Evaluation web / Field Form

[Award # OCI-
1135523](#)

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Executive Summary

This usability test report documents includes test of the Field Form website <http://www.csl.mtu.edu/classes/cs4760/www/projects/s15/group6/www/hci/>.

The test was carried out in Apr.14 to 16th 2015 by Team Justice League. Field Form is a project initiated by Geography Scientist Jessica McCarty and conducted by Team6 Justice League who are Michigan Tech students enrolled in CS4760/5760, & HU4628. It adapted paper-based USDA agriculture field condition criteria and evaluation method by using Field Form website. Local farmers can upload weekly report of weather observation, assessment of crop condition as well as GPS location. Such field data collection across 3000 counties in U.S. will have incredible values for stakeholders.

Based on the usability problems identified in this test, I recommend:

- Fix the position of soil triangle in help doc.
 - Enhance the background when help doc pop-up.
 - Add selectable tab on quick links of help doc. Make it noticeable and clickable.

Team Justice League

Programmer/CS students: Mac Reid, Kevin Erkkila, Mitchell Bartlett, Dominic Diehn

Technical communicator/HU students: Jonathan Maier, Alexandria Van Duzer

Usability Consultant /Report writer: Yuanjing Sun

Geography Scientist: Jessica McCarty

Other progressive design documents can be found in [Justice league Field Form test](#)

Other progressive evaluation documents can be found in [Yuanjing Sun's web](#)

Note: The complete survey questionnaire is included later in this document for reference.

Introduction

UI description

The purpose of the Field Form is to replace a paper and pencil method for tracking weekly report of measurements of crops from USDA volunteers. Users login on the first screen of the website, enter their location information and fill out a structured online form describing the status of the crops condition near their location.

Purpose of testing

The purpose of the testing is to identify programming bugs and examine the ease of use and work flow of the Field Form. The development team is interested in any programming errors that might interrupt the work flow and result in lost data. The scientist, Jessica McCarty, is interested in an application that is easy to use, and is safe from data loss.

Procedure of testing

- (1) Practicing “Think Aloud” strategy when fill in pre-test survey on demographic information.
- (2) Filling in data and their estimation based on given photos describing their crop and soil condition under the instruction of help doc
- (3) Three participants are in web-first group; Four participants are in mobile-first group.
- (4) Completing the post-test questionnaire on their subjective assessment
- (5) Being debriefed about aim of test & giving reasons for their reaction in usability test.

Goal of testing

- Convince of data input both in mobile and static status
- Identify and navigate to each function part: GPS, data input, photos upload and help doc
- Comprehension of relevant agricultural terms by using help doc
- Ease of learning and control
- Visual pleasures of web design
- Overall experience

Scenario 1 10min

You are a farmer who lives in Lee, Mississippi. It is 65 degrees F and your county has received 5 inches of rainfall so far this week. You are growing corn and 40% of your corn crops are at the silking stage and 60% are at the dent stage. The picture below shows they look OK because the soil is drier than normal. And the left most pic shows topsoil condition. Find out crops' phonological stage and soil condition by using help doc and submit your observation based on estimation. *You don't have to fill out all blanks. Explore help doc before ask test facilitator.



Task lists

- Fill in geographic information as scenario listed.
- Using help document figure out the name of the crop, the phonological stage, and the percentage of it.
- Submit the observation

agree

disagree

Tell your feeling on tasks you just performed

1 2 3 4 5

I think that I can easily complete the tasks.

I found it's easy to locate the item in menu and it's easy to navigate.

I feel confused to understand the help documentation and menu.

4. What's your impression on the web app any suggestion?

—

Scenario 2 -10min

You are a student major in agriculture in Houghton, MI. You grew wheat in your greenhouse. It's 34 degrees F and your county has received 55 inches of rainfall so far this week. All of your crops 100% has headed as the pic below shows. And is looking great this time of year. You would go outside and took a picture of the soil or use your knowledge find out soil type by using help doc. Then you would like to upload it. *You don't have to fill out all blanks. Explore help doc before ask test facilitator.



Task list

- Tester will assist you load to Field Form website using browser in your cell phone.
- Using GPS locate where you are.
- Follow the scenario two instructions to fill the observation of your crops.
- Take a picture of the surroundings as topsoil condition and upload it.

| | agree | | | | disagree |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Tell your feeling on tasks you just performed | 1 | 2 | 3 | 4 | 5 |
| I think that I can easily complete the tasks. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| I found it's easy to locate the item in menu and it's easy to navigate. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| I feel confused to understand the help documentation and menu. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Post-test -5 min

Characteristics of the aesthetic/ visually pleased

How did you find the web app's overall appearance?

