New Orleans Techarette

Crowdsourcing Property Condition Data

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SECONDMUSE

CITY OF NEW ORLEANS

esri

"Imagine a clear, detailed, recent, photographic view of each building, home and City or state-owned space in New Orleans. What does that look like? What could we do with that information? How would it affect our 'resiliency' focused efforts? How could it help other cities and states that experience natural or man-made disasters?

In a post-Katrina, (and post-Sandy, post-9/11, post-Fukushima) world, we've seen time and again that data is extremely powerful. What you do with that data is even more influential. Think about it – if you know the condition of properties before a disaster, you can then survey the same area post-disaster and analyze how to best distribute aid, resources, infrastructure, etc. In effect, *what you do with the data is a game-changer*."

Denice W. Ross, The City of New Orleans

Photo by VXLA

Overview

On May 29th-31st of 2014 the City of New Orleans, ESRI and SecondMuse hosted a Techarette to design a software tool for rapid, crowdsourced condition data for properties in the New Orleans. Building such a tool would address the need for accurate, up-to-date information on property conditions which is crucial to resilient neighborhoods, particularly in the context of natural disasters. This Techarette was hosted during the 2014 National Day of Civic Hacking which engaged over a hundred communities around the United States and the world coordinated civic action through technology.

> *"Techarrettes are creative, intensive, collaborative, iterative design efforts that uses a series of carefully tailored inputs and questions to examine a single challenge from a variety of perspectives and scales. The goal of a Techarrette is to conduct highly rich planning and/ or generate new ideas."*
> - The Techarette Group

Crowdsourcing property data is nothing new, but the approach that New Orleans takes is unique for a number of reasons:

- Image collection and scoring are separate tasks, which removes bias and increases the efficiency of scoring large numbers of properties.
- Properties are presented to the user in a random order, further reducing bias and increasing the statistical significance of the results.
- Data is collected through webcams mounted on cars and scored virtually, which is a cost-effective approach that allows for frequent updates compared to traditional "boots on the ground" data collection.
- Volunteers can work virtually to score properties regardless of their location, which reduces fatigue around collecting data and increases the number of potential volunteers.

The techarette, a collaborative design session, focused on addressing four key design needs and used those to generate three different minimum viable product designs. These four design questions were:

- How can we design the photo selection interface to make it easy for users to review all of the photos of a property and chose the best one?
- How might be a citywide standard for scoring property condition be implemented?
- How can we ensure that users are scoring according to the standards that we have set up, and are being consistent in their scoring?
- How can we introduce game mechanics – rules and feedback loops – to the crowdsourcing app so that volunteering to score property condition online is rewarding and engaging, resulting in frequent users who take pride in their work?

This report first details each of the three final minimum viable product designs and then details different proposed solutions and ideas for each of the four key design questions. The report also includes a digital appendix that includes detailed notes for each group presentation and design feature as well as photos of all materials created by the participants of the Techarette.

DESIGN PRIORITIES

The following list of high priority design elements was compiled through a day of intensive ideation and critical feedback. These components of each key design question were vetted by the group and reflect the most desired features as assessed by the participants of the Techarette. Please note that some high priority design elements may conflict with the original intent of the question, such as the suggestion to remove the photo selection step altogether as an option for the first set of design elements. We have included these to illustrate the alternate ideas that emerged during the Techarette.

