

# Mobile Intranets and Enterprise Apps

Mobile approaches to enterprise content

Patty Caya and Jakob Nielsen



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### REPORT AUTHORS



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## Executive Summary

Enterprise computing came late to the mobile party but is finally arriving. We started seeing a few mobile intranets among the Intranet Design Annual winners as early as 2010, but for several years only 20–30% of winning intranets had a mobile component.

Mobile intranets are still not as overheated as mobile websites and apps — and that's probably only for the good. But at least there are now enough mobile intranet work done to allow us to generalize across projects to advise on design trends for mobile enterprise applications and content. To do so, we surveyed more than 200 mobile intranet projects and conducted in-depth case studies of nine projects.

These are some of the mobile intranet apps we encountered:

- Maritime safety inventory
- Allow doctors to look up patient lab results and search for other lab orders
- Information for use at tradeshow booths, e.g. presentations, room calendar, contact list, electronic visit report
- Students and teachers checking their class schedule
- Surgery schedules, tracking germ activity in the population
- Paging and acknowledging of support tickets to engineers in the field along with mobile inventory lookups
- Car insurance services for policy changes, reporting accidents, payments, etc.

Besides such mission-critical applications, mobile intranets were also frequently used for news updates and for internal social networking among employees.

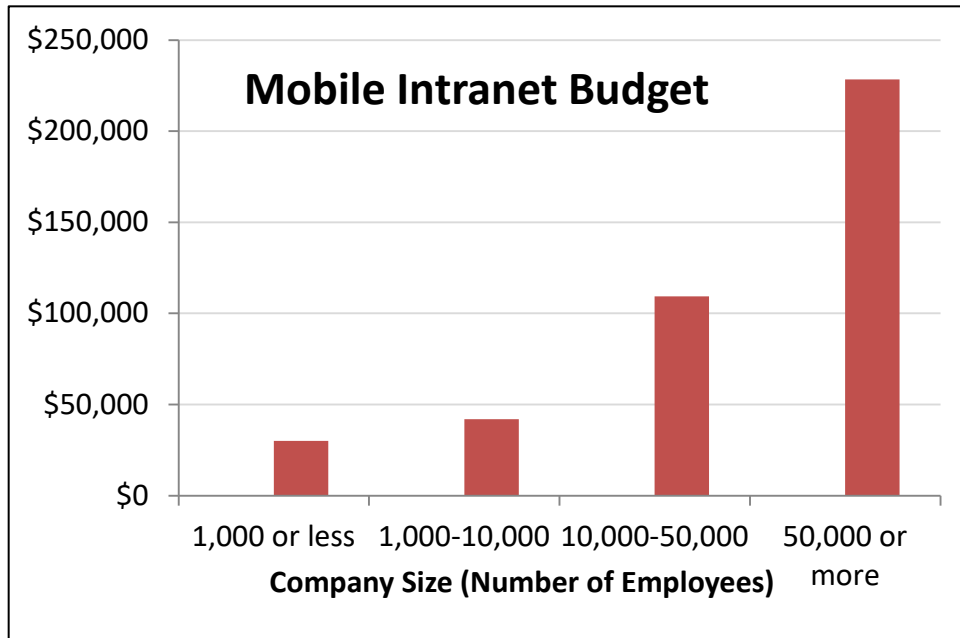
### **MULTI-DEVICE SUPPORT**

The first conclusion is that the days of monoculture enterprise computing are over, at least in the mobile space. Project optimized their design for 2.2 different platforms on average. Unsurprisingly, iOS and Android were the two big ones, with a smattering of additional support for Windows Mobile and other platforms.

Many companies have adopted BYOD (Bring Your Own Device) policies where many employees access company content on their own mobile devices rather than a company-issued device. This trend is obviously a major reason mobile intranets can't just design for a single device, the way many enterprise applications used to do.

### **LOW BUDGETS DRIVE PARTIAL-FUNCTION MOBILE SITES**

Most mobile intranets are developed on a shoestring. The following chart shows the average budget for companies of different size:



Organizations with more than 50,000 employees spent an average of \$228,000 on the mobile version of their intranet, but smaller companies didn't spend nearly as much. The average for mid-sized companies of 1,000–10,000 employees was only \$42,000 which is insufficient for any serious development effort.

Partly because of the low budgets and partly because of the need to support multiple platforms, most companies had chosen to provide a mobile intranet site as opposed to developing a full-fledged mobile application. Only 27% offered a full-featured mobile intranet with all the same features as the desktop intranet. The vast majority of companies offered either limited functionality or different functionality targeted at field staff who rarely use desktop computers.

Indeed, the biggest motivation for offering a mobile intranet in the first place is to support people in the field. This was cited by 79% of the mobile intranet projects we surveyed.

For example, ZON's mTEC supports the company's field technicians as they make house calls. Similarly SEI built its Mobile Field Service Ticketing web-based application to support the company's Field service engineers who repair equipment at customer's homes. CommunicateHealth's Show Me (native app) helps first responders communicate with people with communication challenges during emergency situations. And Applified's 12View (native app) is about as specialized as they come. It gives municipal inspection teams the power to check and report on sewer system incidents and maintenance activities from above ground, using an Android tablet

The two runner-up mobile intranet goals, mentioned by 51% and 49% of respondents, respectively, was to be up-to-date with user expectations and to improve employee productivity. To truly meet these goals, bigger budgets and better mobile user experience will be needed.

A reduced, targeted mobile feature set is not necessarily bad. As one respondent said, *"People liked 'less.' Simplifying down to just a few options helped people not get confused by having a new interface, which would be scary for doctors."*

## DESIGN TO REDUCE ERRORS AND BOOST PRODUCTIVITY

Many of the design considerations for mobile intranets are similar to guidelines for mobile website usability. However, the mission-critical nature of many enterprise applications sharpens the focus on needs to avoid errors and improve productivity.

Plan for offline viewing because of connectivity outages. Even in major metropolitan areas cellular connectivity is sometimes tenuous and multi-national corporations or NGOs with staff in developing countries can also face poor service quality. Design sites and apps that store data, save state and remember what the user was doing when the signal dropped. For example Suma designed its app to accommodate users who might lose signals between the library stacks, and Show Me (for use in emergencies) may need to work without connectivity.

Optimize load times: Pages need to be not only great on mobile, they also need to be lightweight. Minimizing server calls is critical for users whose bandwidth limits are decreasing and mobile charges are increasing.

Even for the most proficient practitioners typing on glass is no picnic. Create task flows that minimize data input whenever possible. Selecting from a list, searching a set list of options or auto-suggestions can all help users enter information more easily. ZON designed its mTec search with type ahead functionality rather than offering users a long list of selections. This reduces the burden for mobile users, keeping data entry intensive work for when they are in the office.

Designing workflows for common tasks forces the design team to fully analyze the steps and task order required to complete the work. Creating logical flows that lead the users down a path reduces the burden on the user. Several teams ran into problems when the process they were trying to recreate in a mobile site or app was broken to begin with. If an offline or desktop-based workflow isn't streamlined or logical, a mobile design based on it won't be either. In these cases, it's best to redesign the process first, before taking it mobile.

Do the work for the user by making smart assumptions where possible. This is often easier in the constrained enterprise environment than on the open web where people can do anything. For example, the Show Me app is targeted at first responders who are working within a specific emergency situation so it is designed to drive the user through one emergency situation at a time and the app remembers the selected scenario for 24 hours, to avoid requiring the user to log in each time.

Design teams have to focus on specific decisions such as font size and how much text to display on every screen. Several teams realized during testing that bigger was better for type size. This forced them to make detailed design decisions such as whether to show a full headline or product name or show a truncated label, when to use an ellipsis, how many icons or news stories can fit in a row. Some companies use icons and color-coding as shortcuts for text. For example, ZON's 4Sales mobile design uses colors to indicate "on time" vs. "late."

12View is an application for the largest sewer cleaning organization in the Netherlands to support inspection teams. In this environment, people don't want to read too much, so the app icons in the mobile interface represent codes that are spelled out in the desktop view. (In contrast, unlabeled nonstandard icons often cause usability problems when designing for the general public where you have to assume zero training time.)

Writing for mobile poses a related challenge: we know that mobile content must be short, and mobile intranets have huge advantage compared with public sites or apps in the ability to teach conciseness to on-staff writers. Splash for example, encourages employees to create “bit sized” content and has revised the company’s style guide to reflect best practices in mobile communication.

Hiding content behind an extra tap sometimes helps via progressive disclosure—users don’t have to see details that aren’t pertinent—and sometimes hides useful information behind an extra step. 12View shows only 10 nearby locations by default to minimize download time and focuses on revealing information as needed (digging deeper). mTec relied heavily on progressive disclosure as well. Show Me gives users the most useful icons for each scenario by default and also offers a quick list of the 10 most recently used icons.

Mobile content and mission-critical applications are a new frontier for both enterprise computing and mobile user experience. We now have some good designs that are worth emulating, but the mobile intranet still doesn’t get sufficient management support in most companies. It’s not a fad, it’s a tool.

# The State of Affairs for Mobile Enterprise Offerings

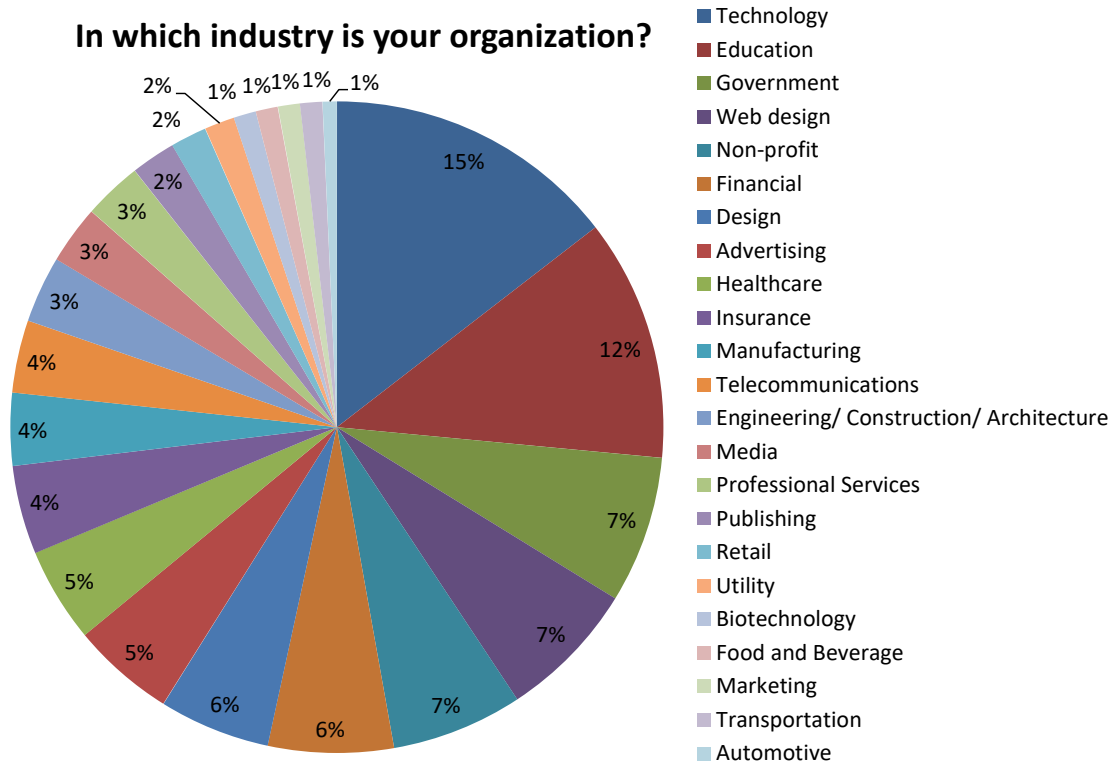
## WHO RESPONDED TO OUR SURVEY

When we began our research on the topic of enterprise mobile we conducted a survey asking for participants willing to share their experiences adapting or developing enterprise websites and applications for mobile use. Individuals from over 200 organizations contributed to the survey, providing information about their goals, challenges, successes and frustrations. Nine companies provided information for the in-depth case studies contained in this report. The survey responses provided valuable context for the case studies.

We were pleased to receive survey responses from organizations representing a broad range of industries and organizations of every size.

Small companies (with 100 or fewer employees) comprised 36% of the results and 21% of the respondents were from companies right in the middle (1,000–10,000 employees). Large companies (50,000–100,000 employees) represented 5.4% of the responses. This diversity of environments gave us a good mix of experiences from which to draw themes.

We weren't surprised by the diverse breakdown of participants because mobile is an imperative inside organizations today as much as mobile devices are ubiquitous among these companies' workers. Mobile has taken root, and now companies are figuring out what that means for enterprise content and applications.



Survey respondents represented a broad cross-section of industries, with the highest concentrations coming from Technology (15%) and Education (12%).

## CHALLENGES

Several of our questions asked about the challenges teams face in bringing mobile initiatives into the enterprise. The survey results reinforced many of the themes that emerged from our case study interviews. Aside from the usual challenges that plague most intranet projects: (lack of) time, money and resources, mobile enterprise projects present their own unique set of challenges. In our research three themes emerged that every team must solve in their mobile projects:

- **What OS and devices to support:** What types of devices (phones vs. tablets) and which Operating Systems to target/support.
- **Whether to design a website or an app:** Whether to create a mobile-optimized Web-based version of an existing website or application (through HTML5 or responsive Web design) or an app. And if an app, a native app, a hybrid app or a Web app.
- **Deciding what to include and what to leave out:** If creating a mobile version of an existing website or application, then to mobilize the whole thing or only some specific components.

### What OS and Devices to Support

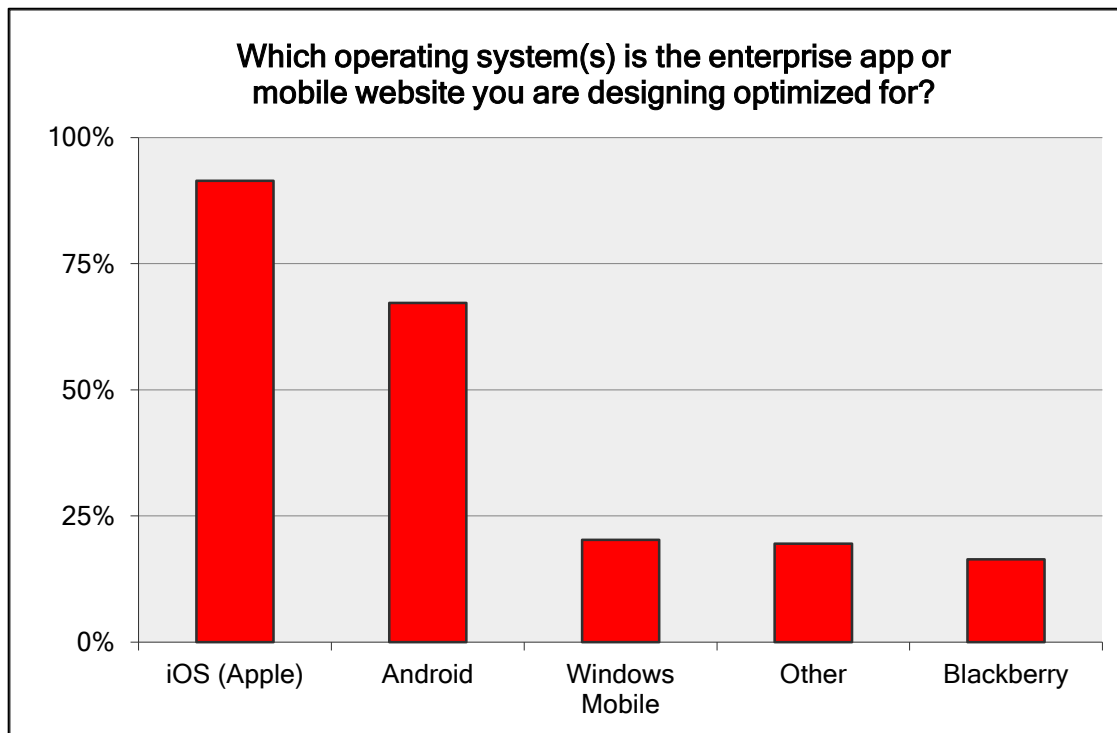
Companies big and small are adopting BYOD (Bring Your Own Device) policies where many employees access company content on their own mobile devices rather than a company-issued device. Among the case study projects, this was one of the factors behind EE's "Splash" mobile social network, Verizon's responsive approach in re-designing VZWeb the company's communications platform and CommunicateHealth's Show Me (native) app.

If the company policy is primarily BYOD then the company has to play follow the leader rather than leading the charge. They go where the users go, designing for the devices that people own. In the mobile phone market Apple's iOS and Android comprise the lion's share of handsets and that preference is reflected in how companies are designing their mobile initiatives.

In our survey, iOS was vastly over-represented at a target platform, being supported by 91% of projects, despite iOS phones only having a 14% market share of smartphones sold during the same period as our survey. In contrast, Android phones were supported by only 67% of projects, despite having a much bigger global market share than iOS. And Windows Mobile and Blackberry were both vastly over-represented in mobile intranet support relative to their tiny market shares.

Two explanations come to mind: First, enterprise support can be a lagging indicator, with a business need to support not just last year's devices, but 2–3 year old devices. Blackberry was strong in the past, and thus still deserves more support than its current market share warrants. Conversely, Android has exploded recently, and corporate projects may be lagging behind in supporting these now-popular phones.

A second explanation is geographical: 79% of our survey respondents came from three narrow regions of the world (North America, Northern Europe, and Australia / New Zealand) where historically the iPhone has enjoyed a disproportionately high market share. We had disproportionately few respondents from Asia, Latin America, Southern Europe, and Africa even though these regions account for more smartphone sales and have a stronger Android presence due to higher price sensitivity.



The breakdown of enterprise-supported operating systems reflects the marketshare of leading mobile operating systems in rich countries. Our survey respondents say their companies are designing for iOS (91%) and Android (67%) primarily, with Windows Mobile and Blackberry lagging significantly behind with 20% and 16% respectively.

The most important conclusion from the platform survey may not be the individual percentages which will surely change every year. A more important point is that the percentages sum to 215%, indicating that the average company has decided to support slightly more than two platforms. The old days of enterprise computing being single-platform (whether IBM or Microsoft) are gone.

### **Whether to Design a Website or an App**

(Native) apps seem to generate all the buzz when it comes to mobile design, both inside the enterprise and in the world at large, but what's sexy is not always what's practical. Companies such as SEI, Inc. (featured in our case studies) know that it's best to choose the right solution rather than the one that is driven by a fad or buzz word. They had to convince stakeholders that a native app was not the best choice to both meet the needs of the company's mobile workforce of field technicians if they were going to do so within a reasonable amount of time with limited resources. Instead of yielding to prevailing expectations made their case and built a Web app which proved to be a better fit given the company's user base (and device environment) and available resources.

Most organizations operate with limited development resources and limited budgets for intranet-related initiatives and at the same time serve a very diverse mobile user base so mobile optimized websites and responsive design approaches are the go-to



solution for most organizations for two very good reasons: cost and compatibility across devices and OS.

- **75% of our respondents have less than \$50,000 to support their enterprise (and intranet) mobile initiatives.**

Oftentimes projects such as these are an entry way into mobile and not the end game, but they seem to be a great runway for enterprise mobile efforts. Many survey respondents said: optimize first, apps next.

As one survey respondent said, "A mobile-enabled website enables us to focus on content and design while only delivering via one path (the current site). Managing the deployment of mobile apps would bring additional overhead that we did not think was worthwhile."