-
- Wonderful, looks like an industrial product. It's not bad. Ok for use. Doesn't matter.
- Lower than my standard. Sorry, it's really need to be improved.

How would you rate the convenience of data input?

-
- Excellent Neutral Extremely poor
- Good Poor

System Usability Scale

1 2 3 4 5

I think that I would like to use this system frequently.

I found the system unnecessarily complex.

I thought the system was easy to use.

I think that I would need the support of a technical person to be able to use this system.

I found the various functions in this system were well integrated.

I thought there was too much inconsistency in this system.

I would imagine that most people would learn to use this system very quickly.

I found the system very cumbersome to use.

I felt very confident using the system.

I needed to learn a lot of things before I could get going with this system.

Miscellaneous

1. Please indicate your level of agreement to the follow statement:

Overall, this android application was easy to perform the task.

1. Strongly agree
 2. Agree
 3. Neutral
 4. Disagree
 5. Strongly disagree
2. Please indicate your level of agreement to the follow statement:

I enjoy using this android application.

1. Very much
 2. A little bit
 3. Neutral
 4. Not very much
 5. Not at all
3. Please indicate your level of agreement to the follow statement:

I would use this android application again.

1. Strongly agree
2. Agree
3. Neutral
4. Disagree
5. Strongly disagree

Thank you very much for taking the time to complete this survey. Your input is valued and very much appreciated!

Methodology & Data collection

Videotape

I use Canon Vixia HG20 to record the whole process of the usability test.

Paper /pencil Timer & questionnaire

Each tester used a timer to measure how long the participants took for each task in the given scenario. Table 1 is the worksheet for tester to record users' operation and reaction to interface.

Table 1. Worksheet for usability test observation

| Subject No. | Task No. | Task RT | Bug No. | Description | Bug location | Sub's Words/mood | Recovery strategy | Recovery time took | Recording Timestamp |
|-------------|----------|---------|---------|-------------|--------------|------------------|-------------------|--------------------|---------------------|
| | | | | | | | Self/ Assist | | |

Participants Profiles

We recruited participants ($n = 7$, 6 men and 1 women) from the Michigan Technological University undergraduate subject pool. Our sample was comprised of relatively young users (M age=18.7, $SD=0.7$). The subjects reported a moderate interest in participating in the usability test ($M = 2.3$ of a 5-point Likert scale in which 1 indicated "most interested" and 5 "not interested at all."

Table 2. Pre-test result

| | subj1 | subj2 | subj3 | subj4 | subj5 | subj6 | subj7 | Mean | SD | Remarks |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------------------------------|
| Web-First or Mobile-First | 0 | 1 | 1 | 1 | 0 | 0 | 0 | | | Web-First=1 Mobile-first=0 |
| Age | 19 | 18 | 18 | 19 | 19 | 18 | 20 | 18.71 | 0.7559 | |
| Gender | 1 | 1 | 0 | 1 | 1 | 1 | 1 | | | |
| Size of mobile screen | 7 | 4 | 4 | 4 | 5.5 | 4 | 5 | 4.79 | 1.1495 | Diagnal length/ inch |
| interest of participation* | 2 | 1 | 1 | 4 | 3 | 4 | 1 | 2.29 | 1.3801 | Mandatory pre-test |

Results

Quantitative Results

Task completion time measures from the time when participants initiate the scenario till they got a green feedback for successful submission. Table 3 includes most quantitative result I got from usability test.

Table 3. Task completion time and subjective assessment on test scenario1 & 2

| | | subj1 | subj2 | subj3 | subj4 | subj5 | subj6 | subj7 |
|-----------|-------------------------------|-------|-------|-------|-------|--------|-------|-------|
| Scenario1 | Complete time | 4'05" | 6'25" | 9'32" | 6'28" | 6'48" | 5'30" | 5'55" |
| | Easiness | 2 | 3 | 3 | 1 | 2 | 1 | 1 |
| | Navigation | 2 | 3 | 1 | 1 | 2 | 1 | 2 |
| | Usefulness of help doc | 4 | 4 | 1 | 2 | 2 | 5 | 2 |
| Scenario2 | Complete time | 7'30" | 5'00" | 7'50" | 2'10" | 13'20" | 20' | 8'13" |
| | Easiness | 2 | 2 | 1 | 1 | 2 | 2 | 2 |
| | Navigation | 2 | 2 | 1 | 1 | 3 | 1 | 2 |
| | Usefulness of help doc | 4 | 4 | 1 | 5 | 4 | 5 | 2 |
| post-test | Aesthetic view | 1 | 2 | 1 | 1 | 3 | 3 | 3 |
| | Convenience of input | 3 | 2 | 2 | 1 | 3 | 1 | 3 |
| | SUS | 85 | 80 | 77.5 | 100 | 45 | 95 | 82.5 |

Both groups show shorter completion time when they conduct task for the 2nd time. The slope suggests learnability effect in design. Participants in mobile-first group took longer time for first-time use. The slope suggests learnability effect in design.