Photo Selection

- A simple image carousel for managing the selection of photos. This includes:
  - iOS-like scroll-ability through a sequence of images.
  - A default of selecting the middle image.
  - The ability for a user to swipe left and right between sequences of images.
- The ability for the user to visualize the position of the image relative to the property being measured. For example, the use of a centroid on a set of points to indicate which photo of the property one is currently looking at.
- The ability to select one or more relevant images.
- The ability to apply resize/crop photo.
- The possible use of panoramic image to eliminate selection step.
- The display of the parcel currently being rated on a map. (Note that this feature may hamper the ability to keep results unbiased as it will reveal more contextual information about the property).
- The ability to skip to the next property due to a particularly challenging photo selection problem.
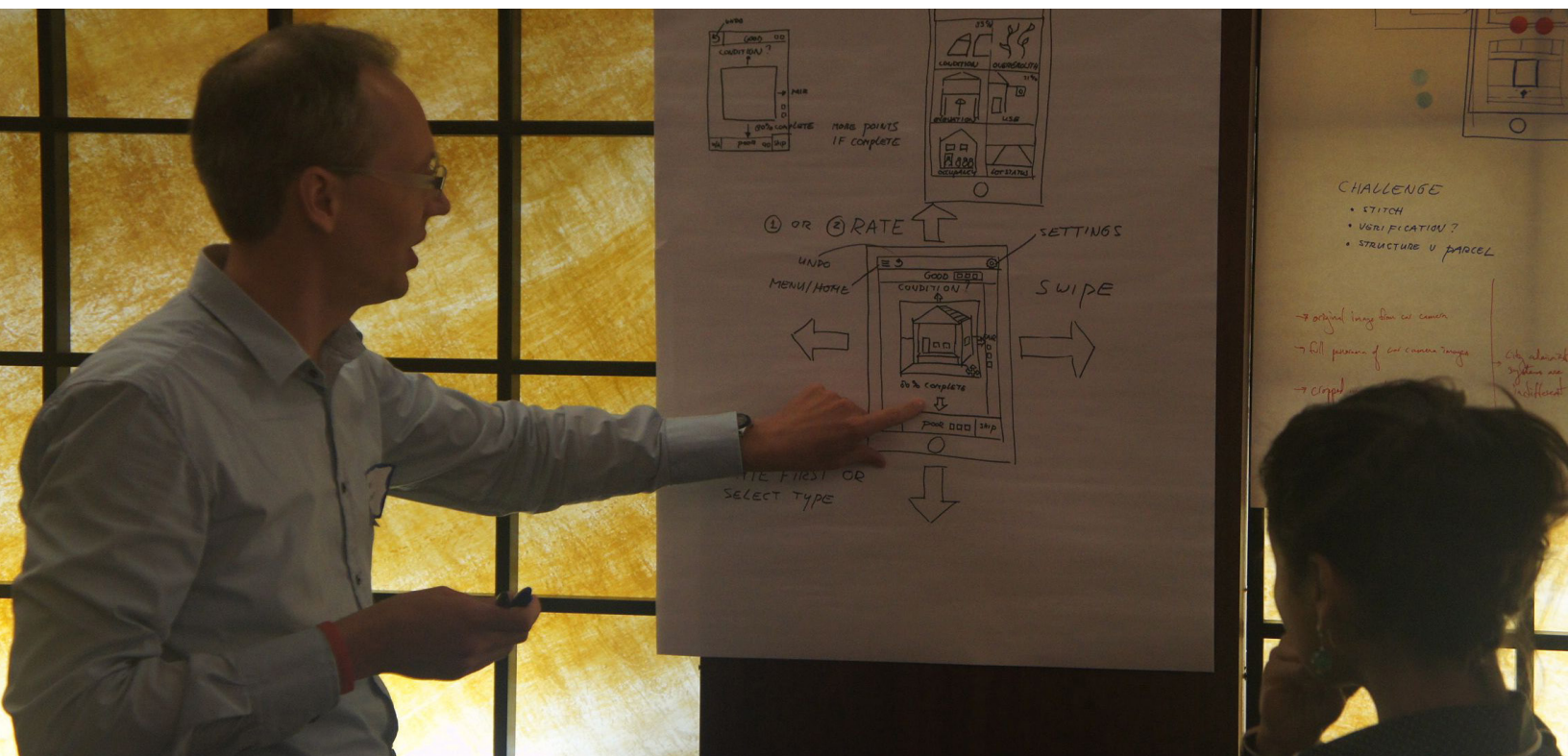
Scoring Properties