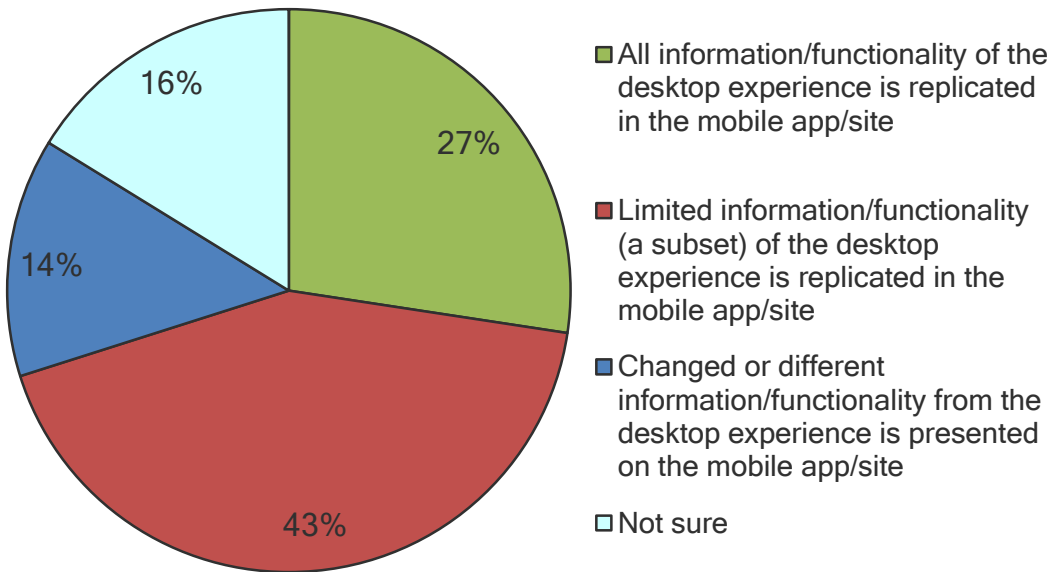
Survey participants were in agreement on several other reasons why apps take a back seat to mobile-optimized sites, at least in the beginning:

- **Cost:** Apps cost more to develop, typically due to the specialized skills needed in comparison to making a website mobile-friendly. Developing (and maintaining) a code base for more than one OS makes the process more expensive and complex as well.
- **Requirements:** If the functionality does not need to call on the native device functions (such as GPS, click-to-dial, etc.) why take on the additional development costs and devote the additional time to developing an app when a mobile website or responsive design may serve the needs of the project. As one respondent said, "I will only design apps if they have at least one function that a mobile website can't do, otherwise there is no point having an app."
- **Maintenance:** Apps can be a headache to maintain. Maintaining separate code bases for each OS, coordinating release schedules, etc. is more labor (and IT) intensive. Many organizations just don't have resources to devote to these efforts without a very good reason.
- **Integration issues:** Organizations often struggle when trying to integrate the company intranet or portal into existing business software systems and databases. Adding a mobile app is another layer of complexity.

## Deciding What to Include and What to Leave Out

Opinions about whether or not to limit what goes into the mobile experience vary greatly, but survey results reveal that nearly half (42.7%) provide only a subset of the full desktop experience on mobile.

## Does the mobile app/website replicate functionality that is available on a desktop website/application?



Organizations are providing a curated mobile experience, rather than just making "everything" mobile, 43% say they provide "limited information/functionality" compared with the desktop experience and 14% provide a "different" information/functionality on mobile. Only 27% provide identical access.

Some of the reasons behind these decisions are very practical:

- **Mobile environment challenges:** We all know what it's like to type on glass. And while many people have become proficient—out of necessity—but it's no picnic. Designers recognize this and try to reduce the amount of typing required. Said one respondent: "No data entry was included because we believed our users would not want to do data entry on a tablet or phone."
- **Space restrictions:** Though mobile screens continue to get bigger with each new generation of devices, space limitations make mobile design a challenge and impose new rules for reducing content volume.
- **Imposed Priority:** While small screens provide design challenges, one of the benefits of space restrictions is that designers must focus and prioritize—getting users to key data quickly, rather than a full reading experience.

## SERVING SPECIALIZED AUDIENCES

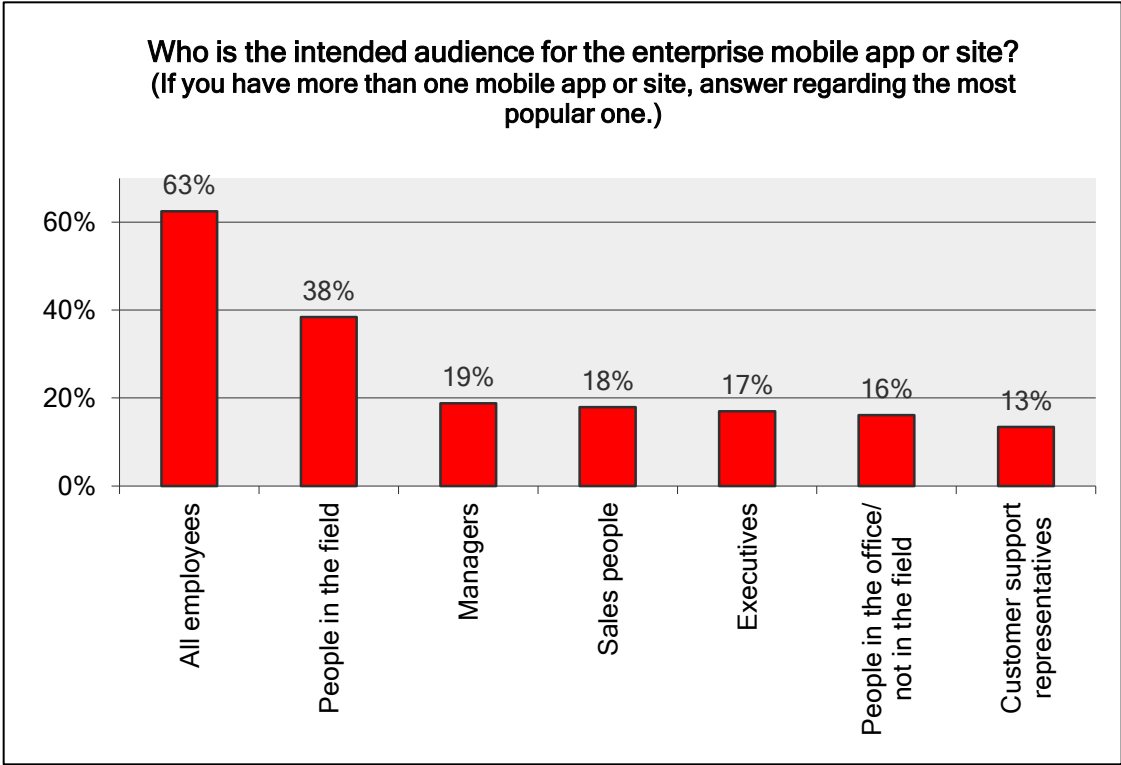
There is one enterprise domain where mobile apps rule and that's in service to specialized workers (especially field staff) doing specialized work. This is one of the areas where mobile shines and apps are gaining the most traction.

When serving the general employee population organizations often choose a mobile-optimized website for all the reasons mentioned above, and many more, but for specialized work groups the high development cost for an app is more easily justified. This divided approach makes sense. Survey respondents said overwhelmingly that their mobile initiatives are aimed at providing access for people in the field or on the go (79.2%) and for productivity (49.1%).

<b>WHAT WERE YOUR GOALS FOR YOUR MOBILE OFFERING(S)?</b>	
<b>Answer Options</b>	<b>Response Percent</b>
Access for people in the field or on the go	79.2%
Be up-to-date with user expectations and needs	50.9%
Productivity gains	49.1%
Be leading edge	36.8%
Public Relations	19.8%
Cost savings	17.9%
Fun	10.4%
Not sure	3.8%

Providing access for non-office workers is one of the key driving forces behind the push toward mobile in many organizations.

While the mobile projects discussed in this report are targeted at a wide variety of users, apps (web and native) were most often targeted toward a specialized group of workers. For example, ZON's mTEC supports the company's field technicians as they make house calls. Similarly SEI built its Mobile Field Service Ticketing web-based application to support the company's Field service engineers who repair equipment at customer's homes. CommunicateHealth's Show Me (native app) helps first responders communicate with people with communication challenges during emergency situations. And Applified's 12View (native app) is about as specialized as they come. It gives municipal inspection teams the power to check and report on sewer system incidents and maintenance activities from above ground, using an Android tablet.

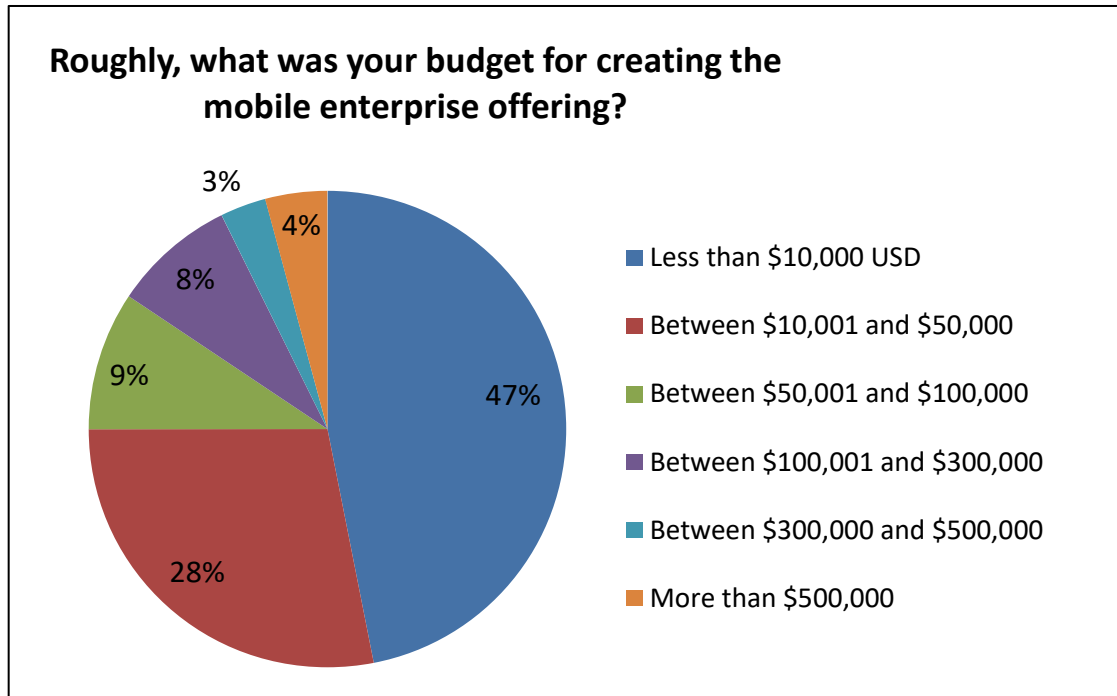


According to survey results the overwhelming majority of organizations are developing mobile initiatives to serve either their entire workforce (63%) or a specialized subset, field workers (38%).

**SUPPORTING THE MOBILE INITIATIVE**

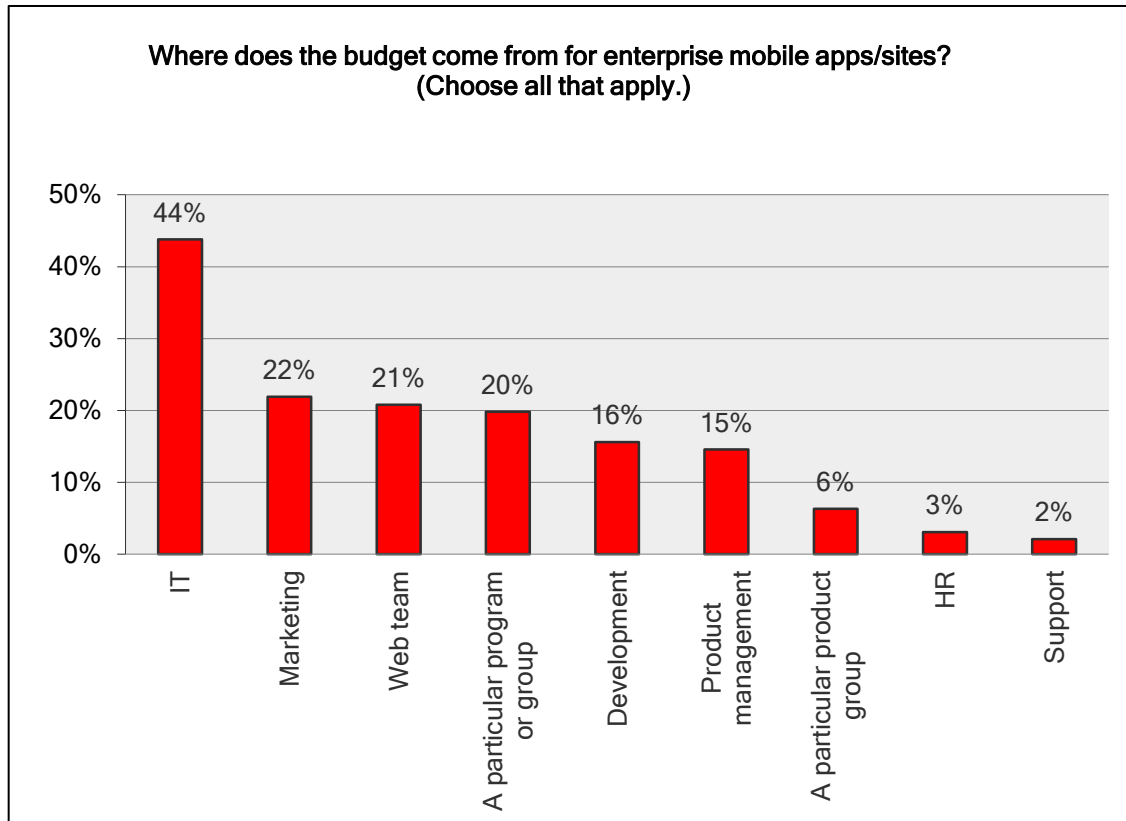
In trying to figure out where support comes from for mobile enterprise initiatives, we asked about three aspects of that support: budget, budget sources and managerial support. The answers to these three simple questions are telling and help explain some of the other findings throughout the survey.

## How Big is the Budget?



Nearly half (47%) of our survey respondents said that their mobile enterprise budget is less than \$10,000 (US). Another 28% are working with a budget between \$10,001 and \$50,000 (US). So, three quarters of our respondents have less than \$50,000 to support their mobile initiatives. That finding speaks volumes for the predominant choice of mobile website vs. app. Apps aren't cheap to build and they require resources to maintain. With limited budgets in play it seems mobile-optimized websites are prevalent because the purse strings may be tight.

## Whose Budget is it?



While IT seems to pay the lion's share for mobile initiatives (44% of survey participants' budgets come from IT), Marketing budgets and the Web team both represent slightly above 20% of respondents, with a host of other groups or projects providing additional funding. These figures follow what we hear in our *Intranet Design Annual*<sup>1</sup> each year.

## What's Driving Mobile?

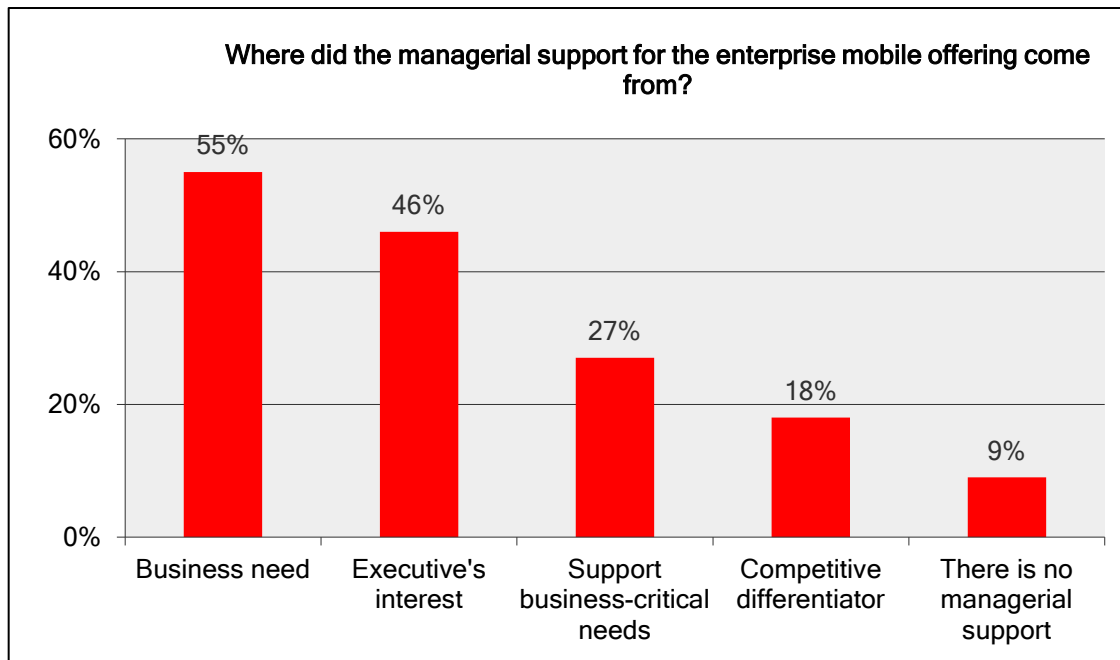
The responses to the question, "Where did the managerial support for the mobile offering come from?" follow trends we often hear when researching other aspects of intranet development. Our recent research examining trends in the use of social features<sup>2</sup> (another intranet "hot" topic) has shown clearly (over two editions of the research) that the driving need behind adoption of these tools for enterprise use is a strong and compelling business need (55%). What's a bit more surprising on the mobile front is the strong showing for "executive's interest" (46%) in our survey. Executives are, of course, also mobile users so it makes sense that they would be interested in mobile tools, but it doesn't bode well for organizations whose leadership are not big mobile consumers, as many initiatives are being driven by "interest" rather than need.

<sup>1</sup> "Intranet Design Annual: The Year's 10 Best Intranets," Nielsen Norman Group: <http://www.nngroup.com/reports/intranet-design-annual/>

<sup>2</sup> "Social Features on Intranets: Case Studies of Enterprise 2.0 A Report From the Front Lines of Enterprise Social Software Projects (2nd Edition)," Nielsen Norman Group: <http://www.nngroup.com/reports/intranet-social-features-case-studies/>

Sadly, 9% of respondents said: "There is no managerial support," which perhaps explains while mobile innovation inside the enterprise is still moving at a glacial pace compared to mobile innovation in the world at large.

Our case study participants said they were supported, but from very different places throughout the organization. From the CEO (EE and Applified), internal mobile evangelists (Arup), Communications business partners (Verizon) and at SEI the end users were clamoring for greater mobile access to information and that need had to be met.



Mobile initiatives are driven by business need (55%), followed closely by executive interest (46%).

## MEASURING SUCCESS

Return on investment (ROI) of intranet initiatives is always elusive. We see this across nearly all of our intranet research projects. So it stands to reason that mobile would follow suit. The "success" of many mobile endeavors is gauged primarily by positive user feedback or not measured at all.

### Success by What Measure?

Because most teams are not measuring impact using hard metrics, we asked the question another way: "Do you have any additional insight about what makes your apps popular or not popular? For instance, support from management, policy, marketing, ease of use, a design element, etc.?"

The answers were not surprising. Substance almost always wins over flash. Respondents cited many of the same things that make any interface useful, but one respondent perhaps said it best: "First, they solve the need, second, they are simple and easy to use."

According to the survey respondents, effective mobile experiences also provide:

- “Valuable content”
- “A well-designed purpose”
- “Ease of use and simplicity”

Several contributors pointed out a very mobile-specific measure of a tool’s utility: “It doesn’t need an Internet connection.” This is a great measure of a mobile application’s utility, because a cellular signal is not always available, and when it is, it often drops; and when you are connected, you might be paying by the minute.



