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Experience Design Intelligence
User-Interface Development
Information Visualization

iCalamityGuide:
Heuristic Evaluation

Client: Dr./Prof. Maysoon F. Abulkhair
King Abdulaziz University, Jiddah, Saudi Arabia

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Introduction

AM+A conducted a heuristic evaluation of the iCalamityGuide (iCG) from June through August 2012. The materials for the evaluation included the iCalamityGuide iOS application and various competitor products. This evaluation applies AM+A heuristics to the above materials and draws from the expertise of the evaluator. The entirety of the iCalamityGuide application was analyzed.

The findings in this report have been organized into the information architecture of the iCG. The report starts from the introduction screen and moves to more advance functionality.

Executive Summary

The iCalamityGuide presents two distinct user experiences based upon a user's credentials. This report will combine the two experiences when they are the same and differentiate them when they are different.

Methodology

A heuristic evaluation is a systematic inspection of a user-interface design regarding usability issues, as well as usefulness and appeal, according to pre-established categories of issues and criteria. The objective of a heuristic evaluation is to find usability issues in the design so that they can be resolved as part of an iterative user-centered design process. A heuristic evaluation involves having a small set of evaluators examine the user interface and evaluate its compliance with recognized usability principles. A list of these usability principles, "The Heuristics," is included in this document in the Appendix. In an expert evaluation, the evaluator draws on her/his own expertise, as deemed appropriate by the expert, to analyze the product and provide recommendations for improvement.

This evaluation constitutes a heuristic evaluation only. For each observation, the severity of the issue is stated/depicted, and the relevant heuristic labels are provided that refer to the Heuristics appearing in the Appendix.

Initial Setup
1. **Initial Learning Curve**

System Set-up

iCG's Initial installation does not afford several options that reassure the user that she/he is capable of undoing a particular action. According to one of Shneiderman's "Eight Golden Rules" of user-interface design, there should be an easy reversal of action if a user wishes to log out of her/his account or change her/his password. Nielsen's Heuristics further emphasize the importance of consistency and standards by stating that an application must incorporate efficient and clearer wording to ensure that a user is not confused in regard to using an application such as logging into the system.

Current initial installation sets a poor tone for users/customers in proceeding with use of the app. Throughout the process, it is unclear what happens if users mistype their passwords or usernames when creating an account for iCalamityGuide. For example, users first opening iCalamityGuide are given insufficient guidance during the set-up of iCG regarding what happens if users forget their account names and/or passwords. It would be more effective for the overall experience to state why users must create an account to utilize the application. Explaining to users why they must create an account is especially important for visitors to King Abdulaziz University because visitors might be cautious about signing-up for an account out of fear of an invasion of privacy. You should explain to potential users the importance of allowing iCG to identify their location while using the iCG (*e.g.*, could save their lives).

Heuristic: **Severity level:** 4
                                                 ■ ■ ■ ■

User control and freedom

Fitt's Law

Give feedback

Initial uncertainty in regard to user credentials

It is unclear to users what happens once they registers to use the iCG because the system currently does not alert users of successful account creation. A confirmation via email or an in-app notification would be a good feedback mechanism. This approach reassures users with a visible system status that an outcome, registration for the iCG, has occurred. In addition, it is unclear what happens if a person has multiple devices. A simple sentence such as, "Please sign-in with your University username and password," would be sufficient to avoid any user confusion.

Heuristic: **Severity level:** 3
                                                 ■ ■ ■ □

User control and freedom

Feedback

Support easy reversal of action

2.   **Basic Functionality**

Education, Workflow, Language, Navigation

iCG is a powerful tool that offers two distinct experiences, the individual user and the security controler, based on a user's credentials. These tools can be vital in a situation in which the environment can be dangerous, such as a flooding or an incident of violence, such as riots or protests.

Information about Features

For individual users of iCG, not the security controllers, once they are registered to use the application they are presented with a map view and a number of functions. The system then presents each building with a color scheme predefined by KAU. Although the color scheme is not random, to visitors visiting KAU, the colors may appear confusing and random, because of a lack of consistency. We suggest following a set of standards in regard to building safety, such as red for danger, yellow/orange for caution, and green for safety. KAU's building color scheme can be confusing to not only campus visitors, but also students, faculty, and staff who are familiar with the color scheme. In times of crisis, there is a possible chance that people will react differently to and/or forget KAU's predefined building colors.