- Embrace objective criteria over value judgments for more accurate property ratings (e.g. roof damage, boarded door/window, graffiti: yes/no).
- The ability to skip to the next property due to a particularly challenging scoring problem. Should include the input of why the user skipped to allow for administrative follow up.
- Seed the system with trusted scored data and grade users based on how much they deviate from those seeded answers.
- Calibrate scores of a user based on their scoring history. For example, a "good" to one person may be "very good" to the average user - this should be accounted for.
- Allow for progressive rankings by users. For example, as a user demonstrates skill and trust their inputs can be transitioned from untrusted data, to trusted data, to the ability to rate new properties, to Quality Assurance testing.
- The ability to swipe to rate a property, rather than clicking buttons, is seen as an efficient and easy UX design element.
- Allow a user to choose what type of scoring they want to do, rather than forcing users to do all ratings. Give more points to areas you want people to focus on - such as rating roofs or overgrowth.

Quality Control

- Identify outlier ratings in properties that have been graded multiple times.
- Enable participants to join groups which can be self-regulating, self-motivating; show how they score in comparison to others on their team and other teams.
- Utilize canonical tests: weigh scores against test data, at the start and then periodically
- Leveling: Allow users achieve "boss status" as they progress by rating photos accurately. This status could allow access to more photos, new questions, and new data.
- Double-check ratings when deviate from norm by prompting a user. For example: "You rated this property "fair" but 82% of other participants said it was 'poor.' Are you sure?"
- Odd man out quality control: show a thumbnails page for photos rated against a certain criteria and allow someone to tap all of the images that don't fit.
- Allow for relative baselines and not just absolute correct answers: show deviations from baseline to enable users to self-correct.
- Ensure quality by maximizing the number of possible users.

Gamification

- Allow users to "follow' properties they scored. They can be notified of resulting actions that occur such as a property being sold or renovated as a result of being rated a certain way.
- Factoids: include fun facts about historical significance of properties.
- Tie the unveiling of the app to the 10 year anniversary of Katrina.

- Associate rating properties with a "My Neighborhood" game where scoring properties earns points to improve a virtual neighborhood managed by the user.
- Create a "value" page: show what a user has done, what all users have done, and what is left to do. This creates a greater sense of shared purpose.
- Put tablets with this application on it in public places with lines such as the DMV and City Hall.
- Communicate the impact that this app can have through the app itself to convince people of the value of using it.
- Implement a parallel "photo hunt" game where the user gains points through finding hidden things in a photo.

Minimum Viable Product Design Pitches

Following the four design exercises the participants of the Techarette were directed to develop a design for a minimum viable product (MVP). Three designs emerged that took into account the design priorities above.