## OVERVIEW OF MOBILE ENTERPRISE (AND INTRANET) PROJECTS

### MOBILE-OPTIMIZED WEBSITES

<p><a href="#">Ovanet</a> <b>Arup</b> (UK)</p>	<p>Arup's Ovanet mobile-optimized intranet pages are a good example of how to identify a few key features that users need on the go (hand-picked from across the greater intranet), optimize them for mobile consumption and make sure they work far and wide across the mobile device spectrum. Ovanet is a good example of doing something small and doing it well, proving that sometimes a small effort can make a big impact.</p>
<p><a href="#">Splash</a> <b>EE</b> (UK)</p>	<p>Designing (and testing) a mobile project—in secret—as a large corporation undergoes a major re-branding effort is far from an ideal environment in which to create a mobile experience but that didn't deter the EE team from meeting its goal of "revolutionizing" company communications with its mobile social network. Working within the constraints of a hefty set of challenges the team was forced to be practical and realistic every step of the way. "Splash" needed to make a splash right out of the gate so the designers drew a hard line with every decision they made. When your company is the largest communications company in the UK you'd better practice what you preach when it comes to empowering employees through communications tools. And you'd better do it right the first time.</p>
<p><a href="#">ZON 4 Sales</a> <b>ZON Multimédia</b> (Portugal)</p>	<p>Many teams are tasked with taking a desktop website or business application and making it "work" on mobile devices. Retrofitting desktop applications for the small screen can be a series of difficult trade-offs. By comparison, the ZON design team was given a dream assignment: focus on mobile screens first, then design for bigger screens by rearranging the design elements and optimizing for the available space. This process of "progressive enhancement" enabled the team to design a mobile-optimized sales website that empowers its door-to-door sales staff in every step of the sales process, from identifying viable leads to closing the sale—from the palm of their hands.</p>

### RESPONSIVE WEB DESIGNS

<p><a href="#">VZWeb</a> <b>Verizon Communications</b> (US)</p>	<p>Serving a workforce of 100,000 employees, all of whom may be consuming intranet content using any device they choose, means finding a design solution that will accommodate all comers. To meet this challenge, the Verizon team decided to redesign the company's corporate intranet (VZWeb), using responsive Web design (RWD) techniques. RWD is an effective design approach for content that must look good on any kind and size of device, but it is not a one-and-done design solution. Scaling a single design to meet many layout requirements is more art than science. The Verizon team found its success through careful planning and an iterative process of design/test/refine, which they performed again and again until the design met the needs of the most possible users.</p>
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<b>WEB APPS</b>	
<a href="#">SEI Mobile Website</a> <b>Service Express, Inc.</b> (US)	<p>“Do what’s right, not what’s expected” might make a good motto for the SEI design team. When deciding that a mobile solution would best serve the needs of its workforce of Field Technicians, the team quickly realized that “mobile” translates unquestionably into “native app” for many people. Changing minds meant convincing stakeholders by presenting test results as evidence for the advantages of a Web app over a native app. The team’s efforts paid off as users have adopted the Field Service Engineer Mobile Ticket System app in droves, increasing their productivity and helping the organization reduce labor costs.</p>
<a href="#">Suma</a> <b>North Carolina State University Libraries</b> (US)	<p>The Suma team transformed a simple tool (a clicker counter that counts, for example, how many people enter/leave a space such as a library) into a mobile-enabled application. In doing so, it has unleashed a world of possibilities for data analysis and actionable reporting that will inform the University’s efforts at space management and resource allocation into the foreseeable future. Taking a tablet computer and turning it into a manual data-collection tool shows that sometimes it’s the simplest idea well executed that can have the greatest impact.</p>
<b>NATIVE APPS</b>	
<a href="#">12View</a> <b>Applied B.V.</b> (The Netherlands)	<p>“Make it useful and people will buy it,” is one of the lessons the Applied team says it learned by creating the 12View Android (tablet) app. Native apps can be time-consuming and expensive to build, and they are most successful when they support a very targeted group of user tasks toward a specific goal. 12View does that. From the choice of a specific Android tablet (to minimize cost) to decisions around how to store and transfer the data (to minimize load time and maximize performance), the team’s precise decision-making resulted in a highly useful application that serves the job needs of a targeted group of workers in a highly specialized environment.</p>
<a href="#">mTec</a> <b>ZON Multimédia</b> (Portugal)	<p>There are some work processes that are just perfect for a mobile device. Field service technicians logging their repair work as they perform house calls is one of those perfect uses of the technology. Taking the (formerly) manual, paper-based tasks performed by the company’s field organization and optimizing them for use on mobile devices creates a multitude of efficiencies across the organization and gives the company a measurable competitive advantage. Achieving this kind of success was only made possible by a design team willing and able to understand the technical challenges, create an optimal workflow, and prioritize (and eliminate) content using a scalpel, not a handsaw.</p>
<a href="#">Show Me</a> <b>CommunicateHealth, Inc.</b> (US)	<p>A research-driven approach helped the CommunicateHealth team design an app that provides useful and reliable services for two different user populations—first responders and people with communications challenges. The app functions in extreme circumstances and provides first responders a reliable way to communicate with a user population with special needs, in emergency situations. Show Me is an example of a specialized native app developed to fill a very specific need for a very specific audience. By narrowing the target with such specificity, focusing on those needs and refining the app through research and testing, the team was able to hit a bullseye.</p>

## “Ovanet” (Arup)

**Company Overview:** Arup is an independent firm of designers, planners, engineers, consultants and technical specialists offering a broad range of professional services related to the built environment. The company was founded in 1946 with an initial focus on structural engineering but came to the world’s attention with the structural design of the Sydney Opera House. Arup has since grown into a multidisciplinary organization.

**Headquarters:** London, UK

**Annual Revenue:** £990 million (year ending March 31, 2012)

**Number of Employees:** 10,000 people in 90 offices and 35 countries.

**Project Budget:** £50,000. This project was a global project funded centrally by the Arup Intranet Client Committee, who in turn received their budget from a global IT Systems Committee.

**Mobile Project Overview:** The Arup team optimized a subset of pages from the company’s intranet, Ovanet, for mobile consumption. These pages give employees direct access to a small number of key tasks from any (and all) web-enabled mobile devices.

### **Design Team:**

In-house, six people formed the core team. One additional person from the agency Artificial Tourism developed the graphical aspects of the user interface.

### **Members:**

**In-house:** Leo Argiris, Principal; Kevin Franklin, Head of Web Technologies; Nick Harvey, Web Developer; Nishit Khakhar, Project Manager; Glen Rainbird, Web Developer; Mohammad Sahebamee, IT Support Analyst.

**Artificial Tourism:** Alicia Comella, Creative Director.

## OVERVIEW

Arup’s Ovanet, the company’s mobile intranet, is a set of mobile-specific Web pages designed to give employees direct access to a small number of key tasks from any Web-enabled mobile device.

Ovanet is a good example of how to:

- Identify a few key features that users need on the go (hand-picked from across the greater intranet).
- Optimize them for mobile consumption.
- Ensure the mobile offering works far and wide across the mobile device spectrum. (The Arup team took great care to get the details right.)
- Do something small and do it well, proving that sometimes a small effort can make a big impact.

**Type of project:** Mobile optimized website (intranet) optimized for any mobile device or platform. No single operating system or device received special attention from the designers. The site was developed according to Web standards with the intention that the design will be usable (albeit with varying degrees of visual similarity) on any Internet-connected device in use now or in the near future.

**Why this Approach:** When the word “mobile” is mentioned, people often think first of apps, but Arup wanted to maximize the mobile reach of its website. The philosophy was to put the mobile experience first, whatever the device or OS users have in their hands? “Our design philosophy was to assume that every user was on a

mobile device by default," says Kevin Franklin, Arup's Head of Web Technologies "only serving the desktop interface if we detected a desktop user agent."

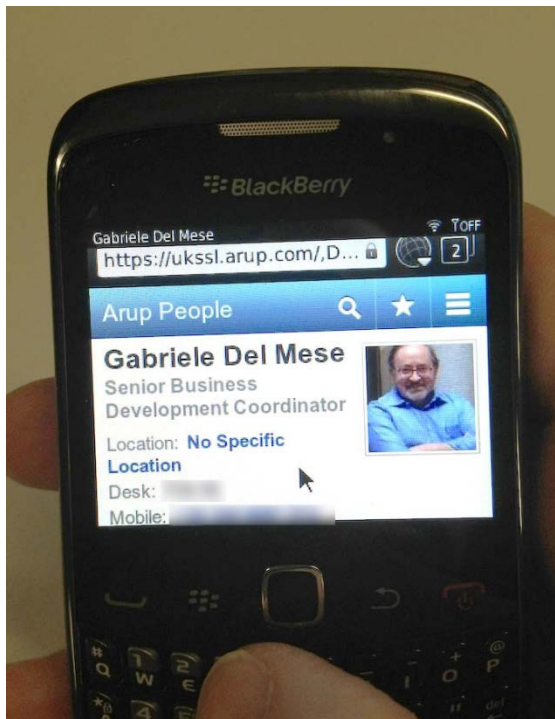
That means that tablets tend to get the mobile interface by default, too.

"That's a good failsafe," he says. "It gives everyone a decent starting experience and allows movement between the two interfaces if need be."

Putting the mobile experience first meant creating a design that would be optimized for mobile, specifically, not simply an elegant degradation of the desktop experience, as can be the case with responsive Web design.

"We didn't take our desktop designs and restyle them for decreasing screen sizes," says Franklin. "The file size and volume of content that they contain would be unsuitable to send to mobile from a bandwidth and data tariff standpoint. Not to mention the work that would be required to redesign the entire desktop experience to work across a range of viewport sizes."

This approach was necessary to support the wide variety of company-issued mobile devices, which ranged from iOS and Android to Blackberry and even a Nokia feature phone. It was an ambitious undertaking to ensure the pages would work across this spectrum, but with rigorous testing the team made it happen.

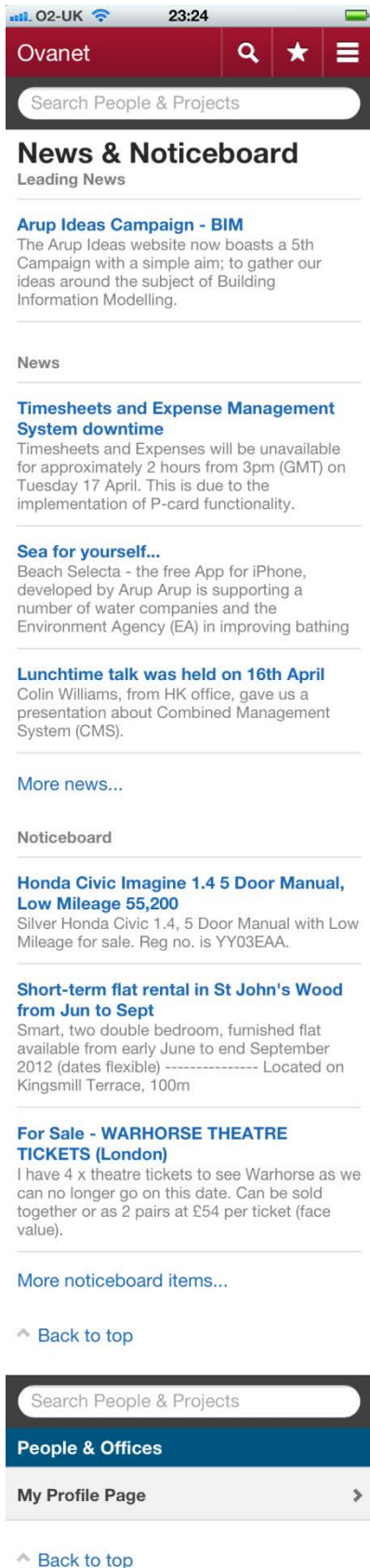


Because the focus for Arup was on Web optimization rather than an app created for a specific platform, the company ensured that the site would be accessible across a wide variety of mobile devices, not merely the most popular smartphones and operating systems. **Left:** Here, Ovanet is shown on a traditional Blackberry handset. **Right:** Ovanet as it is seen on a Nokia feature phone.

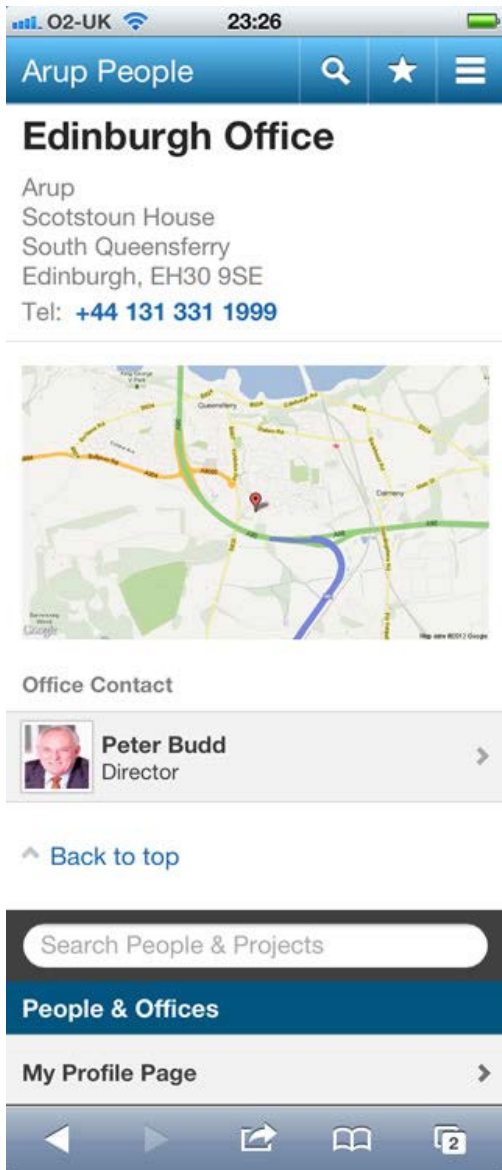
Ovanet's mobile pages include a number of useful features for the company's workers on the go, including people and project details, information about the Arup office locations, search, and functionality to help users assemble customized marketing packs to support customer follow-up.

These mobile Web pages give employees the ability to:

- Discover personalized news and social notice-board items
- Identify and contact co-workers with domain expertise across the firm
- Find company office locations and key contacts at those sites
- Access project records and collate them
- Submit business development materials.



The mobile landing page features personalized content, including news and noticeboard content, based on the users' role, location and communities of practice to which they belong.



The Ovanet mobile pages feature key location details for every Arup office. The map is a static image (to avoid accidental interaction caused by thumb scrolling), and it links to the device's native mapping application (if present) where GPS navigation is then handled by the device's native app.





Users can find detailed information about their co-workers on the mobile-optimized pages, including a “key facts and expertise” page for every Arup person (shown on an iPhone 5).



O2-UK 23:38

Arup Projects

## 2nd Avenue Subway, New York

Client **NEW YORK CITY TRANSIT AUTHORITY**  
 Client Type **NEW YORK CITY TRANSIT AUTHORITY**  
 Location **New York, USA** [View on Map](#)  
 Start/Finish **2001 - 2020**



### Project Description






New, multi-billion dollar, 8-mile underground railway line along 2nd Avenue in New York City. When complete, the new, twin-track line will include 16 new underground stations. It will comprise bored and cut-and-cover tunnels, and mined and cut-and-cover stations. Phase 1 construction commenced in 2007.

### Scope of Arup Service

Full multidisciplinary design including planning, civil, geotechnics, tunnel engineering and tunnel ventilation, structural, mechanical, electrical and plumbing engineering, plus acoustic, facade, fire and life safety, risk and environmental consultancy, construction schedules, contract packaging.

-  **David Palmer**  
Project Director >
-  **Don Phillips**  
Project Manager >

### Create Marketing Pack

-  **Awards** >
-  **Communications** >
-  **Cut & Cover Tunnels** >
-  **Underground Railways** >
-  **Value Nugget** >

[^ Back to top](#)

Search People & Projects

**People & Offices**

**My Profile Page** >

[^ Back to top](#)

The mobile site also features a key facts page for every Arup project. These pages link to project contacts and provide the starting point for the marketing pack generation process (outlined below).

## Goal

Productivity. “We had a simple strategy to underpin the project,” says Franklin, “To respond to the capability and popularity of mobile devices, the mobility of our staff, and their expectation to be able to work effectively while away from the office by providing seamless, task-based access to our intranet systems from any Internet-connected device.”

## Challenges

Arup’s challenges in optimizing Ovanet for mobile were more institutional than technical. With competing intranet projects vying for limited technical resources, the mobile intranet just had to “wait its turn.” The project was first suggested to the intranet client committee in early 2011 but had to wait until development resources became available in January 2012 before work could begin.

The company recognized the importance of external mobile adoption trends and had a desire to establish an internal mobile beachhead before the popularity of mobile device use swelled within the organization.

“A clear trend was emerging where a growing number of staff has the expectation that they should be able to work effectively while away from the office,” says Franklin. And that trend is gaining ground.

“I am starting to see ‘mobile’ and ‘access anywhere’ being written into the aspirations and requirements of our digital projects now,” he says.

## Users

The users of the Arup mobile intranet can be divided into two broad groups:

- **Project design team members** visiting construction sites, other Arup offices, or meeting other collaborators. They may need access to basic staff information and office details, or access to project records information (often to find someone with relevant experience with whom to consult).
- **People winning work** are often tasked with researching the company’s track record in a particular market or assembling and submitting a custom pack of marketing material as a follow-up to a meeting with a potential client.

In addition to supporting these specific task scenarios, the mobile site also provides personalized news and notice board (bulletin board/classifieds, and similar types of notices). Consumption of this ancillary content is likely to be a byproduct of users’ visit to the intranet, rather than the reason driving the visit in the first place.

## THE MOBILE EXPERIENCE

The first thing that happens when users visit Ovanet is something they are unlikely to even notice. The technology behind Ovanet serves the mobile pages by default and does a sniff test to redirect desktop visitors back to the (full) desktop intranet. This means the site is designed to assume the user is coming in on a mobile device, and desktop access is considered the exception. Once on the mobile pages, users can always choose to go back to the full site if they need access to content not featured within the mobile-optimized pages. Ovanet provides users bi-directional links between versions. These links are between the corresponding pages of content

in each version—not just a link to the homepage of each version. The site remembers users' choice (mobile or full) during a session so that their experience remains consistent. Additionally, Ovanet serves all versions of a page from the same URL (for example, they do not use a mobile-specific subdomain or path design). The mobile site makes use of user agent detection and browser detection capability to deliver the appropriate experience based on device. This results in shared or saved links always taking users to an experience relevant to the device they are using.

Ovanet's mobile pages are optimized to take full advantage of native mobile phone features, when available (for example: click to call, GPS and email). And the developers kept in mind the constraints inherent in mobile computing.



The Ovanet bookmark icon is shown here on the home screen of an iPhone 4. The team created a range of icons to give the mobile site a quick access point across a range of devices. This icon can be pinned to any home screen or pinned to a Windows 8 start page.

## Reducing Load

While the design and task flow of a mobile experience is important, that design has to be balanced with the technical and environmental challenges of users computing on the go. Mobile users are not only doing their work on small screens (sometimes in awkward environments) but also they are (often) using metered bandwidth to get things done. Mobile designs at their best are lightweight, clutter-free and action-oriented. The Arup team recognized the importance of reducing data load in their mobile designs to optimize the pages for speed and also for bandwidth usage. File

sizes, HTTP requests and application chrome are minimized across Ovanet's mobile experience. Also, whenever possible, users are given useful features and content rather than interface dressing or extraneous choices. A good example of this is the homepage where users get personalized news, not just global navigation, by default.

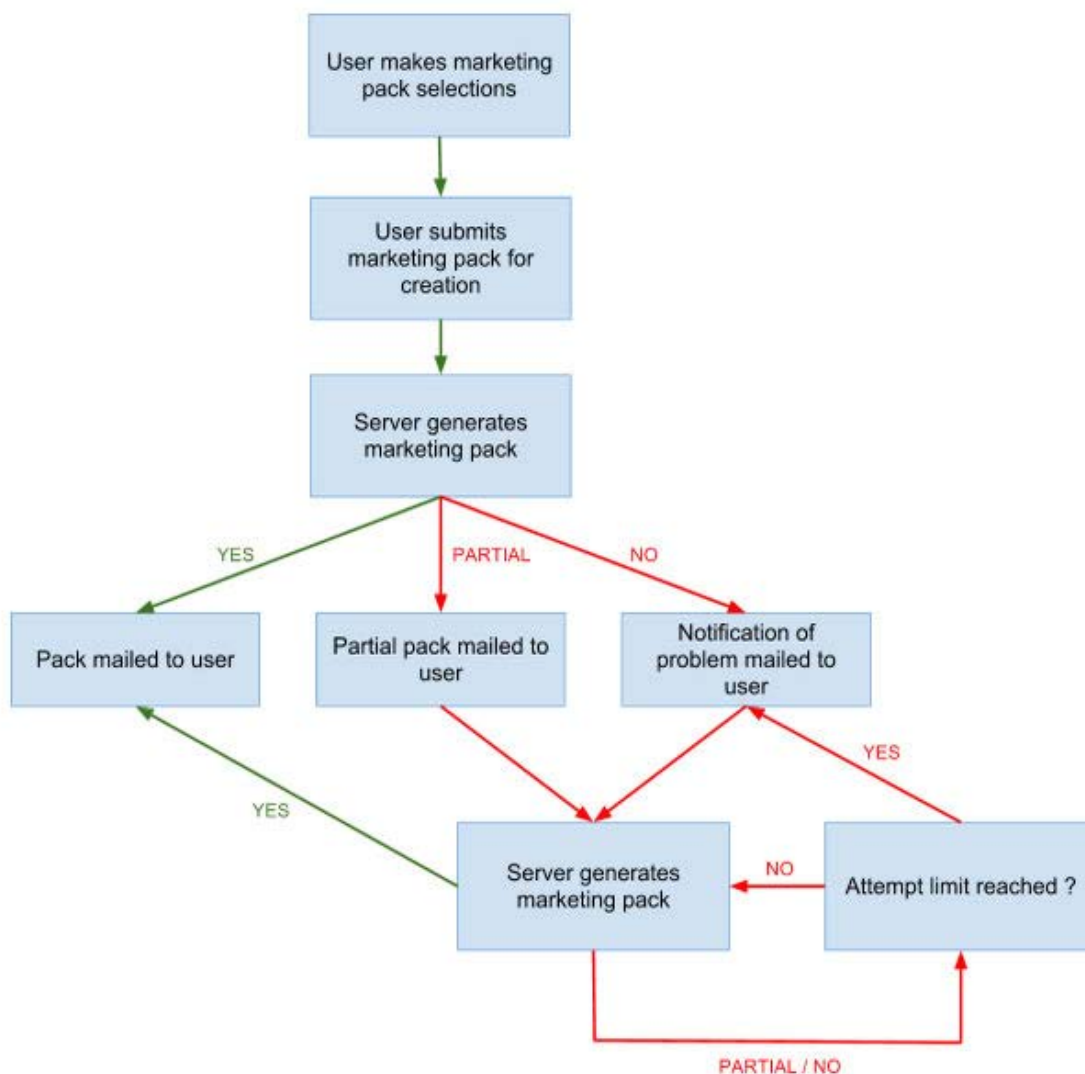
Behind the scenes, developers made good use of code to minimize load. This meant the minification of JavaScript and CSS; well-structured HTML and sensible use of CSS selectors (rather than "classitis") to achieve styling and use of image sprites for common graphical assets; and compounded JavaScript files to reduce HTTP requests.