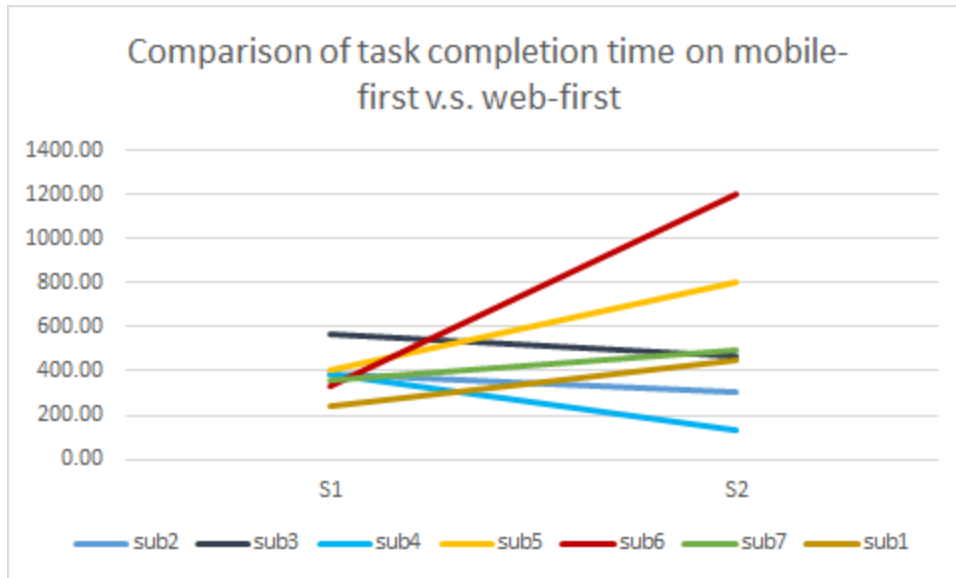


Figure 1. Comparison of task completion time between web-first group and web-first group. Subject 2, 3 & 4 are web-first group as showed in three blue lines stand for web-first group. Their operation order is scenario1 (S1) first then scenario 2 (S2). The warm tone color lines stand for mobile-first group. Their operation order is scenario2 (S2) first then scenario 1 (S1).

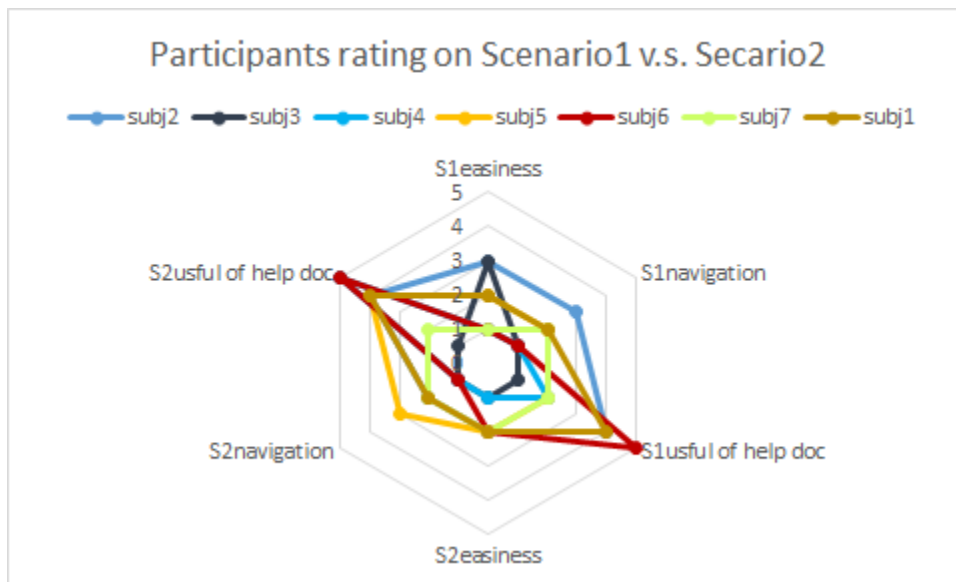


Figure 2. Subjective rating on three usability metrics: easiness of use, navigation and usefulness of help doc. 1 means positive and 5 means negative.