Once more, in the toolbar section for the first view of a user screen, it is unclear what functionality the Twitter logo performs. Users might confuse the sign as a means of launching the Twitter application or Website. A possible solution would be to incorporate the iOS built-in sharing features, because iOS 5+ has this functionality already built-in to its operating systems. This approach also allows those who use other services such as Facebook or email to do so within the menu displayed of available sharing services. Nevertheless, if one desires to limit the app's functionality to only Twitter, we suggest following the Twitter guidelines for using the Twitter logo. The current design does not fit with its guidelines, because the design utilizes the old logo and modifies the logo with a speech bubble.

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Heuristic: **Severity level:** 3

Information legibility and density
Consistency and standards
Match between system and real world
Help and documentation

Recommendations:
- Provide users with clear, short descriptions of services and their benefits right up front. Text used to describe features of the application should be present in a tutorial.

- Standardize one a set of three colors to signify: Danger, Caution, and Safe.

Heuristic: **Severity level:** 4

Visible interfaces/WYSIWYG

Direct manipulation/See and point
Consistency and standards

3. Notifying Users of Calamity

The push notification to alert users of an emergency could be enhanced, because the notification does not provide much context about the type of emergency that is present. The notification also does not inform users if they are affected by the situation.

Heuristic: **Severity level:** 2

Consistency and standards

Recommendation:

A clearer description should be utilized

4. Content

Clarity of Language and Detection of Users

The general language of the application is clear given the limited abilities of the application's purpose.

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A more effective means to detect users (to locate them and to display them) is necessary for enhanced usability. To detect the application's users in the location-pin mode can become quite cumbersome and ineffective, because the screen layout will appear quite cluttered and consequently, the system can become difficult to use. Often, it is more effective to use a list similar to the safe building list. We suggest that you consider adding the number of people in the building next to the building's title. This suggested enhancement is visible in the redesigned Security Screen shown in Figure 8. Another addition would be to include a number overlay over each building that depicts the number of people inside the building, if this design approach does not add significant clutter and/or does not obscure other visual details.

Heuristic: **Severity level:** 3

Consistency and standards

Recognition rather than recall

Key Words

Users look for information by scanning for keywords. If the terminology users expect to see is not present/used, they may have difficulty finding the information they are seeking.

For example, users who want to find an important evacuation route may not initially know where to look in the zoomed-out map view. The color of buildings (*e.g.,* green, blue, red) leads to confusion about how to differentiate among buildings. The Guide Me button is too ambiguous, because users might infer its functionality is as a user-guide about how to use the application or a guide around campus. Better terminology is necessary to alleviate any potential confusion.

Recommendation:
- Consider how users think about tasks, and specifically what words or phrases make most sense to users. Validate these words and phrases in user tests.

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Heuristic: **Severity level:** 3

Consistency and standards

Information legibility and density

Match between system and real world

To enhance usability, consider the iOS Human Interface Guideline

In iOS applications, only navigation buttons appear in the navigation bar; therefore, the KAU buttons should change locations to the toolbar, because functions are typically located in this area. If, however, you wish to keep the KAU buttons in the navigation bar, consider centering them because the function is not a navigational function, as is visible in the iOS YouTube and App Store apps. We also suggest that iCG use initial capital letters for the titles of buttons in either the navigation bar or the toolbar, because of better consistency and readability.

Error Handling

The error message warning should use better terminology, and should reword terms, instead of using computer "jargon." For instance, when security personnel decide to change a building's status to safe and the security person selects only one building, not two, the error message could state:

Selection Error
Please select a current safe building followed by a new safe building.

Recommendations:
- Review specific High Level Findings recommendations, below.

- When user testing, examine both users' abilities to figure out how to install and use the system as well as ease-of-use of the system once they've learned their way around the system. Particular findings about the initial learning curve will provide invaluable feedback.

Heuristic: **Severity level:** 3

Consistency and standards

Help and documentation

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Application Management

5.   Manage Accounts

Deleting Accounts

Currently, no visible option/ability is present for users who wish to be removed or logged-out from the system. This absence prevents users from successfully feeling that they are in control by not being able to delete their accounts.

Recommendations:
- Allow users the ability to disassociate their accounts with the iCG application.

- Allow users to logout of the application.