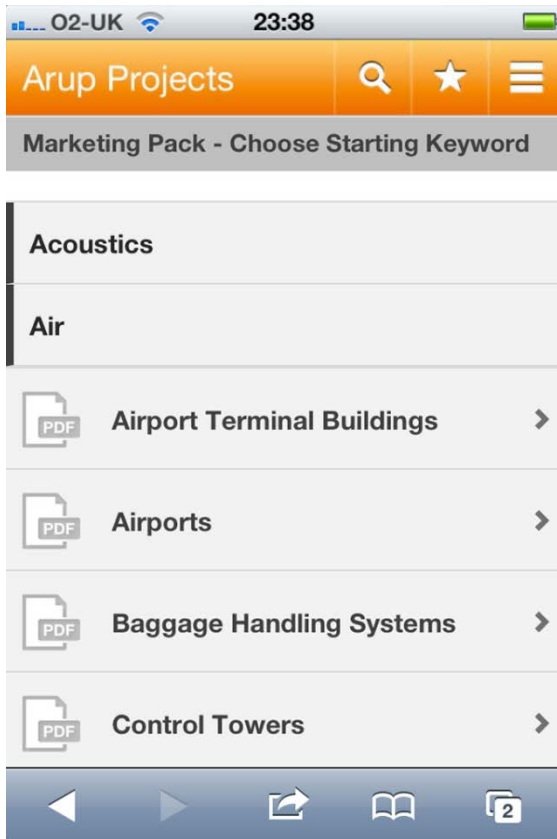
As a technique to aid mobile website performance, graphical assets used in the interface are assembled into a single image "sprite" to reduce the number of HTTP requests that a page makes.

## Marketing Packs

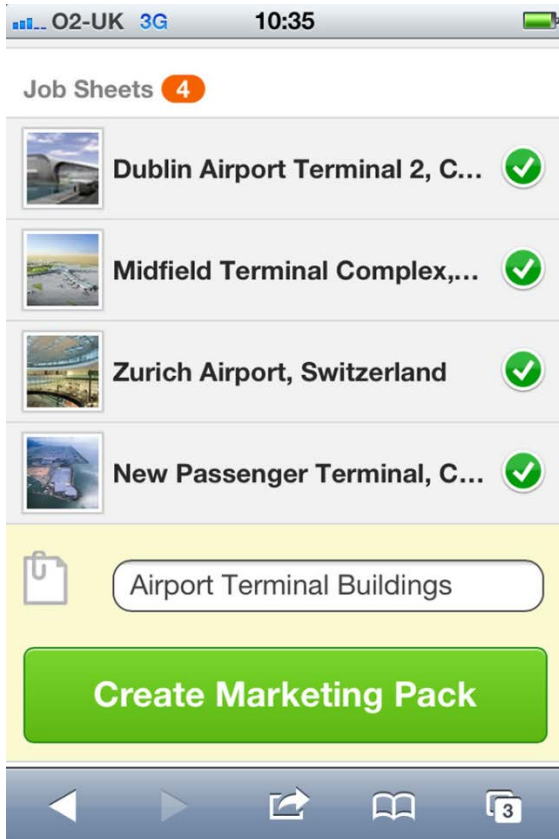
While the Ovanet mobile website offers users quick access to several things they need to get work done on the go and it also offers a core function: the ability to assemble marketing packs. Marketing packs allow users to create custom marketing packages for customers—on the fly, and this is at the heart of the mobile experience. The mobile interface supports this process, yet leaves the heavy lifting to the server side, so users are not burdened with bandwidth-intensive calls. Through a series of selections, the user creates a custom marketing package that suits the needs of the marketing opportunity at hand, and completed packs are emailed. If at any point the process fails, users receive an apology note (copied to the support staff and information team), along with a phone-number link so they can talk with a person and resolve the issue in real time.



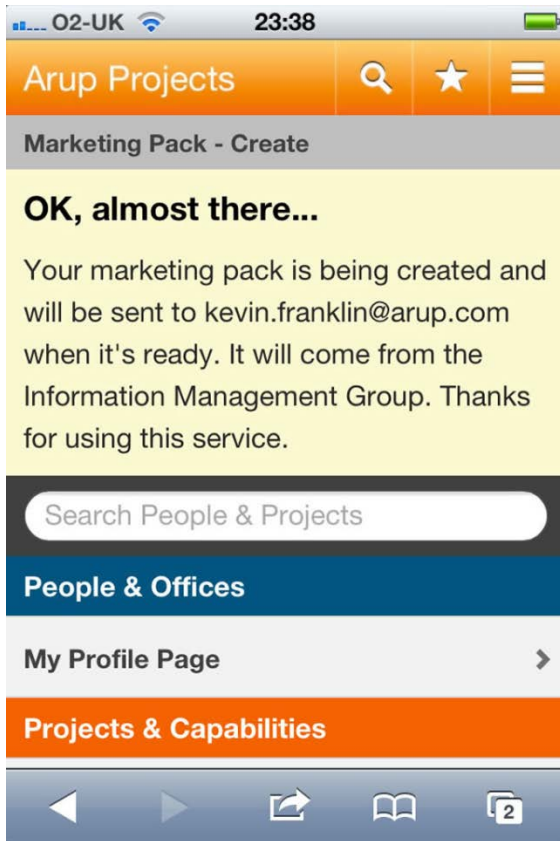
The process flow of creating a marketing pack.



This screen shows the marketing pack keyword-selection list. Users start by selecting (by searching, browsing, or from a project page) the keyword that best fits the type of project list that they want to generate, for example: *Communications* or *Underground Railways*. Through the use of metadata (in the central projects database), projects tagged with these keywords will be returned to users as potential project matches.

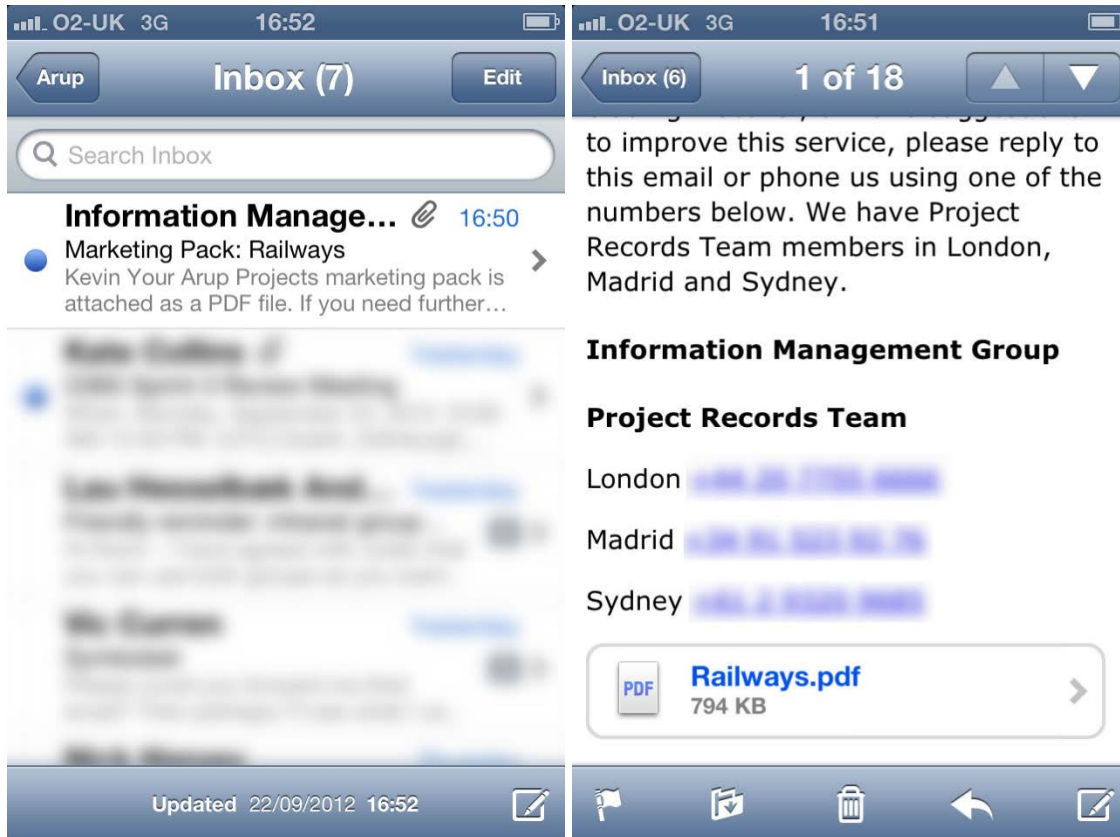


**Projects list:** The project shown here are a short list of projects that match the user's chosen keyword. All projects have an image in the image database and an approved paragraph of marketing text in Arup's records system. The resulting list is prioritized, with award-winning projects appearing first; then the rest are organized by project completion date (with most recent first). If the list is long, it is truncated at the first 15 matches, just to keep things simple. The user can deselect projects to omit them from a marketing pack, but there is no way to add additional projects. This, again, was decided to help simplify the process. At this point the user can give the marketing pack a name and submit the package to be generated by the server. The *Create Marketing Pack* call-to-action button is prominent on the screen. The resulting marketing pack (a PDF file) is emailed to the user when it's ready.



The thank-you screen after the user has created a marketing pack. Because the PDF generation process is server-side, the user cannot tell, at this point, how long it will take.





**Left:** After the user generates the marketing pack it is emailed to the user. Note that the subject line reflects the name that the user gave the marketing pack. **Right:** The marketing pack email (with PDF attachment) can be used with the devices that have native functionality. Note the inclusion of telephone numbers to help users get in touch with a person if they need additional assistance. Phone numbers are formatted to international dialing standards and spaced to ease touch-target interaction.

## DESIGN PROCESS

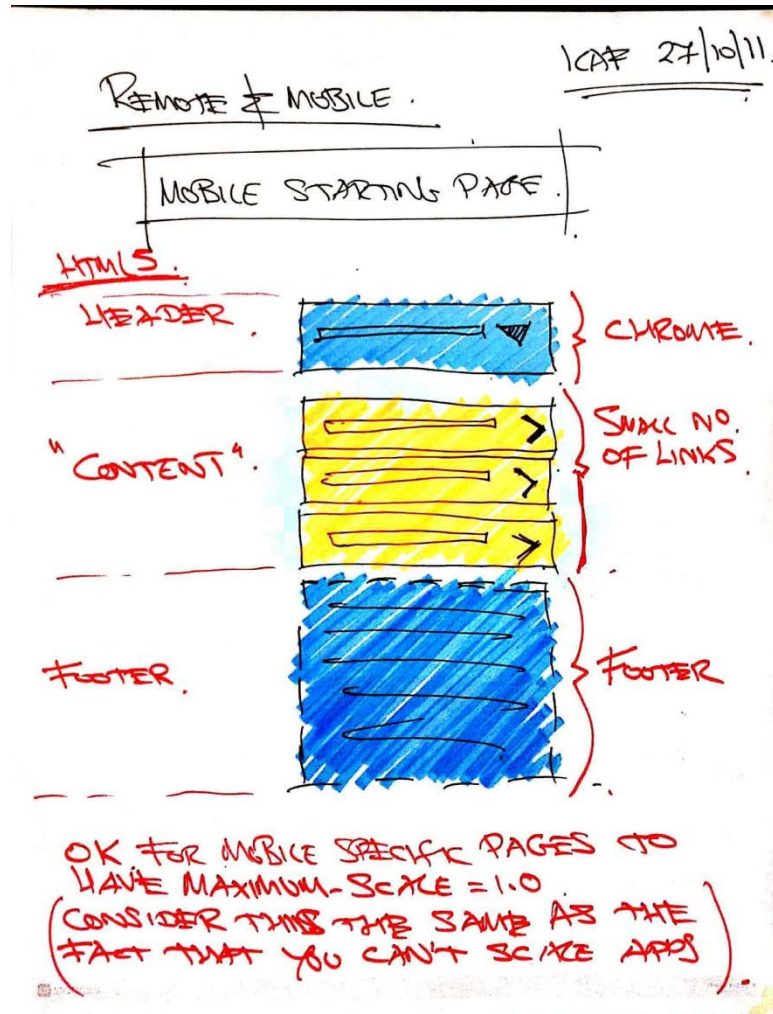
### From Desktop to Mobile

Because Arup's mobile website is a subset of its desktop intranet experience, the team had to decide which content and functionality to prioritize for the mobile experience and what to leave out. That curation process was critical because each feature that was included had to work across nearly every mobile platform and device in use today. The team focused its efforts on output.

"Our focus was on providing simple ways to get people and project information out of our systems," says Franklin. "Therefore, we distilled the desktop (or 'full') content down to our best estimate of what would be of primary use when mobile."

## Sketching

The team employed an iterative design process to move the design ideas from pen and paper to online mock-ups, evaluating and refining design ideas as it went along.



An early sketch exploring options for the home screen and the use of HTML5 elements.

News

## Building a lifeline in remote China

Bridging the gap

In December 2011, a team of Arup engineers travelled to Mixia Village to build an Arup-designed bridge alongside student volunteers. The bridge replaces a makeshift bamboo bridge that was often washed away by the rainy season, giving villagers a safe and stable passage.



Building this Arup-led Wu Zhi Qiao project is truly a special experience for all those involved. Arup has contributed to a wide range of landmark projects, but this bridge bears another kind of significance to the firm. Lack of machinery and skilled construction workers, and the fine balance of robustness, sustainability and constructability in the remote location all posed great challenges to the team.


### Built by hand



In addition to the bridge programme, the team also visited Balong Primary School, brought clothes and stationery donated by Arup's Hong Kong office, refurbished school desks and chairs and had a circle painting fun day with the students.

Media






[Back to top](#) 






 **Favourites** 23 


**People & Offices**

- My Profile Page** 
- Offices Near Here** 
- All Office Locations** 

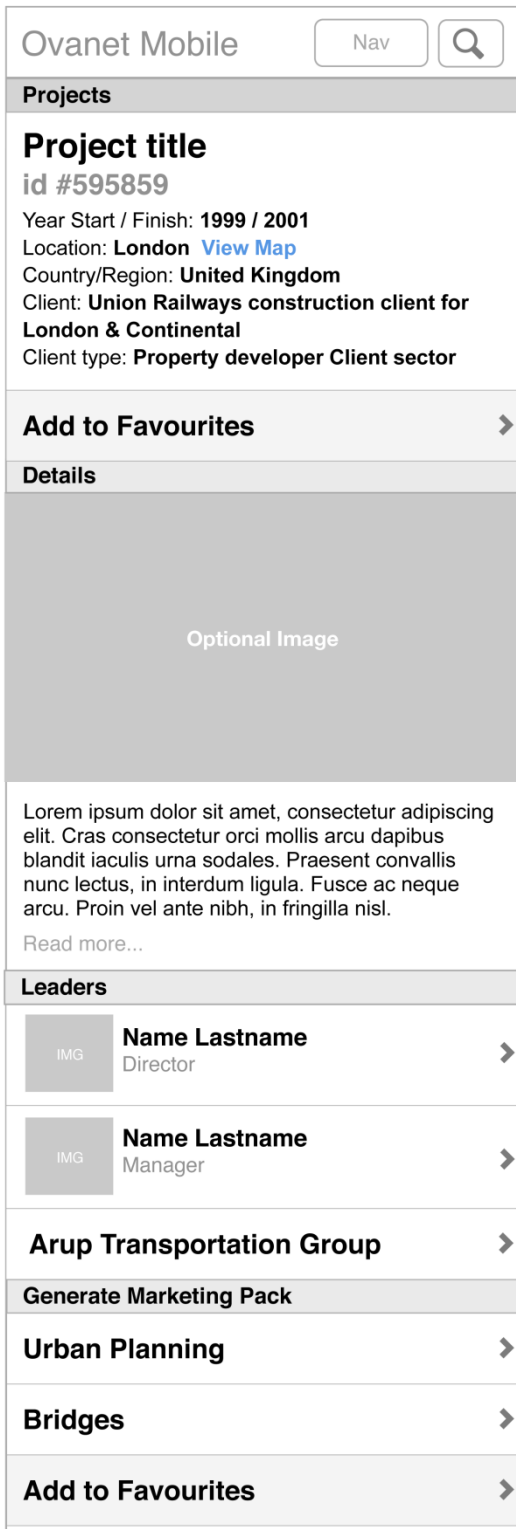
**Projects & Capabilities**

- Create Marketing Pack** 
- My Recent Projects** 
- Projects Near Here** 

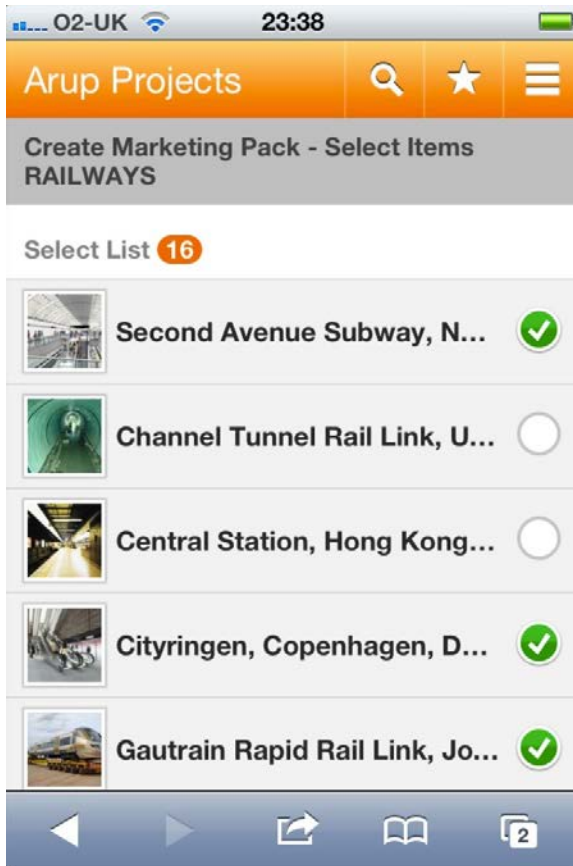
**Collaboration**

- Start a Meeting** 

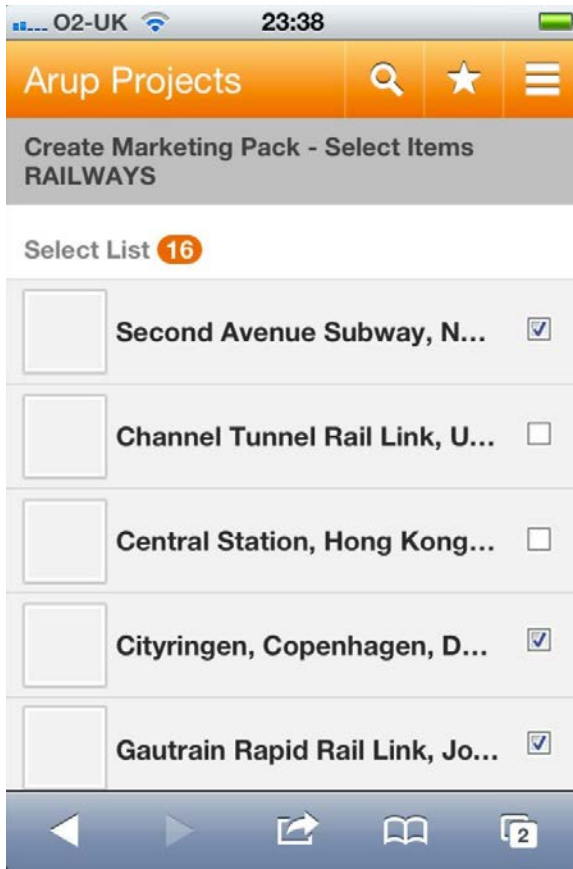
An early mock-up of a news article page.