MVP Design #1

This MVP design focuses on a trust score on the back end to ensure that the user is inputting accurate property ratings. This requires a login system to manage the trust score. The user experience is nimble, utilizing a photo carousel and swipe-based controls to move through properties and score them. The user can also skip a property if desired.
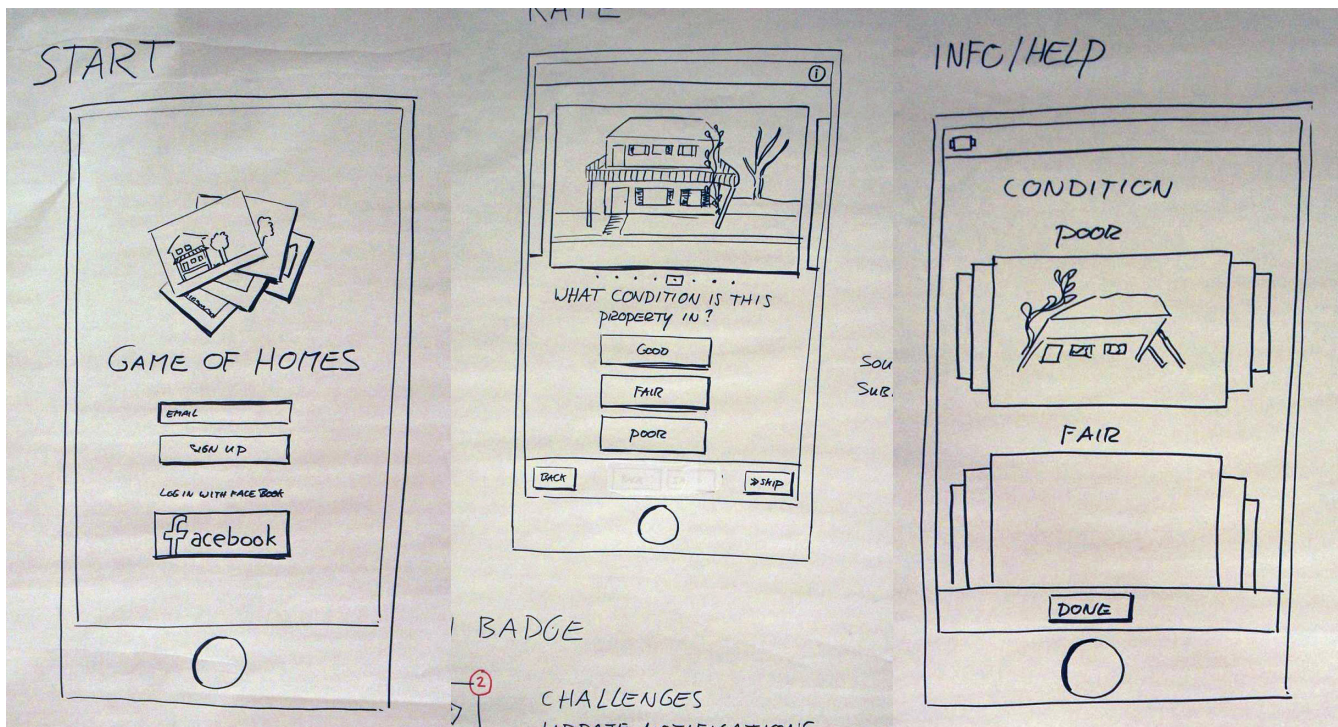
Login page
- Login screen shows when the app launches.
- User can login by entering an email address, or by signing in with Facebook.
- The purpose of the login is to keep a trust score in backend, which can be used to calibrate ratings or remove activity from malicious users if needed.

Rate page
- Rather than selecting a primary image, the user sees a full set of images here, and in enterprise applications.
- The property images appear in an carousel and the user can thumb through them by swiping left/

right.
- Dots below the image indicate the total number of images and which image in the sequence is selected.
- A user is expected to review the whole set of images and answer all the scoring questions for a property in the MVP release. If the app is scaled for mass-users, a single/fewer criteria rating system may be explored.
- The questions appear one at a time below the image carousel. When a question is answered, the next question automatically appears.
- The user also has the option to skip a property or to go back to the previous property.

Icon badge
- The app will include city-wide challenge (e.g. 1,000 ratings today) and notify users of the challenge through badge app icons.
- The user will also receive badge notifications when there are changes to properties that the user has rated (e.g. permit is pulled, property is sold, property is razed).

Help page
- The help page will be accessible from an icon at the top of the app and/or icons on the rating page.
- The page shows sample images of the various property conditions (poor, fair and good) to help users understand each and the differences.
- The page can also be used as a "odd man out" exercise, to identify and mark incorrectly assessed properties.

Questions & Feedback
- "How does a user know if a property is good/fair/poor?" The help screen is the tutorial. It lets users jump right in.
- "How does a user know how to use the app if there is not a tutorial?" Tutorial-like screens would live in the app stores, so users would see it before installing the app. The app is also intended to be very easy to use.
- "When users start rating properties, would they view seed data (known) properties?" This is possible.
- "How do you handle quality control?" The system keeps a trust score in the backend. It would not be visible through the app.
- "I like idea of carousel in enterprise apps, but can you set a default image? It would be helpful to make sure you're looking at/focused on the right structure." It could be the job of an admin to set the default image, though that could be laborious for an admin.