The radar plot indicates mobile-first users seems more unsatisfied with help doc than the web-first users. The smaller size device increase the need to switch back and forth between help doc and input box. It's tedious for user to scroll down to bottom to exit the help doc.

Interpretation of post-test result ---System Usability Scale (SUS) score

In systems engineering, the system usability scale (SUS) is a simple, ten-item attitude Likert scale giving a global view of subjective assessments of usability developed by John Brooke at Digital Equipment Corporation in the UK in 1986. It has been applied to more than 500 products or prototypes for decades in the industry. The interpretation of SUS score is a little bit tricky because it doesn't equal to percentage although it range from 0 to 100. A reference based on 500 usability test using SUS showed the average score is 68. It means if a product score 68 means it falls right at the 50th percentile of the whole pool. Because the distribution of SUS score is not equal distance, someone use seven adjectives as translation of raw SUS score. A means excellent and E means poor.

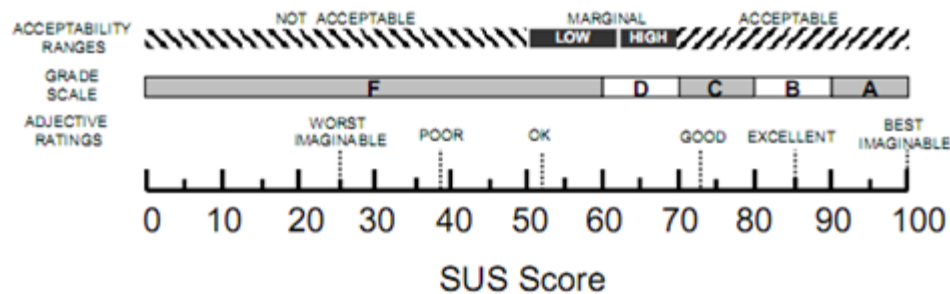


Figure 3. Seven adjectives to translate raw SUS score based on the score distribution of historical usability test over 500 products or prototypes using SUS

Unawareness of clickable image and quick links in help doc banner

- **Soil Triangle**

One out of seven found out the interaction with soil triangle when they try to answer "soil type". Probably because it's static picture in help doc. It never occur to any participant to touch the soil texture triangle.

- **Quick link tab in banner of help doc**

Three web-first participants did not use quick link in help doc because they are not clickable to them. Also, because the side-to-side setup layout is easy to neglect in web browser. However, four mobile-first participants intuitively find the quick link.

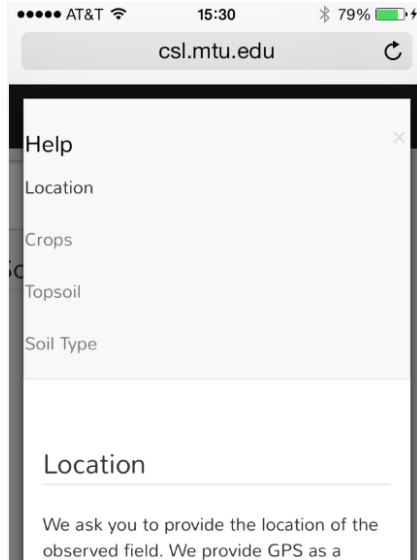


Figure 4. Snapshot of quick navigation tabs in the banner of help doc of Field Form

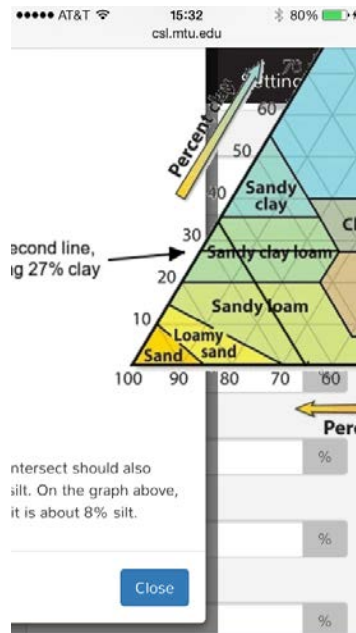


Figure 5. Snapshot of soil triangle extend the boundary of help doc of Field Form

Suggested changes

Modal window is smaller on mobile devices. The pictures were a fixed size that was beyond the width of the modal window. When you scrolled to the side the modal seemingly disappeared as the only part from the modal showing was the large pictures. As long as developer fix the image width correspond to modal window size, it will no longer bother the user.