An early wireframe of project detail page. While early sketches were done with pen and paper (as shown above), later wireframes, such as this one, were created in Photoshop. The team looked at public dotcom sites such as Amazon, Flickr and Bagcheck for design inspiration.



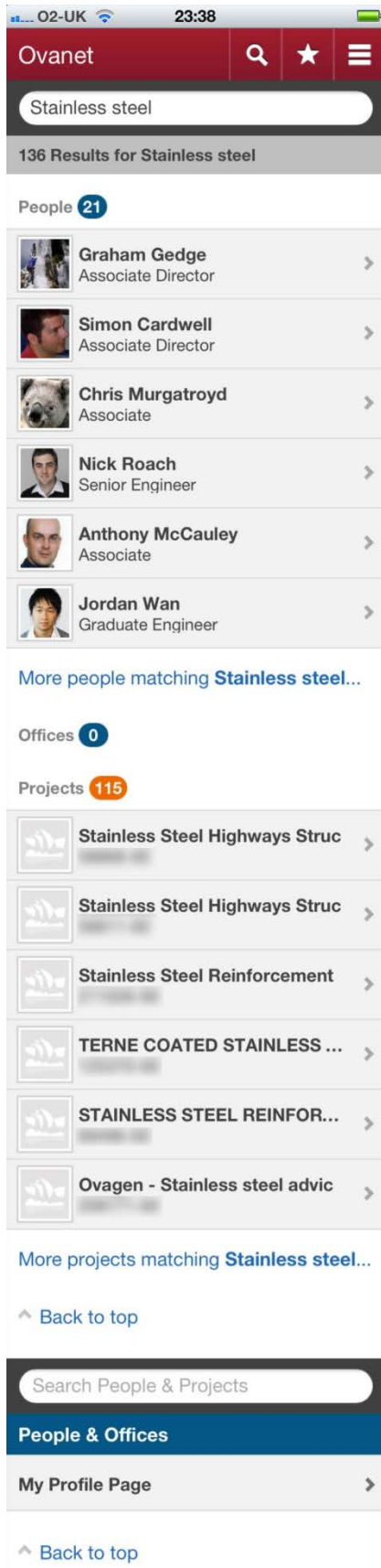
A good example of the careful approach the team took with balancing visual design with the constraints of the mobile environment. This screen shows a project list generated during the marketing pack process. Visual touches, such as project images from Arup's digital asset management system and the tick icons, help to lift the interface of the project list choices (see next screen).



While the team was interested in creating a pleasing visual design, it was also cognizant that the users may be accessing the data on a fragile cell connection. If images don't load, the interface must still be usable; so here they use standard HTML form elements to create the basic page functionality, then "dress" the form with visual elements, so that if images do not load, the form remains usable.


## Designing Mobile Search Results

It's one thing to process search queries quickly and another thing to present them in a way that makes them more easily consumed on a small screen. The Arup team tried to do both. The Ovanet mobile search results page is deliberately different from a traditional desktop design. In designing this page, they tried to take into account both the limited space available and the interaction method of the mobile environment. Instead of presenting the user with a long list of results (as one might expect in a desktop experience), the website processes the results server-side and then pre-groups them into small chunks (up to six) of each result category (people, office, project, marketing pack, etc.). These groupings and the associated contextual thumbnail images mean the user only has a small number of well-sized blocks on the page with which to identify and interact. If the result that users need isn't on that initial results page, then they can click through to see a full list of results filtered by the category that they are interested in. So, for example, a link to *More people matching stainless steel* shows only people results.



In the mobile interface, search is restricted to finding people, offices, projects and marketing material. Search results are grouped to help users get to their desired content quicker. Users can access more results in any group (such as people) to refine the results.



📶 O2-UK 3G 10:44 🔋  
🔒 Stainless steel - Intranet Search - Ovanet  
   
 Arup Intranet 🏠 👤 📁 🔍 🌐 📌  
 Ovanet 👤 📁 🔍 🌐 📌  
 Stainless steel  Filter your results  
Unsuccessful search? [Tell the Information Management Group](#)  
[Stainless Steels - Technical - Networks](#)  
 finish, bolts, reinforcement and lots of other good stuff. **stainless steel**, austenitic, duplex, reinforcement, bolts, grades, selection, **stainless steel** costs, castings, Graham Gedge. **Stainless steels** seem to be confusing and expensive materials, it needn't  
 [Personal Profile - Jonathan McCray - Arup People](#)  
 Graduate Engineer  
 A very green perspective on: Facades Materials Metals / metallurgy Corrosion Metallography Polymers (plastics) Natural stone Slip resistance of pedestrian surface materials (particularly code requi  
[Adhesion strength of stainless steel kinetic metallisation coatings - Jonathan McCray - Arup People](#)  
 26 page iii 1 INTRODUCTION 1.1 BACKGROUND Welding of **stainless steel** remains a difficult problem. **Stainless steel** is almost always used where corrosion resistance is important. In austenitic **stainless steel** sensitisation to intergranular [ pdf | 4.1MB | Preview ]  
[Adhesion strength of stainless steel kinetic metallisation coatings - Jonathan McCray - Arup People](#)  
 at 600Å°C Interface cracks appeared in all pure **stainless steel** coatings after heat treatment at 600Å°C and 300Å°C Cracks Pure **stainless steel** coating after annealing at 300Å°C for 24 hours These cracks contributed to the low bond strength Intra- [ pdf | 1.1MB | Preview ]  
[Weldability of Structural Steels - Structural and Stainless Steels - Networks](#)  
 is required in relation to specific problems assistance can be provided. Contact either Chris Murgatroyd or Simon Cardwell .. Welding and Fabrication | Structural and **Stainless Steels** | Technical | Materials Skills Network | Networks | Straker Shado  
[Stainless Steel Castings for Construction - Structural and Stainless Steels - Networks](#)  
 7/7 Memorial Hyde Park, London **Stainless steel** investment castings - Hudson River Park New York WMATA Canopy support structure, Washington DC Introduction **Stainless steel** castings are used for both structural and architectural components  
[European Stainless Steel Development Association - Mechanical](#)

- All Results (4178)**
- People (215)
- Projects (757)
- Insight (21)
- Networks (2326)
- Essentials (305)
- Forums (1779)
- Practices (3)
- Groups & Offices (93)
- Sports & Social (1)
- Australasia (1)
- East Asia (96)
- General (381)

This shows the full (desktop) version of the mobile search results page. This is an example of where the user might switch between the mobile version of the site and the full desktop view.

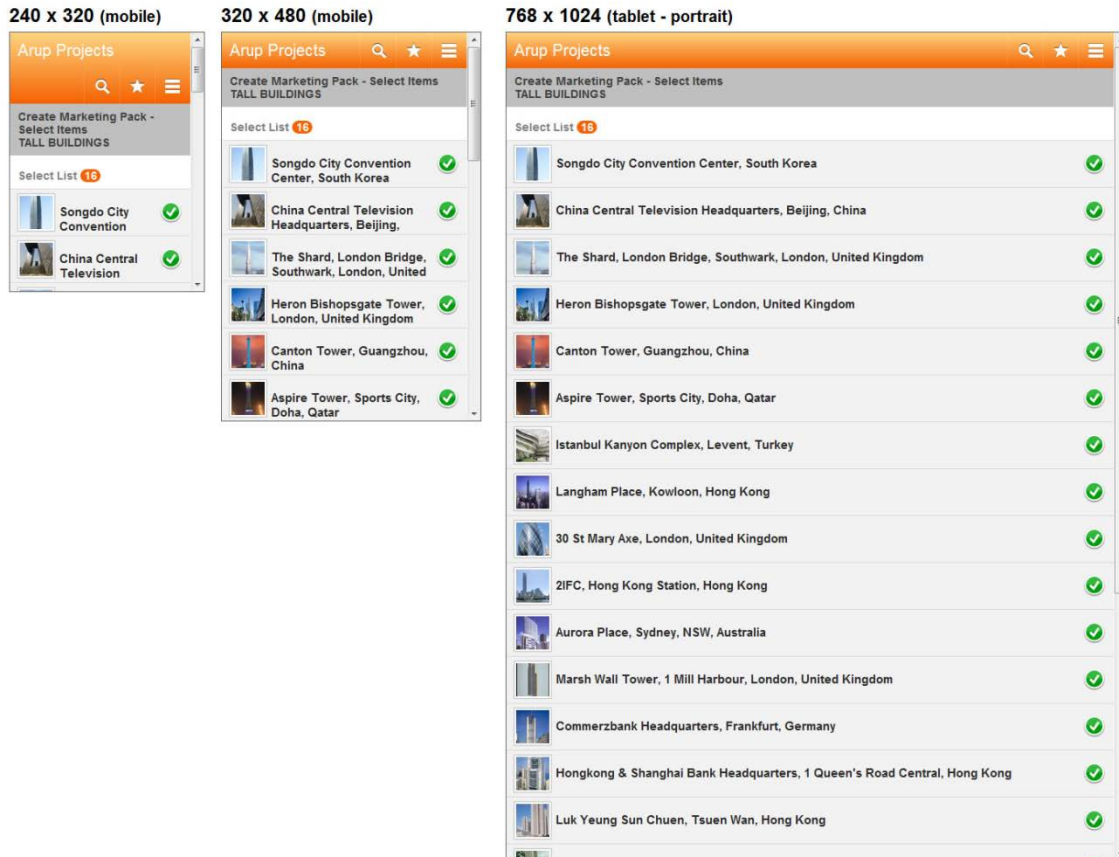
## Testing Far and Wide

Providing ubiquitous mobile access, regardless of device, is a testing burden for the development team. Ensuring that design decisions translate broadly across mobile platforms and handsets means testing far and wide across the mobile spectrum. This



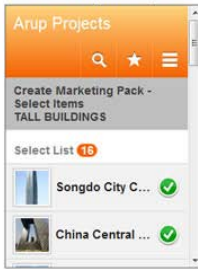
level of rigor was especially important for the Arup team to ensure that all users can assemble marketing packs.

The team tested first in desktop browsers, as it's much easier in that environment to debug CSS rules and changes in layout as the viewport changes. Then they tested on real devices for both interface rendering and user interaction via touch (iOS and Android), thumb pad (Blackberry) and keyboard (Nokia feature phone). As shown below, some of the early design decisions were refined as the testing process played out:

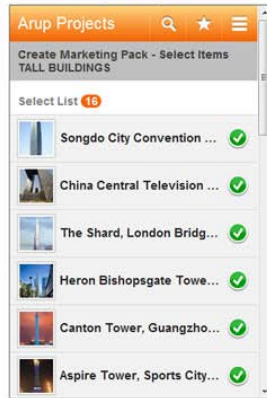


Testing the behavior of long text strings in variable viewport widths. In this example the lines wrap.

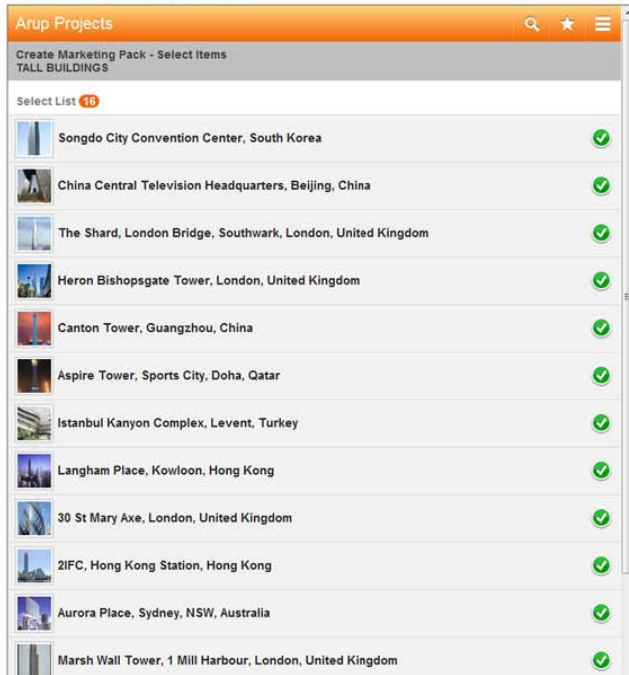
240 x 320 (mobile)



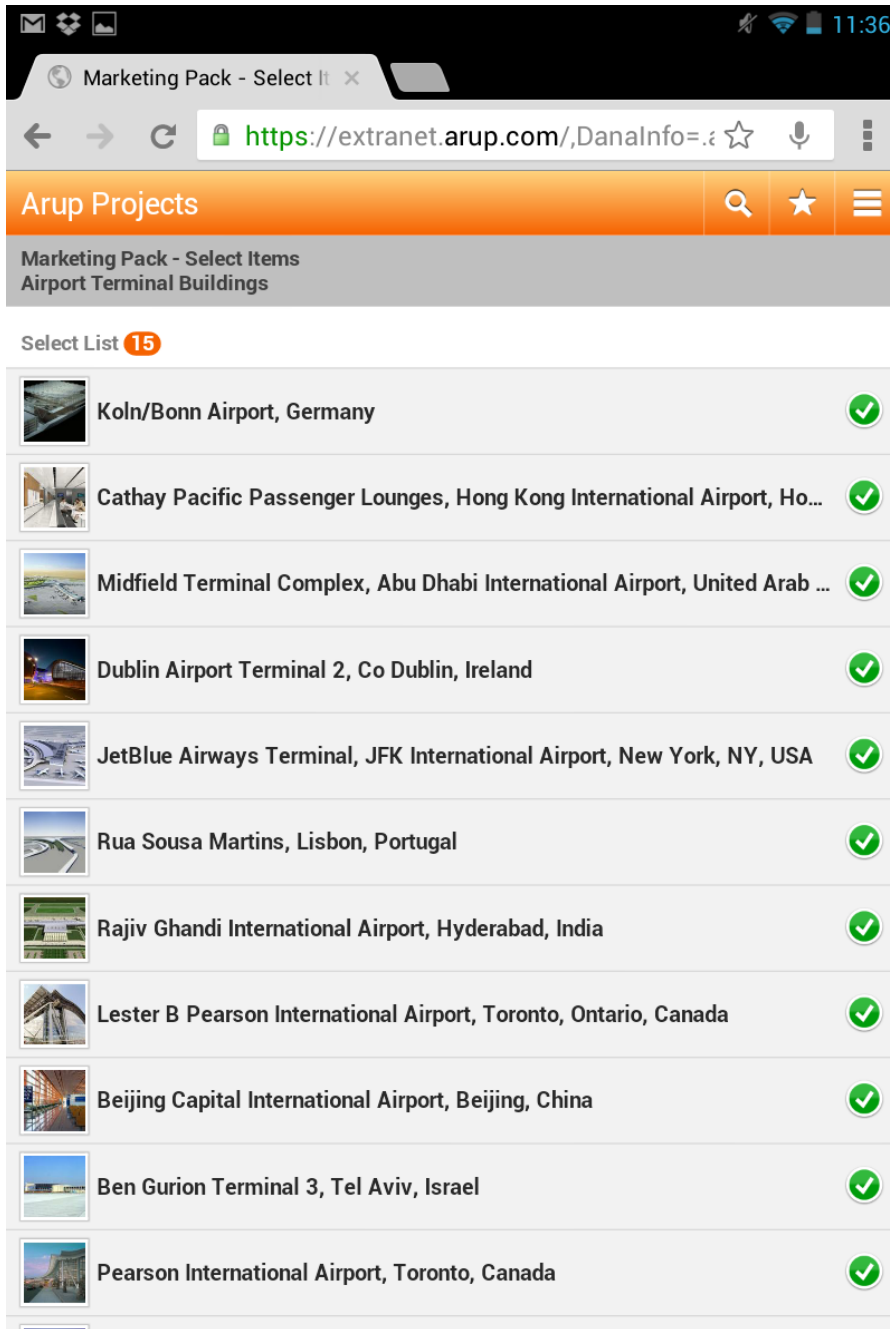
320 x 480 (mobile)



768 x 1024 (tablet - portrait)



Testing the behavior of long text strings in variable viewport widths. In this example the lines slip out of the viewport and an ellipsis is rendered using CSS. This approach was chosen over having the lines wrap (as shown above).



Testing the marketing pack screens on an Android 7-inch tablet. Note that with this viewport width, most of the lines of text are visible without truncating. On smaller screens, a CSS *text-overflow: ellipsis* is introduced. Project titles are deliberately written from left to right so as to be meaningful if the right end is truncated. (Ovanet is shown here on a Google Nexus 7 tablet.)

## MONITORING USE

Ovanet's mobile page views are considerably smaller than those of the desktop intranet (approximately 1% of the total), yet mobile access has increased fivefold since the mobile project launched. This is indicative of a trend the team considered inevitable and were preparing for. "The genesis of the project was one of 'for those folks that already access our intranet, let's make it a better experience'," says Franklin. "And let's be ready for when that number naturally increases."

"Our users aren't going to migrate from desktop to mobile, so it's not about volume of use," he says. "It's about complementing desktop use with a good quality mobile experience when that use case arises."

Most of Ovanet's mobile users come from the UK and Australia (nearly 60% of page views together), with Hong Kong and America next (25% between them).

Besides simply measuring the raw number of users accessing the pages, the team is also analyzing users, broken down by staff grade. By that measure, mobile use is also solid.

"Here we see that our mid-grade people are the heaviest consumers of the mobile interface," says Franklin. "Our senior grade (principals and directors) account for 10% of page views which, considering the size of that population compared to the others, feels like good usage."

## LESSONS LEARNED

Arup team members share some of their lessons learned:

- **Look outside the enterprise for design inspiration.** "Research and be inspired by commercial websites. These folks probably spend more money on usability and design than your intranet's entire budget—if you have one."
- **Design in the desktop browser for speed and convenience.** "Make use of user agent switchers to mimic devices where appropriate, but test in a representative range of physical devices often. The variety of screen sizes and input techniques (touch screen, track pads, keyboard navigation) can render some design approaches more suitable than others."
- **Hire experts (if necessary).** "If you generally undertake intranet projects in-house but, like Arup, you do not employ interface design skills, consider commissioning them for mobile work. At the mobile scale, the content is the interface, and an understanding of design patterns, touch targets and visual design is invaluable."
- **Start small.** "Focus on solving a few key tasks simply but thoroughly."
- **Just because it's mobile doesn't (necessarily) mean "app."** "For an intranet project, assume Web delivery by default, just like your desktop. Modify that assumption if the Web cannot meet your project's needs."
- **Avoid group think.** "Keep away from as many committees as possible."

## “Splash” (EE)

**Company Overview:** EE is the largest communications company in the UK. It was the first to launch 4G mobile broadband in the UK. Its vision is to give customers the best network and the best service, so that they trust it with their digital lives. EE operates the EE, Orange and T-Mobile brands, providing digital services to more than 26 million people.

The company is investing £1.5 billion over three years to roll out superfast 4G mobile services covering 50 towns and cities and extending to an additional 30 across the country by summer 2013. It wants to reach 98% of the UK population by the end of 2014, building on a £15-billion investment since 2000 to develop Britain’s biggest 3G mobile network. EE’s fixed-fiber broadband service reached 11 million households and businesses by the end of 2012.

### Headquarters:

London, Hatfield and Bristol UK

**Number of Employees:** 15,500

**Mobile Project Overview:** Splash is a custom, EE-branded mobile-optimized employee news channel and social network, available from any Web-connected device.

**Number of employees the mobile experience supports:** All 15,500 EE employees

### Design team:

EE worked with a team of designers and developers from IMP Media—from initial concept all the way through to design and delivery. A cross-functional team of approximately 15 people, from EE and IMP Media combined, were involved in creating Splash.

### Members:

**In-house:** Lynne Arrowsmith, Head of Internal Brand & Comms; Ian Hughes, Senior Channels Manager; Simon Chesterman, Digital Channels Manager; Mark Brewster, Digital Channels Manager.