MVP Design #2

This MVP design on ease of use through a swipe-based interface and carousel for images browsing. It also incentivizes users to continue to rate properties by improving the visual condition of the virtual

neighborhood presented on the home screen of the application. The group presented two options for answering questions to score properties: one where the users looks at a set of photos and then answers all questions, and another that prompts the user to answer a question after examining the photos repeatedly.
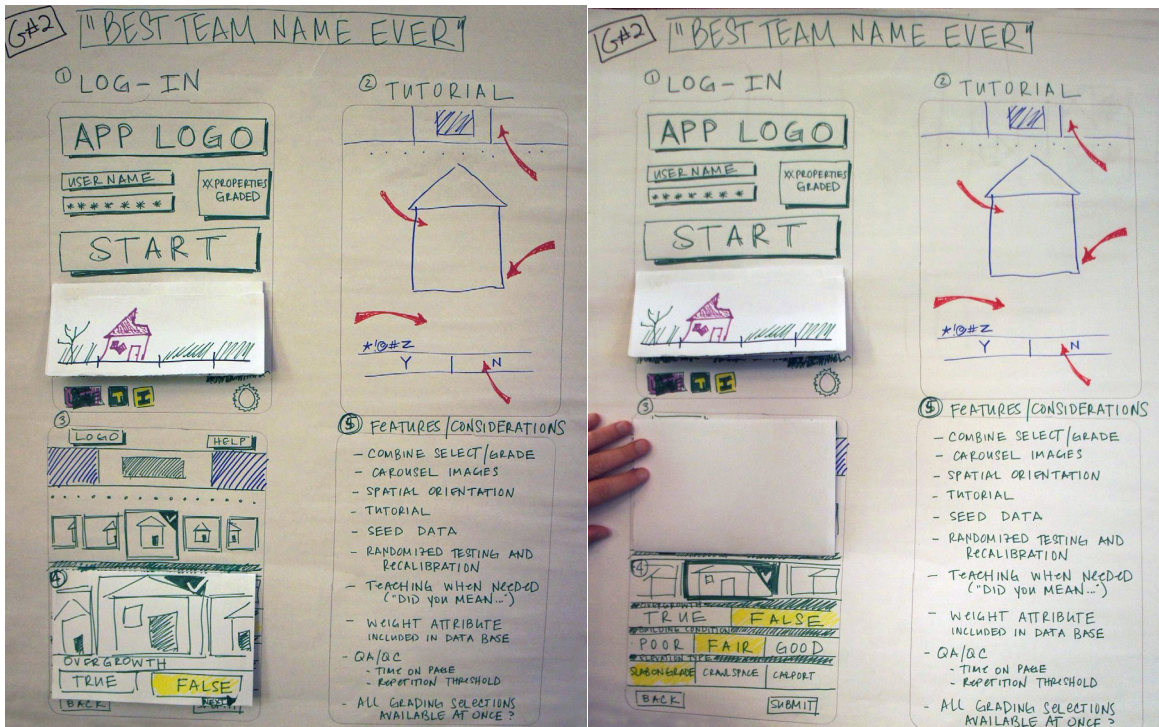
Home Page
- App logo.
- Login: the user must login to use the rating tool.
- # of properties graded.
- "My neighborhood", an image that changes based user activity. The user's neighborhood starts as a blighted property and begins to look better as they rate more properties. "My neighborhood" will include a sequence of around 20 images. The image displayed will depend on the number of properties scored by the user and how frequently they user the tool.
- Social Media integration (Facebook, Twitter, Instagram) to invite others to join in making their neighborhood look good.

Tutorial
- Shows the user interface with instructional overlays explaining elements of the interface.

Image Selection & Rating
- The parcel is displayed at the top of the screen, with dots representing the various images of the property and an image carousel below.
- As the user scrolls through the images by swiping left/right, the highlighted dot moves to indicate which image from the sequence the user is looking at.
- The image in the middle of the carousel is displayed larger than the other images. Clicking on the image will select it (marking it with a checkmark).