Also, the panel will be displayed with the position: absolute CSS property, meaning it will scroll with the page. When a panel is opened the framework checks to see if the bottom of the panel contents is in view. If not, it scrolls to the top of the page

Accessibility issues

- **Comprehension of function name as well as input box**

Although all participants find the GPS position, they think it should have a direct access instead of under name of "Setting".

- **Missing terminology explanation in help doc**

No one understood the items: Range/Township/Section because lack of explanation in help doc.

- **Plus button**

Only one out of seven did not notice use plus button to add one more phonological stage of mixture crops.

- **Recovery from errors**

One participant wanted to exit the help doc but accidentally hit the "back" in browser in Scenario 2. His accidental operation lost all temporary storage. So he had to start over again.

Suggested change

More explanation need to add to help doc.

Conclusions

It is important to note that the app is designed to be used by trained volunteers of USDA. Our participants are dissimilar in some ways to the target users of our app, for example, most questions raised by participants revealed that none of them has prior experience with corps and agriculture terminologies. However, the help doc assist general users complete the task. The results of Field Form usability test indicated that with a few debugs, it will be an effective field data report and collection tool for USDA and other stakeholders.

Appendix A: Undergraduate group member attendance at testing

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Invitation to Participate in Web App Usability Testing

Students from Dr. Pastel's HCI and Dr. Johnson's usability courses invite you to participate in usability testing their web applications projects. The testing will take about an hour. Register for any project and hour by printing you name, email address and the course that you wish to receive extra credit in the corresponding cell. You may register for only one time slot. Although you should be reminded by email, please record the location and time for your own records. Arrive promptly on the hour. Identify yourself and the app that you registered for.

**Reserve by printing neatly your name and email address and course adjacent to the hour.
Record for your own records the time and location of the testing.**

App and Administrator: Field Form, Yuanjing Sun

| Date and hour | Location | Name | Email address | Course |
|----------------------------------|-----------|-----------------|-------------------|--------|
| Apr. 14, Tue. 11:00am - 12:00 pm | Meece G08 | Brian Terry | bmterry@mtu.edu | CS2311 |
| Apr. 14, Tue. 11:30 - 12:30 pm | Meece G08 | Scott Muffly | smuffly@mtu.edu | CS2311 |
| Apr. 14, Tue. 6:00-7:00 pm | Meece G08 | Madison Cleary | mmcleary@mtu.edu | CS1121 |
| Apr. 14, Tue. 6:30-7:30 pm | Meece G08 | Zachary Garavat | Zgarav@mtu.edu | CS2321 |
| Apr. 15, Wed. 6:00-7:00 pm | Meece G08 | Ben Manning | btmanning@mtu.edu | CS2321 |
| Apr. 16, Thu. 11:00am - 12:00 pm | Meece G08 | Charles Heckel | ccheckel@mtu.edu | |
| Apr. 16, Thu. 11:00am - 12:00 pm | Meece G08 | Benjamin Vesel | bvesel@mtu.edu | CS2381 |

CS undergrads participation:

Apr. 14th: Mac Reid & Kevin Erkkila

Apr. 15th: Kevin Erkkila

Apr. 16th: Mac Reid, Kevin Erkkila, & Dominic Diehn

Appendix B Bug Reports

| Bug No. | Severity Level | Bug description | Category | location |
|---------|----------------|--|------------------------|----------|
| 1 | 1 | help modal soil triangles are too large | User control | global |
| 2 | 1 | help modal navigation buttons don't look like buttons | WCAG2.0-operationable | global |
| 3 | 1 | images are different styles and sizes | Visual-Inconsistency | local |
| 4 | 1 | everyone confused about section township range inputs | WCAG2.0-understandable | local |
| 5 | 3 | hard to exit help modal on mobile | User control | global |
| 6 | 3 | soil triangle doesn't look clickable | WCAG2.0-operationable | local |
| 7 | 3 | unaware that content is optional but should be entered wherever possible | WCAG2.0-perceivable | global |
| 8 | 1 | settings with one option is a bit asinine | WCAG2.0-understandable | local |
| 9 | 1 | looked clean and professional but could use colors to separate content | User control | local |
| 10 | 2 | button to add row (+) is not clear | WCAG2.0-understandable | local |