**IMP:** Tony Cuthbertson, Director of Services; Paul Thompson, Program Manager; and a team of designers and developers.

## OVERVIEW

Splash was an opportunity for EE to go social as well as mobile, at the same time. Feeling that static intranet sites had become “a thing of the past,” the EE team set out to transform the company’s intranet into a social network—a mobile-optimized social network—that would give workers an opportunity to participate in a company-wide conversation from any Internet-connected device—anywhere, at any time. The content column design of Splash should be familiar to any Internet user who is familiar with a newsfeed on Facebook or Twitter.

Splash uses a combination of responsive Web design (RWD) layouts, adaptive navigation and information-handling tools (such as endless scrolling) to provide the same visual output and user experience, regardless of the device used to access it.

Throughout the user experience, Splash exploits native OS features, like the date picker in iOS and built-in video players. The design team didn’t want to reinvent elements that were already built into a device. That would be inefficient; besides, people were already familiar with them.

The Splash team took a practical approach to facing their challenges by doing a few major things right:

- They bit off only what they could chew. Instead of trying to mobilize the entire intranet, they picked a very focused target: a mobile-optimized social network.

- They created a flexible, easily updated and inexpensive mobile-optimized website rather than try for a native app as their first big mobile initiative.
- They landed on a feature set that would make Splash a splash, but not put their limited resources underwater. The EE team didn't let the perfect be the enemy of the good, and their prudent approach paid off.

**Type of project:** Mobile-optimized social network (intranet) optimized for use by any company employee, on any Internet-connected device: phone, tablet or laptop.

## Why This Approach

With over 15,500 employees, many of whom have multiple mobile devices, the organization couldn't provide a solution for just a few devices or operating systems. It needed to build something that was accessible to everyone. And, simply put, a mobile-optimized solution was the most cost-effective approach for EE.

"We chose a mobile-optimized solution because we felt it offered us the biggest bang for our buck," says Simon Chesterman, Digital Channels Manager. It was the right choice for a variety of reasons, most of them practical. A mobile-optimized solution gave EE a majority of the features they had planned, in a reasonable amount of time and within the budget they had available.

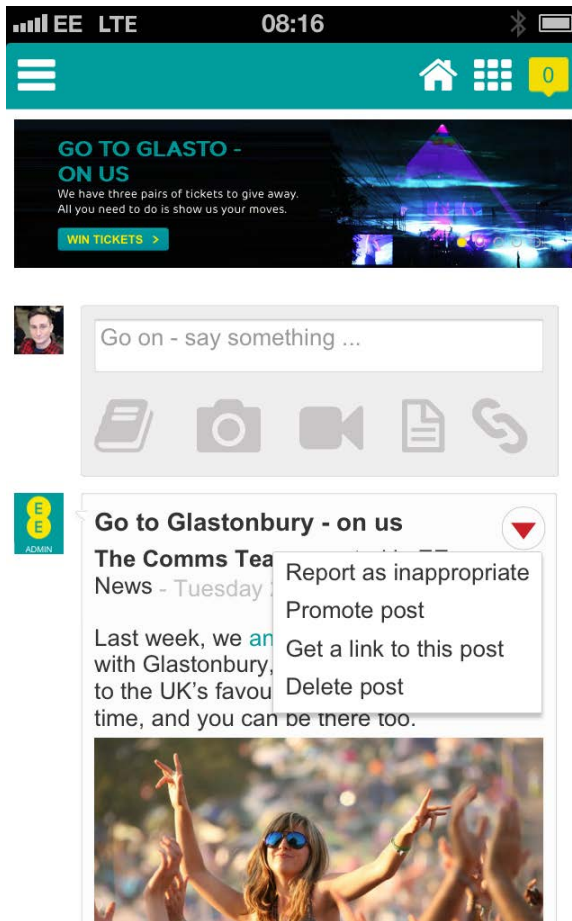
"It also gave us the flexibility to continuously develop the platform, even after launch," he says. "There's no established process to deliver apps securely to our employees at EE, despite the almost voracious appetite to do so."

For many organizations, mobile-optimized Web solutions, when done well, can give the overall experience of an app, but without the associated costs and delays in development. "You can make a change to your platform that seems relatively minor, but that change can prove costly and time-consuming when it comes to redeveloping your app across all operating systems," says Ian Hughes, Senior Channels Manager. "We've made changes and released them within hours, and these changes just seamlessly drop into our users' experience. No fuss, no delay, and a better product at the end of the day."

A mobile-optimized Web solution had many benefits (over an app) for the company, at least in the short run. "For us, the benefits of a native app do not outweigh the costs—at least for the time being," says Hughes. "Apps can be costly and time-consuming to build, particularly when there's a need to support several different operating systems whilst maintaining a similar user experience and feature set across all devices."

"We're still adding new features and finding new ways to use Splash, so it makes more sense to complete these enhancements first and then build an app which includes all of the new features and functionality—instead of having to revisit app development through a series of updates."

"The mobile-optimized version of Splash has been the proof point for us that mobile is ultimately the way to go for our employee content, and we continue to enjoy the flexibility it allows us for enhancing the product," says Chesterman. "Ultimately we envisage a collection of EE employee apps that can be easily delivered and managed for different tasks like managing holidays, submitting expenses, and booking a desk/meeting room."



Splash mobile homepage.

Splash is EE's employee broadcast news channel, created to replace the company's static one-way intranet homepage with a solution that is both social and mobile, giving access to all, without regard for device or platform.

Splash provides EE employees with the latest company news, messages from the CEO, business updates, and a hub for formal and informal groups, all in an open social space that's updated in real time. Any member of the organization can publish, manage and interact with content on Splash, including:

- Add comments to posts and other comments
- "Like" posts and comments
- Create and join groups
- Share posts with other groups
- Pin posts to a personal or group board

## Goals

The goals for Splash were both high-minded and practical. At its most basic level, Splash had to be mobile, fast, and available anytime, anywhere. But, as the



company's primary communications channel, it also had to be secure. In the bigger picture, EE wanted to "revolutionize the way its employees receive and share information," basically democratizing information that had once been one-way and top-down. So, Splash needed to be a vehicle for change within the organization by creating opportunities for real-time conversation and collaborative work streams. By doing so, it would support a more informed and educated workforce, helping employees to be more involved and committed to business objectives and more confident in and willing to promote, support and sell the company's products and services.

## Challenges

There were many levels and many aspects to the multiple challenges facing the Splash team. Among them were:

- **Operating in secret:** EE was in a unique position when the design team was planning Splash. The organization was on the cusp of a major rebranding effort, so the work was taking place in the strictest secrecy. Only a tiny fraction of the organization knew what was being planned.  
*"And we had to build a new communications channel that would touch every single person at EE and be integrated into our global infrastructure, at a time when we couldn't even tell some people what we were working on," says Chesterman. "It was crazy at times."*
- **A brand in flux:** While the team was developing Splash, the company was working on its new brand. These parallel tracks made the design process more complex. *"Guidelines were written, rewritten, then torn up and started again!" says Hughes.*
- **A mandate to change the communications paradigm:** Perhaps the biggest challenge the team faced was that Splash was intended to fundamentally change the way the organization communicated with its employees and facilitate an open dialog among employees. This was a sea change. *"We were giving our employees a voice," says Hughes. "Many, many people were extremely nervous about this idea, even within our own communications team. But, our CEO was clear that he wanted change. He wanted his messages to land in new and exciting ways."*
- **Limited resources:** That environment of secrecy made it difficult to wrestle already scarce resources and allocate them to an internal-facing project that was operating in stealth mode. This land grab for development resources was an almost daily struggle. *"We're a small team," says Chesterman, "and the task was huge. But we spent months talking to the right people around the business: Security, HR, Engagement, IT, Retail, Customer Operations. We had to speak to them all to sell in our idea and get their help. All while they were focused on 'bigger things'."*



- **A short and fixed timeline:** The team had only eight months to complete the work and was operating a fixed deadline. “On day one of EE we wanted every single employee to come in to work, turn on their screens, and immediately know that something had changed, beyond the décor and the posters on the walls,” says Hughes. The timeline was a challenge, but it created a kind of forced efficiency that ultimately benefitted the project. There was no choice but to stay on top of every detail and be decisive. “A big advantage of rapid time-to-launch is that you’re not tempted to add in lots of features that end up under-used or getting in the way of core functionality,” says Thompson.

## Users

Recognizing that the organization has a diverse set of roles and that not everyone works in the same way or wants the same information, they based the design of Splash on a set of defined role-based stereotypes:

- **Customer service representatives and retail advisors:** These are the people on the front lines, serving and supporting customers on the phone and in stores. People working in these roles typically have limited time to use anything outside of their core support tools.
- **Network engineers:** Engineers are the backbone of the company’s network. They work primarily out in the field and have limited access to the corporate network (through VPN).
- **Business sales:** Sales staff spend their time on the road, visiting clients, and have limited access to the corporate network (through VPN).
- **Home workers:** These employees use their own homes as their office but travel to different office locations.
- **Office workers:** Typical office workers who commute daily to a desk in an office and access the corporate network over LAN or via broadband.

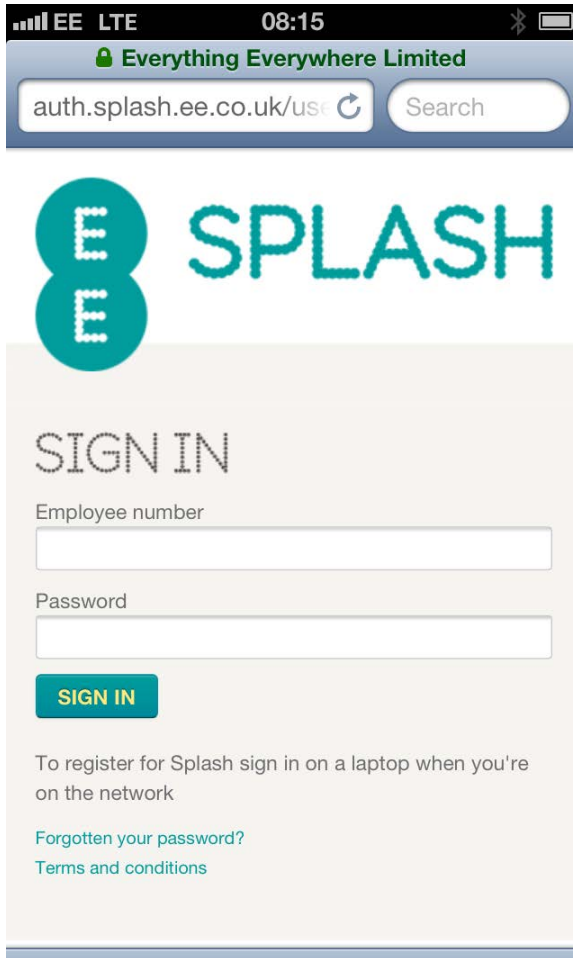
## THE MOBILE EXPERIENCE

### Logging in Without an Email Address

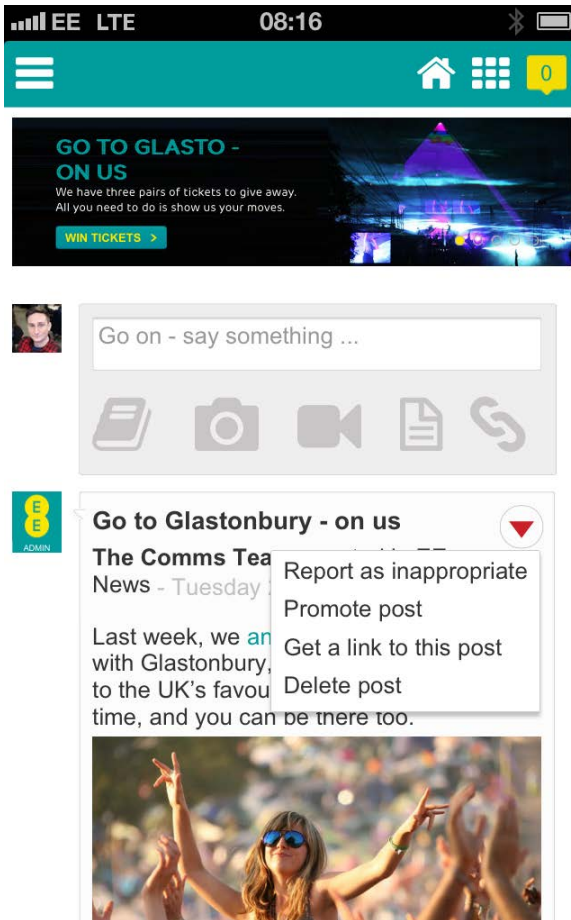
Rather than have users authenticate using an email address (not all EE employees are desk-bound employees who have company email), the design team chose instead to use employee ID numbers—something that every employee has as part of their profile in the HR database. A new hire can register for Splash upon arrival, and when an employee leaves the company, access is automatically revoked. Initial registration has to be done from a desktop computer connected to the corporate network. Users who don’t want to register can view content but cannot actively participate or use the mobile version of Splash.

Opt-in registration was important to EE. “If all you want to do is get the latest news and access content in the office, then you can still do that without interference,” says Chesterman. “This approach also helps build a community vibe, by saying, we built Splash for you but we’re not going to force you to use it.” Linking Splash to the employee profile was also important, so that users would not have to update their information in more than one place. The site does not yet have single sign-on capabilities so for mobile devices that aren’t connected to the corporate network (by

VPN), links are grayed out, with rollover information explaining why they're not accessible.



The Splash sign in screen where employees log in with their employee number rather than a company-issued email address. (Not all EE employees are deskbound employees with email addresses.)



Mobile homepage. The main feature carousel (immediately below site navigation bar) promotes the latest EE news, followed by the user's profile photo and a post panel. This is where a user can create a post, upload an image or video, and add a link to a document or website. Below this area, users see a rollup of all the latest posts for the groups to which they are subscribed. In any post, the user can use the down arrow on the right side to:

- Report a post as inappropriate
- Get a unique link to the post
- Delete the post (admin only)
- Promote/un-promote the post (admin only)

## Navigation



Show/hide left menu with links to posts and groups



Go back to the homepage from anywhere in the site

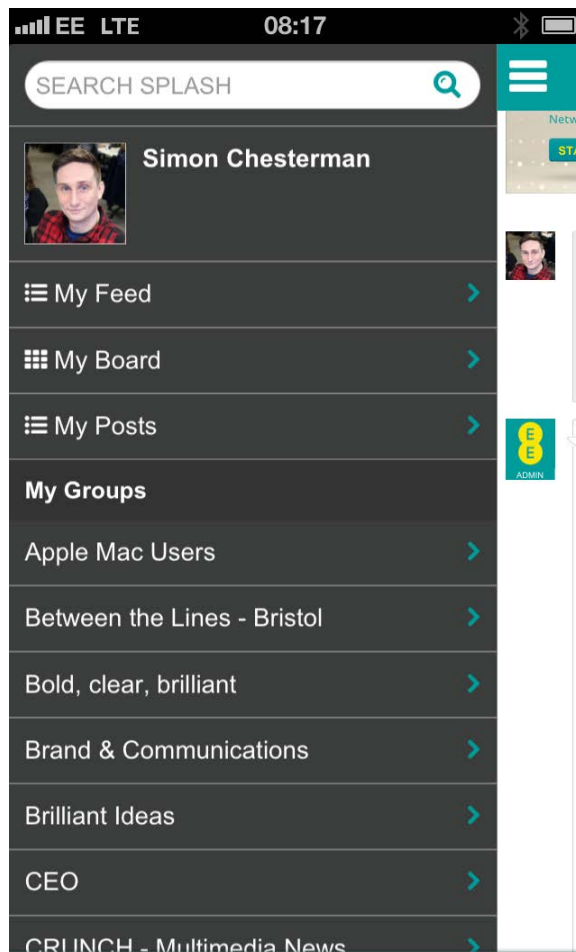


Visit your board



Notifications for activity in groups and posts

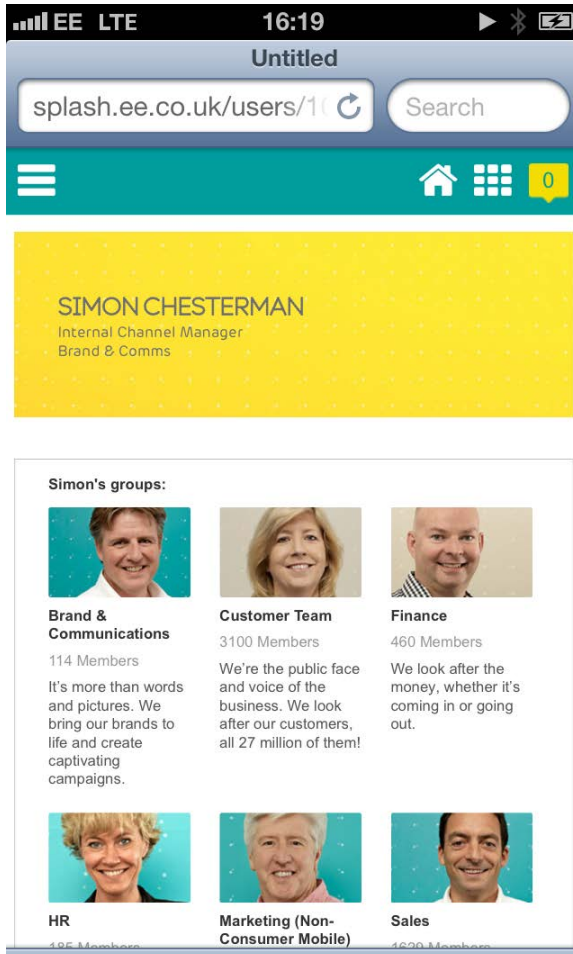
The main navigation bar at the top of the page is consistent throughout and provides a simple way to get to critical content quickly.



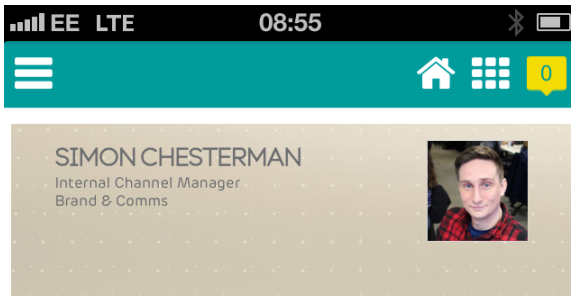
Mobile site navigation is accessed through a slide-in panel offering links to all the key areas of Splash. This creates a virtual left-column within the mobile experience and allows for a more effective IA experience than would be achieved through dropdowns or page-top navigation bars on a mobile interface. Placing the main navigation links in the left fly-out menu keeps the content separate from the navigation. The menu is activated by swiping the stacked bar icon in the upper left corner.

## Profile Pages

User profile pages provide details about people and also show which groups to which people belong. All registered users can see everyone else's profile, but there is currently no friending or following functionality. The team is considering ideas for enhancing the user page to include a user's posting activity and an @mention functionality, so that if someone references a user directly in a post or comment, that user will receive a notification. One method people use to find one another is to search for a skill or interest. For example, a search for "Excel" will return everyone who has listed this program as a skill in their profile.



**Profile page:** All Splash users have a profile page that shows their full name, job title and function area, along with all the groups to which they belong.



**If you need to change your Job title or Work Location below, speak to your manager who can update things using the HR forms in MSS. Your phone number is fed from the directory so please follow the steps there if this is incorrect.**

**Profile image:**

You can upload a new photo to be used just in Splash. All we ask is that you make sure it's recognisable as a photo of you. We want Splash to help us connect with different parts of the business and that means it's pretty important that people know what you look like. In a nutshell, make sure it's you and not a picture of your cat.



no file selected

*Square photos at least 300 x 300px work best*

**Name:** Simon Chesterman

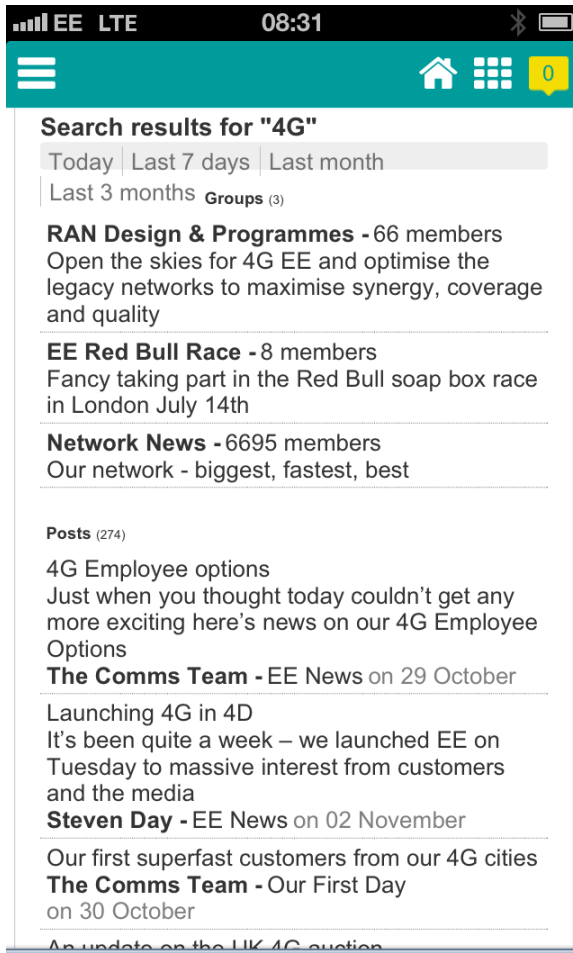
**Job title:** Internal Channel Manager

**Chief group:** Brand & Comms

**Location:** Bristol

Users can personalize their profiles by adding a photo, information about themselves, their skills, interests, and email address. They are also able to choose a background color, change their password, and leave/hide groups, all from the profile screen.