Heuristic: **Severity level:** 3

User control and freedom

6.   Changing a Building's Status

Currently, it is confusing for security personnel who wish to change the status of a building from unsafe to safe. The current setup is difficult to discern if a person is changing building #420-6 or changing building #420 from being safe to building #6 becoming safe. In addition, there is no quick way to change the status of several buildings from either safe to unsafe, or vice-versa.

Recommendations:
- Consider the implantation of our proposed screen redesign

Heuristic: **Severity level:** 3

Modelessness

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Competitive Analysis

AM+A performed a competitive analysis of three mobile applications in order to offer direction and comparison for redesigning the iCG user interface. A competitive analysis can be helpful in informing and critiquing design decisions. Comments on these three mobile applications follow:

Deliotte's Bamboo

The application is targeted at businesses that wish to replace paper-based disaster-management protocols with an electronic/interactive system.

Positive

- Enables users to see location of fellow colleagues

- Follows Shneiderman's Eight Golden Rules of Interface Design

Negative

- Generally designed for offices in a single building

- Uses location-pins for finding colleagues, which can become cumbersome because the screen becomes cluttered

- Provides no toolbar for easy navigation

MyDisasterDroid

MyDisasterDroid is a calamity application designed by two professors in the Philippines. The application determines the optimal route to safety based on users' current locations and the location of safe areas.

Positive:

- Prioritization of closer location for rescuers

- Prioritizing location with lots of people in need

Negative:

- No user awareness

- User interface is unintuitive

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- Neither able to see the location of users nor able to designate safe and dangerous buildings

Meridian App

The Meridian application is marketed for hospital, malls, and other large building complexes. The purpose of the application is to guide users from one point within a building to another point within the same building with easy-to-understand directions and visual cues. The product does not rely on a GPS signal, but instead on users' abilities to follow steps until they reach their destinations.

Positive:

- Logically designed user interface with legible words and warnings

- Allows for direct manipulation

Negative:

- Not designed for a multi-building campus

Screen Redesigns

The following screen redesigns incorporate the comments in the above evaluation and suggest possible functionality improvements to screen layout, color, typography, and navigation.

Non-Security User Screens

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This screen illustrates a rewording of screen 6 to enhance usability of a pop-up notification. The screen also introduces a key above the tab bar for glanceable reference.
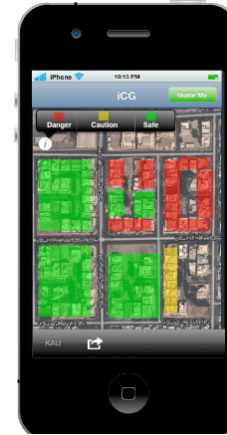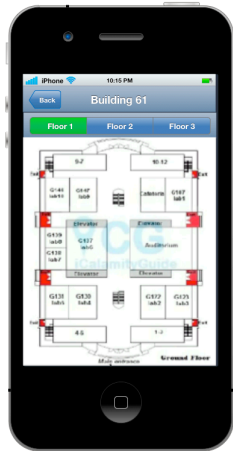

This screen is another iteration of screen 6; however, this version places the key inside of the tab bar to conserve screen real estate.

This is an additional iteration of screen 6; however, the key in this version is only visible if a user selects the "I"/Info button.

Security Personnel Screens

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In this redesign of screen 7-9, we relocated the floor navigation from the tab bar to be below the navigation bar for greater consistency. The color scheme is also different because it is no longer blue and white for better readability.

For redesigning screen 4, we made the selection more logical for personnel who are changing a building to becoming safe. We separate the two columns so users do not confuse the two options and incorporate an arrow to direct users to the next selection for easy recognition.
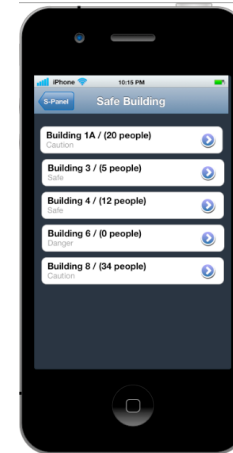
In redesigning screen 8, we reword the statement under building name if a building is safe or not by simply stating "Safe, Caution, or Danger." We too incorporate the number of people in the building for easy reference. Personnel can also select the right blue arrow button to see a list of people located in selected building.

Conclusions

This Heuristic Evaluation has identified some areas for improvement in a good application's user-interface design, in order to make it better. In addition to a heuristic evaluation, detailed user testing can determine more precisely which of the redesign suggestions would provide the most powerful enhancements of the application to make it more usable, useful, and appealing.