- The group explored two different layouts for rating, which show below the carousel image.
    1. The first version shows a larger image of the property and presents one question to the user at a time.
    2. The second version presents all the questions at once, without the larger image of the property. The rationale is that once a user looks at the photos, they will typically not need to go through them again to answer the questions. The concern however is that all the questions may not fit on a mobile interface without significant vertical scrolling.
    3. The group suggested to do a usability test to determine which option would work better.
- The user would always have access to all the photos while rating a property and could change the default at any time. Tapping the default image would enable the user to zoom in for a better view. This could be confusing since tapping is also used to select the default image.
- Seed data would be randomized throughout the scoring process to test raters and calibrate their scores. It also provides an opportunity for user feedback ("Did you mean…").
- Randomized testing could be triggered if a user spends too long on a page or scores too many properties in a row the same.

Questions & Feedback
- Gamification: The group tried to limit the scope and focus on what was essential for a MVP. Gamification was included but in a very basic form, consisting of the simple "My neighborhood" feature and social media integration.
- "How many levels would you need for the "My neighborhood" to make progress?" The group assumed that most users would grade 100-200 properties. Gamification is most effective when there is quick progress early on. Therefore, users would advance every 10-15 ratings up to ~200. There would then be 5 really fancy neighborhoods for very high raters, who rate 1,000+. The images would change more often when a user first starts. For example, a user would quickly get flowers and a manicured lot.
- "Would the scoring screen with all the options advance automatically?" Yes, it could work that way. It could be configured like a long clipboard where you can see what comes next, and then automatically advance the viewable area as questions are answered.
- When scoring, it will be annoying to keep clicking between screens.
- Answers to overgrown and structure criteria could define what questions appear next, and the app will allow for skipping questions that do not apply.