## Search



**Mobile search** works and behaves in exactly the same way as on the full desktop version. Search results are organized by groups, posts and users. Newsfeeds and search pages make use of endless scrolling through AJAX pagination. That enables the user to skip down long pages of content on demand without compromising page load times or having to navigate through several screens of traditional pagination. To improve page load times and reduce endless scrolling, Splash loads articles in batches of eight. When a user gets to the bottom of the page, another set of articles is loaded and displayed. This chunking approach is quicker, reduces data transfer, and provides up-to-date information as the user is making fresh server requests to get the latest content.

## Groups

Splash was designed primarily as a replacement for EE's broadcast news channel, so it had to deliver business-wide news and leadership messages to the widest possible audience. At the center of the Splash user experience is the site's groups functionality. By subscribing to groups, users are able to find content that is more relevant and interesting to them personally *and* professionally.

Groups give users a more personalized view of that broad information. At launch, every registered user is automatically enrolled in at least three default groups:

- **EE News:** Broadcast news collated and published by the company's central communications team
- **CEO:** CEO Olaf Swantee's leadership messages are a default group for each employee
- **Chief's group:** Leadership messaging based on where an employee works within the business

"One of the main things we wanted to avoid in Splash was 'noise' from everyone and everything going on," says Chesterman. Apart from the three main company news groups (that everyone's a member of), Splash is there for you to create and share."

"The Splash design reflects the importance of groups," he says. "You can find and discover groups via search, in the fly-out navigation, and on your profile page."

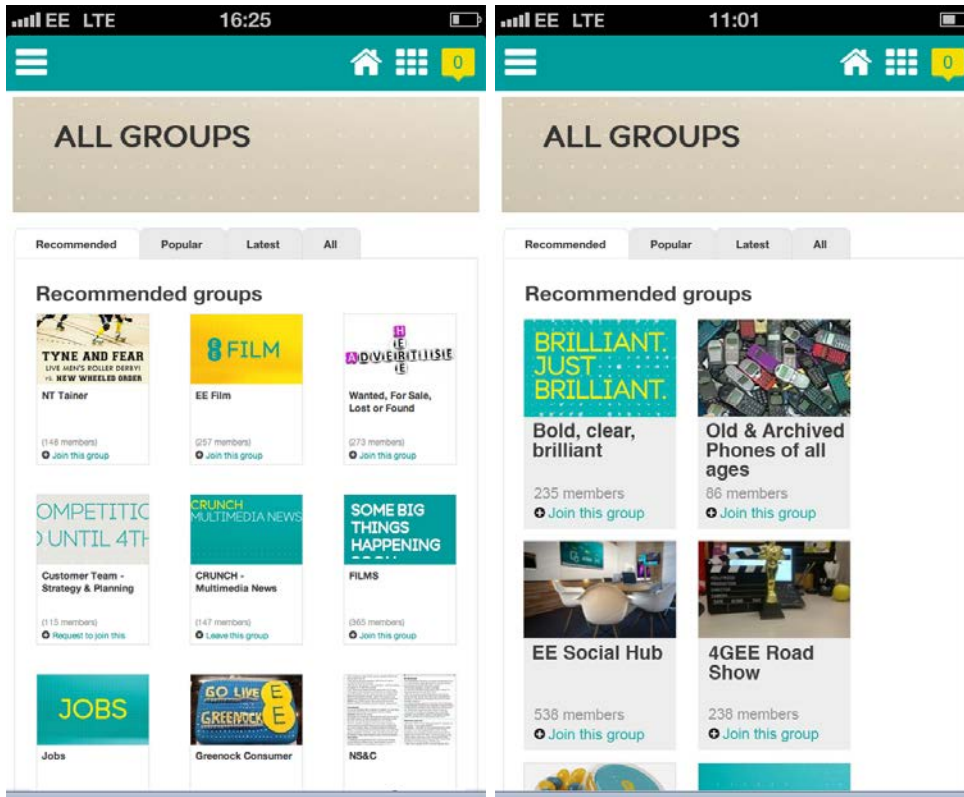
There's also a main group landing page that lists groups by Recommended, Popular, Latest, and All (shown below).

There are also numerous default groups assigned for select audiences, for example, managers, talent and development personnel, and the company's Retail team. Each has its own group.

Splash groups are most useful when people create their own, so anyone can create and manage a group on any subject they feel is appropriate for the audience. The company offers guidelines and performs occasional audits to make sure groups are suitable. Other than that, users are free to create what they want. Group administrators can manage their groups directly and choose who can see and join them, along with who can post, pin, and add comments.

When Splash launched, many people created a group for their team, which was a natural fit for the group's functionality, but within minutes of launch, special-interest groups began popping up also. From five-a-side football teams to people fed up with the sloppy parking in Bristol, EE employees suddenly had somewhere to gather (virtually) and talk about what was going on.



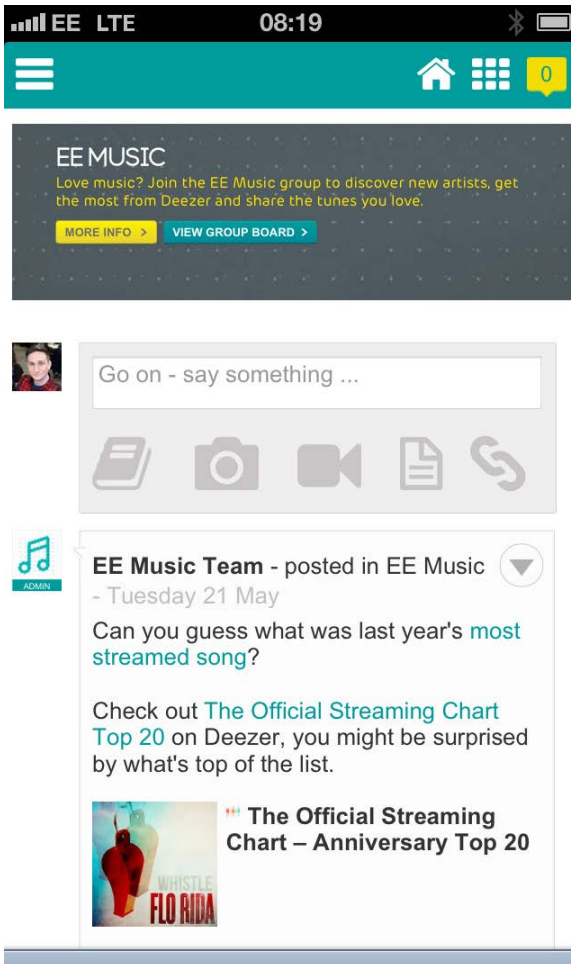


**Left:** This screen shows the original design for browsing through all available groups. The three tabs segment the groups by categories: Recommended, Popular, Latest, plus a button for All Groups. In response to user feedback, this design has been modified (shown below). **Right:** The redesigned groups page. Responding to user feedback the design team narrowed the tiles down to a two-column display (from three as shown in the previous screenshot).

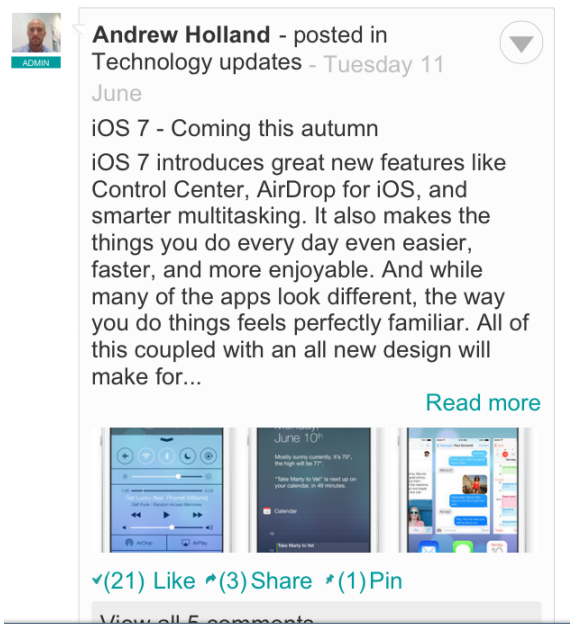
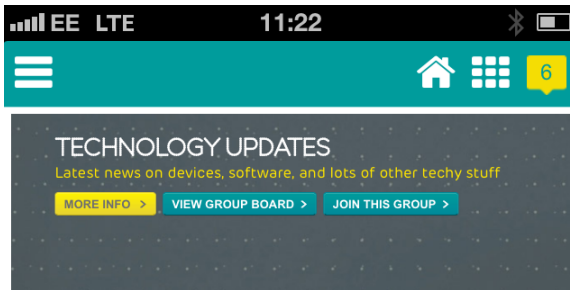
The redesigned groups overview page (shown below) is a good example of how the Splash design has evolved, and it illustrates one of the advantages of a mobile-optimized approach over an app.

The *All Groups* pages are generated by pulling in the group's profile image as a tile. (The group's profile image is set by the group admin.) If a group profile image hasn't been set, the most recent post with an image is captured and used. Every group has a description on its own landing page, and EE encourages group leaders to create meaningful, straightforward group names to make them more easily recognizable.

Despite all of these efforts to pull relevant, recognizable content to represent the group, the team received feedback on the original design (shown above) that it was difficult to recognize the groups from such small images and (smaller) text size. The team responded by reducing the number of groups displayed in a row, from three to two (shown here). That change was something it could quickly implement because Splash is a mobile-optimized website rather than an app.

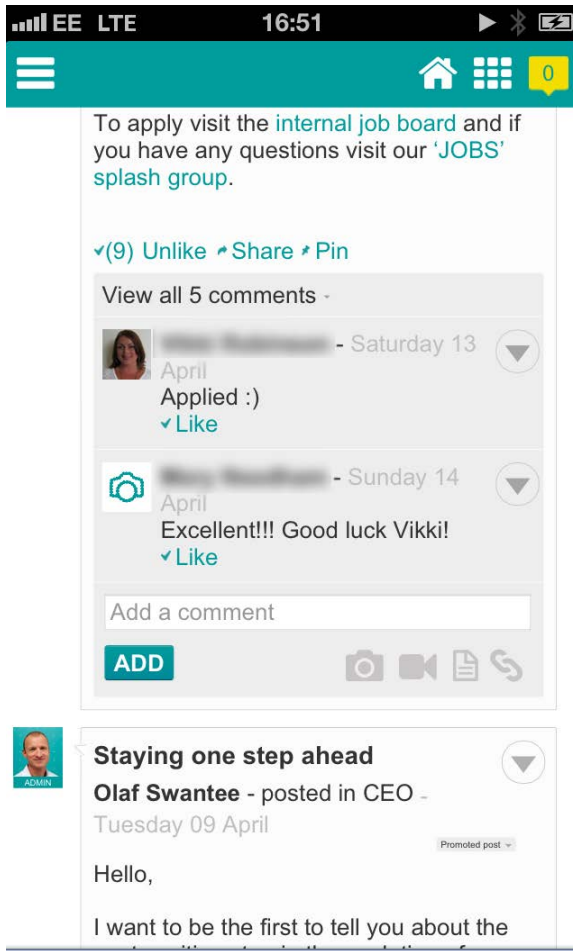


This screen shows the homepage of a group called “EE Music.” These types of personal/special interest groups have proliferated on Splash. A banner at the top of the screen invites users to join the group, offering links to find out more about the group or view the group’s board. Within a group, users can start a conversation by posting a comment or a video, image(s), SharePoint document or link, or Web links to external sites. (Icons for these actions are shown directly below the conversation box.) Users can also share or “like” others’ comments. The EE Music group is open to everyone. This screen shows the group’s main feed, which is a newsfeed of content, and a board where content from all over Splash can be stored for future reference. The EE team likens this to a “digital pin board” where users can pin and store content in the same way they would with a real pin board in the office.



Group admins have three choices to which they can set the group permissions: open to all, apply to join, and invite only.

Groups have been a great success. Company research shows that the number of “cross-functional workflow” groups is proliferating. These are groups of employees from all corners of the business that get together to talk about common issues affecting their day-to-day roles. From competitor tracking to tips and tricks on getting the best out of the latest Android devices, people are sharing knowledge and communicating on a scale never seen before.



At the bottom of every group post, users can *Like*, *Share* (with another group), and *Pin* to their group board; add a comment, image, video or link; *Like* other comments or report other comments. Splash displays the two most recent comments, with the option to read back in time, in batches of 30.



By putting our network right into the hands of consumers while they're in the cab, we're able to demonstrate just how amazing it is. Maybe they want to upload a new work document while stuck in traffic or stream a YouTube video to keep themselves occupied. Using our 4G network, they can.

[Read more](#)

✓(17) Unlike ↗(2) Share ↗(2) Pin

View previous comments -  
30 of 690 Close comments



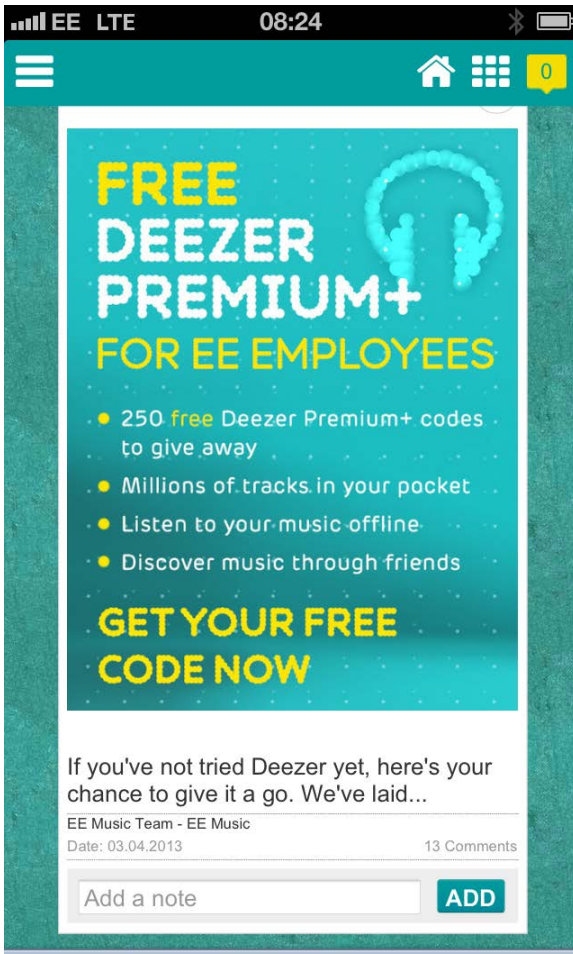
**Katy Newman** -  
Wednesday 10 April  
4GEE VOUCHER  
✓Like



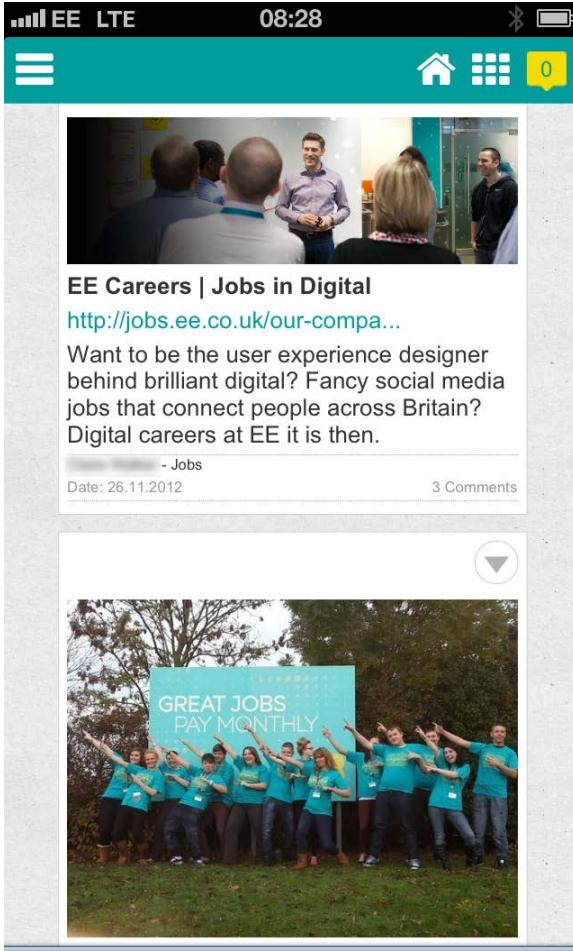
**Lenalisa Fornberg** -  
Wednesday 10 April  
4GEE VOUCHER



Article authors can also set a break point anywhere in their copy, which adds a *Read more* link. Posts and comments are automatically truncated at 160 characters. The company has revised its writing guidelines and recommended article word count to encourage bite-size communication with rich visual media that gets to the point and, where appropriate, prompts a response.

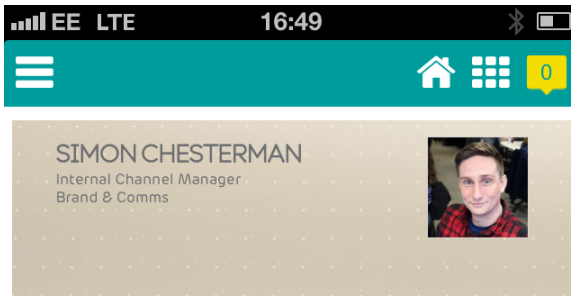


To help promote and discover useful and important information, every person and every group has a board where they can pin content. A board might contain a Chief video, (Chiefs are responsible for a business area and report directly to CEO), links to a SharePoint document, team event photos, or just a simple sticky note. Users pin their favorite content to boards so they can keep track of it. Here a user has pinned a post to a group board.



An example where an article and photo have been pinned to the jobs board.





**Notification settings:**  
Choose which events you want to be notified about and whether you also want to receive an email confirmation

Groups	Notify me	Send email
Invitations to join a group	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Invitations to become a group admin	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Requests to join your group	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
New members joining your group	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A post or comment in your group has been flagged as inappropriate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Posts</b>		
Your post is pinned	<input checked="" type="checkbox"/>	<input type="checkbox"/>

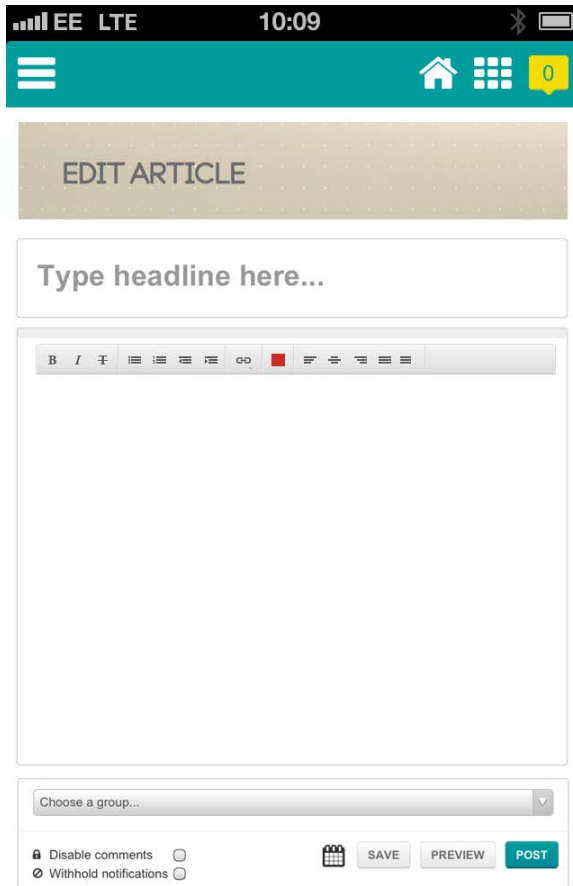
Users can choose which events they want to receive notifications for and how they want to receive them. When a user has new notifications, a number appears in the yellow dialog icon at the top right (currently showing zero).