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Appendix:
UI Design Heuristics

The heuristics used in this report are adapted from various sources including:
- *Graphic Design for Electronic Documents and User Interfaces*, by Aaron Marcus (Addison-Wesley, 1992).

- The original list of usability heuristics authored by Jakob Nielsen, in *Usability Inspection Methods* (1994 Nielsen, Mack).

- The classic *Human Interface Guidelines* (Apple, 1992). These deal more with the quality of modern user interfaces in general, rather than specifically with usability concerns.

- Principles of clear information visualization and graphic excellence espoused in *The Visual Display of Quantitative Information, Envisioning Information,* and *Visual Explanations,* by Edward Tufte (Graphics Press).

- *Tog on Interface,* by Bruce Tognazzini (Addison Wesley, 1992).

- Designing the User Interface: Strategies for Effective Human-Computer Interaction, by Ben Shneiderman (Addison-Wesley Computing, 2009).

- iOS Human Interface Guidelines (Apple, 2012)

Aesthetic integrity and minimalist design

Dialogs should not contain information, which is irrelevant or rarely needed. Every extra unit of information in a dialog competes with the relevant units of information and diminishes their relative visibility. Information should be well organized and consistent with principles of visual design. Avoid information overload.

Consistency and standards

Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

Direct manipulation/See and point

Users should be able to see on the screen what they're doing and should be able to point at what they see. This forms a paradigm of noun (object) then verb (action). When the user performs operations on the object, the impact of those operations on the object is immediately visible.

Error prevention

Even better than good error messages is a careful design which prevents a problem from occurring in the first place.

Feedback / Visible system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time. Provide confirmations when the outcome of an action is not visibly apparent.

Fitt's Law

The time to acquire a target is a function of the distance to and size of the target.

Flexibility and efficiency of use

Accelerators—unseen by the novice user—may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

Help and documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, be focused on the user's task, list concrete steps to be carried out, and be concise.

Help users recognize, diagnose, and recover from errors

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

Information legibility and density

Maximize the amount of data to the amount of ink or pixels used. Eliminate any decorations on charts and graphs that do not actually convey information, such as 3-dimensional embellishments. Less is More is the rule in information design as every pixel used that does not contribute to information, dilutes it.

Match between system and real world

The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and

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logical order. Accommodate the ways in which users are accustomed to working.

Modelessness

For the most part, try to create modeless features that allow people to do whatever they want when they want to in your application. Avoid using modes in your application because a mode typically restricts the operations that the user can perform. Modelessness gives the user more control over what he or she can do and allow the user to maintain context of the work.

Perceived stability

In order to cope with the new level of complexity that computers introduce, people need stable reference points. To give users a conceptual sense of stability, the interface provides a clear finite set of objects with a clear, finite set of actions.

Recognition rather than recall

Make objects, actions, and options visible. The user should not have to remember information from one part of the dialog to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

User control and freedom

Allow the user, not the computer to initiate and control actions. Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialog. Support undo and redo.

Visible interfaces/WYSIWYG

Don't hide features in your application by using abstract commands. People should be able to see what they need when they need it. Most users cannot and will not build elaborate mental maps and will become lost or tired if expected to do so. Clearly convey key information. Users should not have to dig or click to find important features or information.

Severity Ratings

The severity of a usability problem is a combination of three factors:

1. The frequency with which the problem occurs: Is it common or rare?

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2. The impact of the problem if it occurs: Will it be easy or difficult for the users to overcome?

3. The persistence of the problem: Is it a one-time problem that users can overcome once they know about it or will users repeatedly be bothered by the problem?

Finally, of course, one needs to assess the market impact of the problem since certain usability problems can have a devastating effect on the popularity of a product, even if they are "objectively" quite easy to overcome. Even though severity has several components, it is common to combine all aspects of severity in a single severity rating as an overall assessment of each usability problem in order to facilitate prioritizing and decision-making.

The severity ratings used in this report are described below:

Severity level 1 Cosmetic problem only—need not be fixed unless extra time is available on project.

Severity level 2 Minor usability problem—could impair users' productivity and ability to learn.

Severity level 3 Major usability problem—important to fix, so should be given high priority; impacts users' productivity and increases likelihood of errors.

Severity level 4 Usability Catastrophe—imperative to fix this before product can be released.