MVP Design #3

This MVP design requires a tutorial session before allowing the user to begin. The features of selecting the best image to represent a property and rating the property are done at the same time rather than splitting those tasks. User feedback occurs when their scores deviate from the scores of others on the same properties. The application also makes use of a decision tree for property scoring to base it on more objective data - such as whether or not a roof is instact - rather than subjective "good" or "bad" measurements.
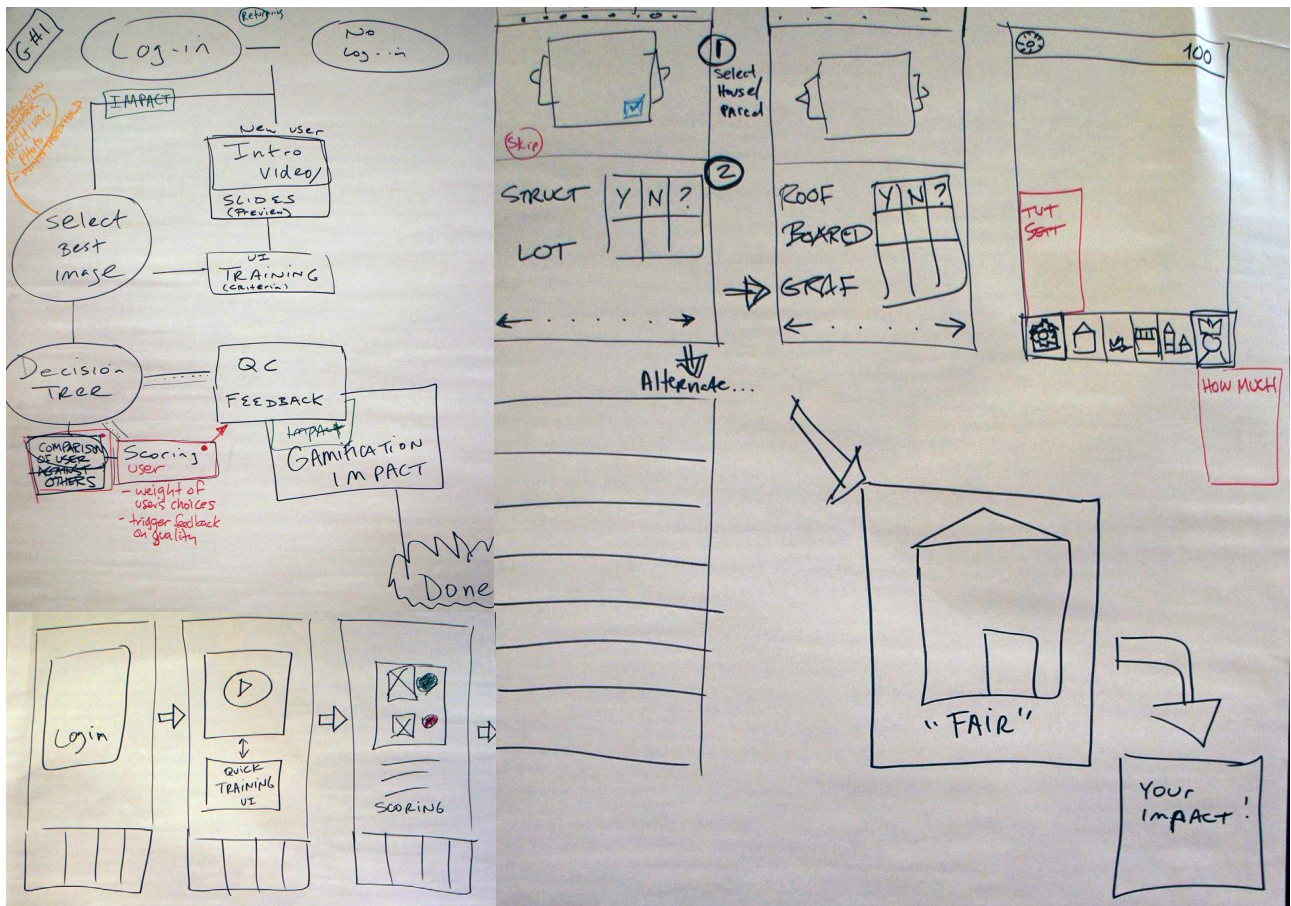
High-Level Features
- Login/no login: Login for general use. No login for special cases, if there's a need to ramp up to 1,000s of users.
- Intro video and/or slides: optional.
- User interface training: shows user how to use the app (login, navigation, scoring).
- Criteria tutorial/help: shows example of criteria (elevated, roof damage, etc.

Image Selection
- The parcel is displayed at the top of the screen, with dots representing the various images of the property and an image carousel below.
- The user selects the best representative image from carousel by tapping on it.

Decision Tree & Scoring
- Image selection and scoring are done on the same page. Scoring appears at the bottom but is greyed out until an image is selected.
- Uses decision tree to go through objective questions (e.g. boarded window/door, roof damage) instead of relying on people's subjective criteria (e.g. poor, fair, good) to score the property. This avoids typical variances found when scoring subjective criteria. Questions include yes, no, and ? options.
- The screen could be displayed laterally, advancing through multiple pages of questions, or vertically, which enables the user to see what comes next. The usability advantage of one approach over the

other needs to be assessed.

Quality Control Feedback
- Users scores are compared with the average and feedback presented when answers deviate.

Gamification
- The app includes options for people to enter notes about a home that they are familiar with.
- It communicates the impact of what you've contributed, along with the total impact of everyone's ratings.
- Notified when a property you rated has a change (e.g. permit, sold, razed).

Questions & Feedback
- "Does it become laborious to answer 5-6 questions per property when only 10-15% of properties are blighted?" Alternatives: Could ask users to justify a subjective answer. Could ask if there is visual damage and then select type if it exists.
- "Would it be difficult to identify all the objective criteria up front?" If there are many, it could make the app difficult to use. Objective criteria, if you could define them and keep the list short, are much clearer and informative.
- It is difficult to decide between fair and poor conditions. The decision is subjective.
- Rating objective criteria allows you to identify tangible changes (or lack of changes) in condition over time. If properties are boarded up for more than 6 months, it is actionable.