## Digging Deeper

The Splash team continues to develop the site, expanding its capabilities and providing a richer experience for advanced users. Some of these initiatives include the following:

- Rich text formatting:** Users posting official company updates (for example, members of the communications teams) are given a WYSIWYG toolset in which to create formatted posts. The goal was to give communication publishers the ability to create rich, formatted articles on their mobile devices. This feature is a work in progress. "This seemingly simple idea has proved to be not so simple, and we're still working on improving and refining some of the back-end functionality," says Chesterman.



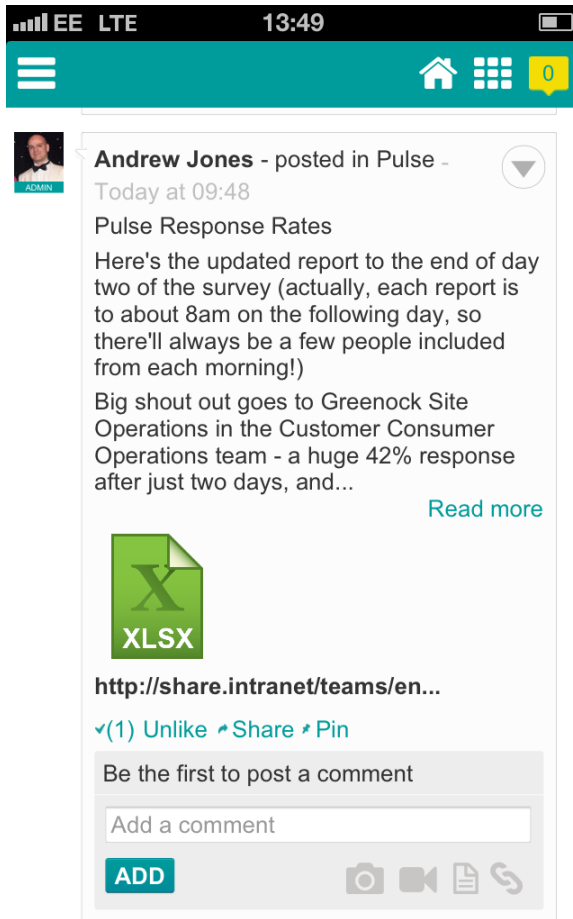


Users posting official company updates (for example, members of the communications teams) have access to a WYSIWYG formatting tool. The screen above shows the team's initial take on this formatting functionality.

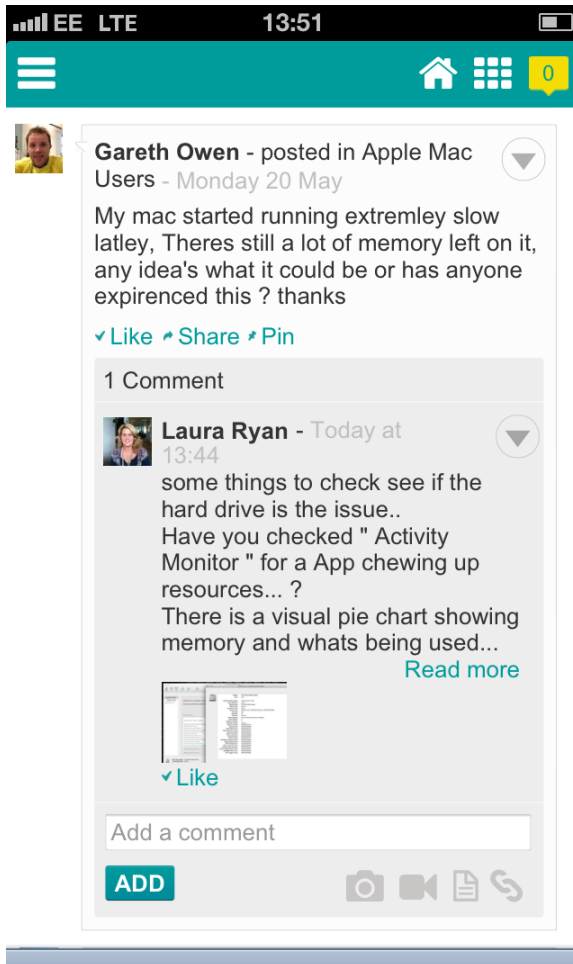
- **Connections to SharePoint:** SharePoint is the underlying technology for the company's intranet. While connections exist between Splash and SharePoint, the two are not integrated.
  - **SharePoint** is where the company stores its static reference information. It's totally secure and accessible only on the corporate network.
  - **Splash** is a separate social communications tool designed to link to further resources, so, for the most part, the content won't be of the most sensitive type—that all lives in SharePoint.

Splash is the front door to the company's SharePoint environment. "We believed that everything you can do in the office, you should be able to do on a mobile too, without compromising the design and usability," says Chesterman. Splash provides relevance for documents hosted on SharePoint; where users might reference a company policy, for example, they are also able to link directly to it from Splash. But the items stored in SharePoint stay in SharePoint. Splash just provides another conduit for users to access the information. "Storing documents in our SharePoint site, they can be maintained and managed inline with our document storage

classifications and workflow,” says Chesterman. “We wanted to provide a nice, easy path to SharePoint documents, not replace the already existing and established functionality.” Users whose devices aren’t connected to the corporate network by VPN see SharePoint links grayed out and are given an explanation through a floated message that appears when a grayed-out link is pressed.



This is a truncated post with a link to a SharePoint document. When there is a link to a document, a thumbnail image of the file type is shown, so users know what to expect when they click on it.



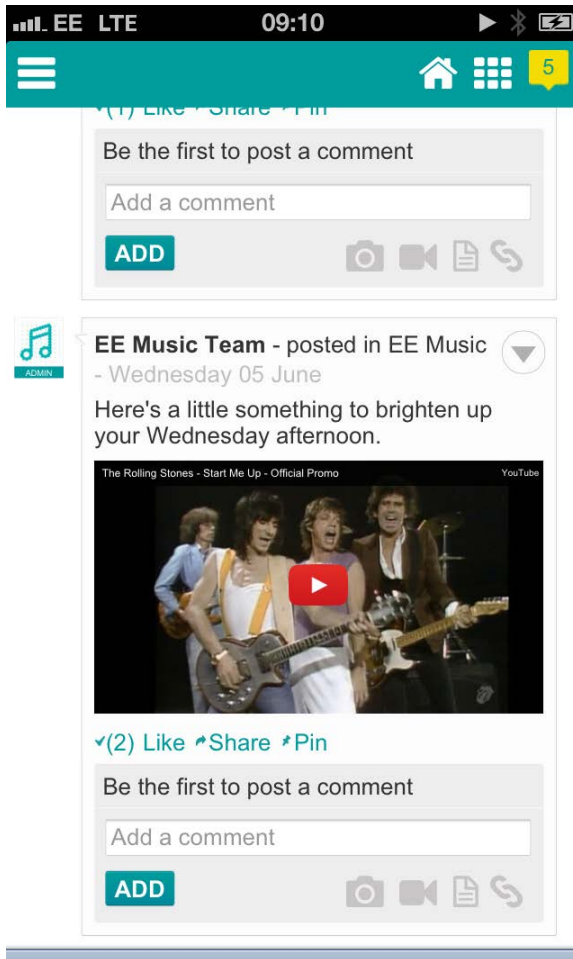
The post and newsfeed on Splash lend themselves to the chunking of content, which is delivered as an endless scrolling feed using AJAX pagination. That lets Splash load faster and serve the latest content. Splash also provides automatic truncation of long posts and comments (providing a *Read more* link at the cutoff point) and concertinas—multiple comments in an expandable list. This feature allows users to skip quickly through content in their newsfeed while offering them the ability to expand comments or read more of the posts they're most interested in.

## DESIGN PROCESS

### Designing for Mobile First

Even though most EE employees first encounter Splash in its desktop version, the team used the mobile experience as the starting point for its design thinking. "As we mapped out the core features of the service—the newsfeed, boards, groups—we wireframed and designed the user experience so it worked intuitively on the smallest screen first," says Chesterman. "Once we'd cracked that and knew it worked well, we built outwards when developing a version for larger screens, presenting additional content and adding nonessential but useful elements as 'other things you might like'."

Defining a set of core rules meant the team had a foundation from which to think about adding complementary features. “It was totally the reverse process of taking elements away from the desktop to fit a mobile,” he says. “Mobile always came first.”



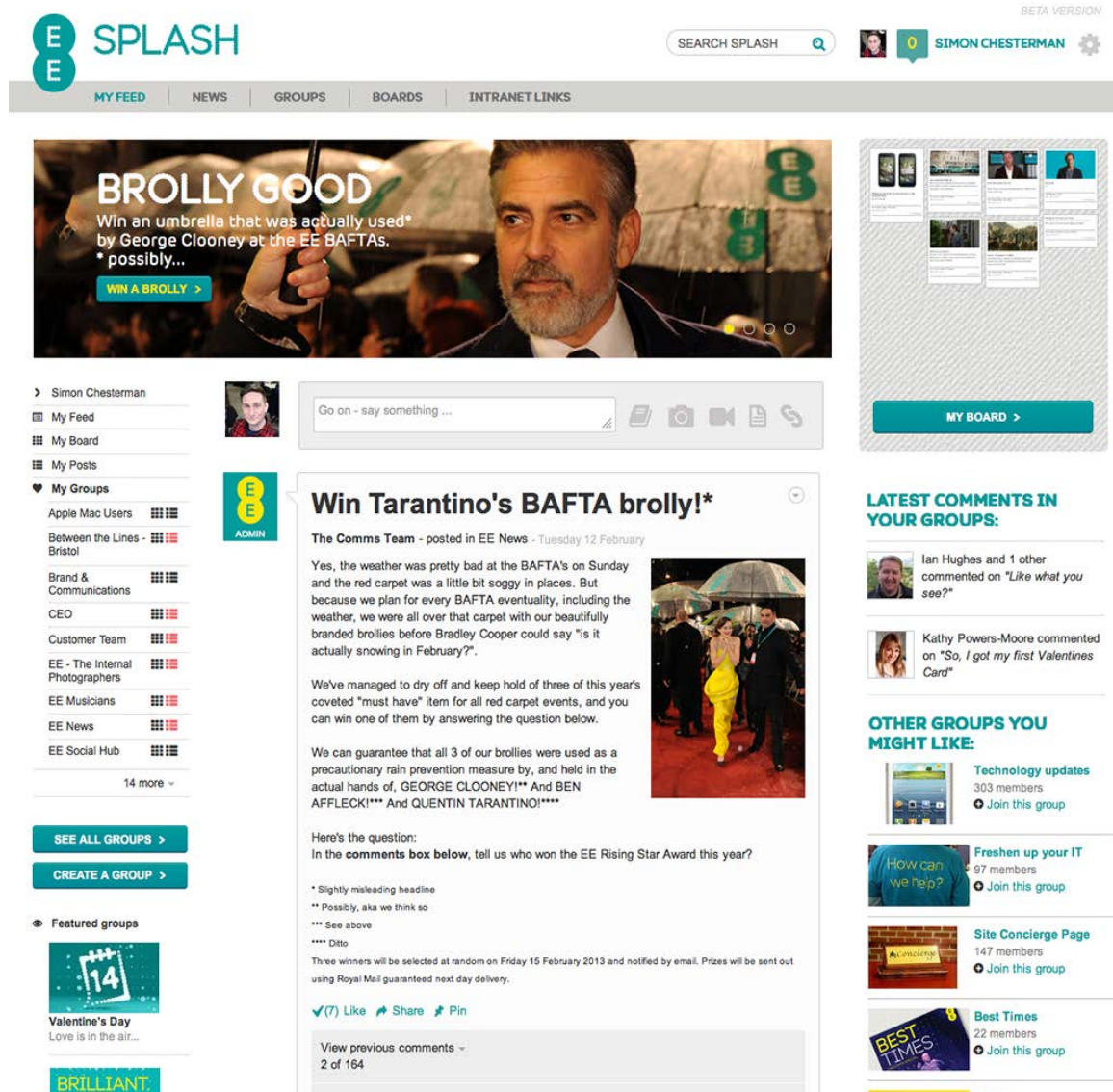
The design team wanted Splash to be able to easily handle rich media, such as YouTube videos and Deezer playlists. That meant IMP often had to rewrite embed code to accommodate smaller screen resolutions and then apply the translation automatically in the mobile designs.

## Translating Mobile Design to the Desktop

The tricky thing about a mobile-first approach is that eventually, you have to get the mobile design to scale up. That means figuring out how that thin, nimble design will stretch out its wings to fill the full expanse of a desktop browser. This eventuality heavily influenced how the designers approached the mobile interface. For example, in the main feature carousel, they floated text over the image to help maintain legibility when the image is used across different resolutions. Board items were designed to display vertically on a mobile and as a grid on a desktop, while maintaining the same width.

"We wanted the mobile version to be consistent with the desktop, so people would instantly be familiar with it, not just from a design perspective but functionally, too," says Chesterman. "To make this work, we focused on the central news column and restructured the navigation. You still have the top bar that follows you down, but with fewer links and the addition of a fly-out left menu."

"The mobile design is a classic case of separating content from navigation," he says. "It can essentially be distilled down to the central feed column and slide-in left navigation. The desktop version builds on this by fixing the left navigation with a top header and additional right column."



The traditional desktop view of the Splash homepage. The center column here is similar to how it appears on the mobile view. The left column navigation appears in the swipe menu on the mobile version of the site; and the persistent main navigation (shown here in words) is replaced with icon-based quick links on the mobile view.

## Involving Users (in Secret)

Getting users involved in the design at certain points was critical to making sure the design worked well, but this process was somewhat complicated by the covert nature of the work. So, the team shared its work with users how and when it could.

“There were specific points in the project plan when we would share the design and functionality with a closed group, but only when we were happy ourselves,” says Chesterman. “Splash development was confidential. We were only able to share our work with people who had signed a Non-Disclosure Agreement (NDA), but we also made sure we had a cross-section of people, including a Customer Service Representative (CSR) and a Chief (responsible for a business area, reports directly to CEO). We worked with this group to trial areas of the service and create simulated scenarios that allowed us to challenge and modify the designs.”

The team wasn’t looking for opinions. The designers wanted to confirm that what they were building worked and that people could understand how to use it—just by using it.

“A successful design doesn’t need a big introduction with lots of training material,” says Chesterman. “We wanted people to ‘get it’ straight away, like a new user to eBay or Amazon would.”

The team’s approach was based on realistic scenarios written with partner agency IMP Media. IMP would start with wireframes, then develop working examples they could use to take users through realistic tasks, such as: “Where would you create a group?”, “Find someone who works in Finance,” “Reset your password,” “Upload a video,” and so on. But, even conducting these simple test sessions was not simple.

“Because of the sensitive nature of what we were doing, we could only run face-to-face sessions with a cross-section of people under NDA; and we quickly found how challenging and time-consuming it was to organize, facilitate and write up,” says Chesterman.

Post-launch, the team moved toward remote testing to test additional features it was developing. During these tests, an email containing login information for the development site and an Excel template was sent to participants. The users were asked to complete several scenarios, report their experiences, then send the information back to the design team. This was obviously not an ideal approach.

“While this was much easier to manage, the results weren’t as good,” he says. “We were able to get richer, immediate results through face-to-face sessions, and of course we could watch the user in action. That’s so useful.”

## Quality Testing

Mobile designs require rigorous QA testing, especially mobile-optimized websites, because they are expected to work well on just about any device. This is one of the areas where the EE team relied heavily on the expertise of its partners at IMP Media. To test Splash for device compatibility, the team used a variety of methods, including testing on actual mobile devices and using desktop simulators and online mobile test centers, which use screen mirroring derived from physical mobile devices.

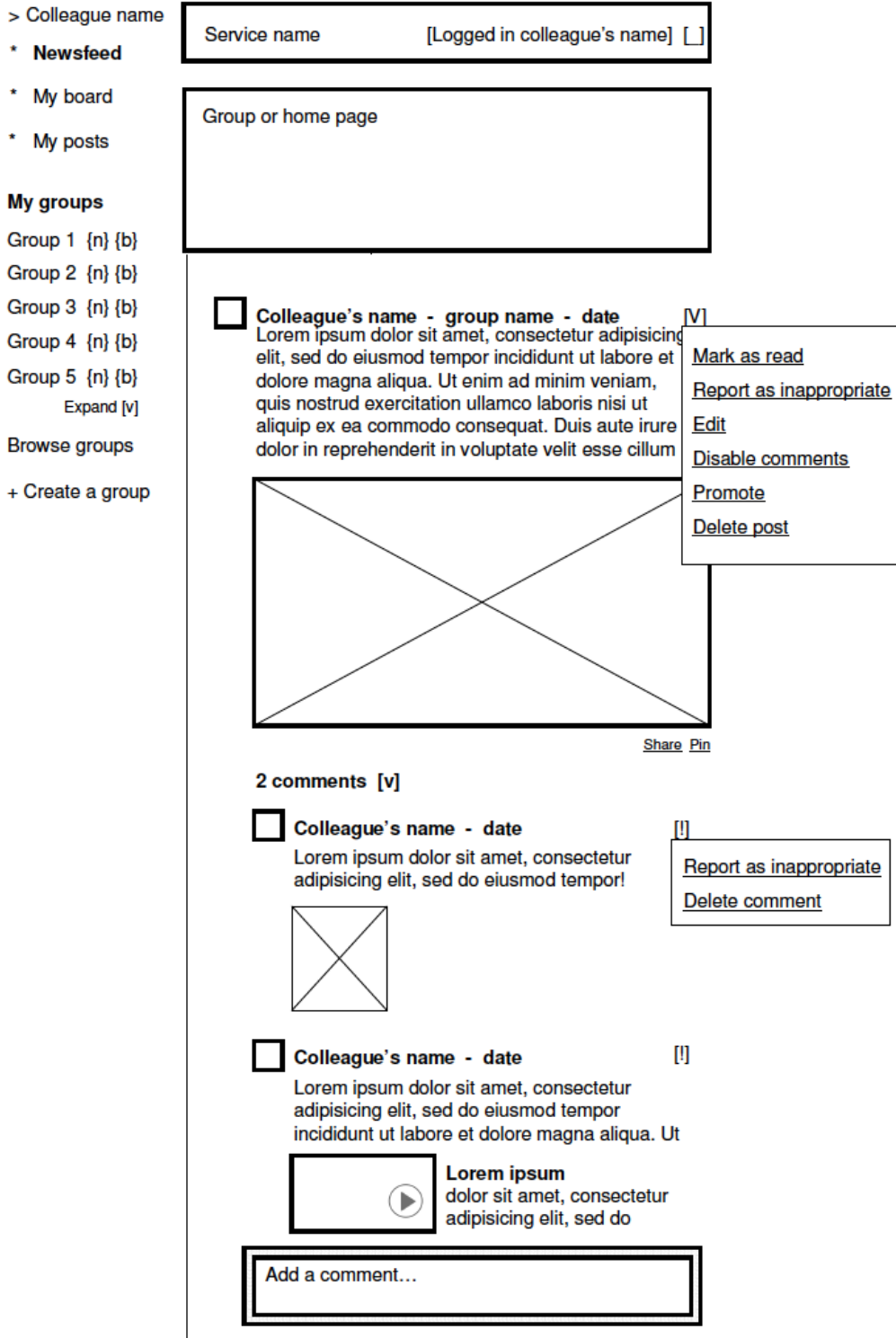
“We’re not precious about the test method we use—mobile vs. simulators, for example,” says Chesterman. “It just needs to be tested quickly and efficiently. We do

like to hold the device in our hands because it's more tactile, but if we can't do that, we'll go for an online simulator and then a mobile test center."

This approach is not bulletproof, but it's a pragmatic approach, given the number of devices available in the marketplace. And it seems to work, at least for EE. Testing on the real thing is by far the best way to ensure compatibility, but that's not always easy to do, so emulators and other testing solutions at least provide an opportunity to detect and correct some potential issues.

"Testing on real devices—there's no better way to test," says Mark Brewster, Digital Channels Manager, "but it can be difficult to get hold of the latest devices and keep hold of them, even here!"





An early wireframe sketch of the mobile design. The central news feed column is the pillar of the Splash design. "Mobile phones are ideally suited for an endless scrolling news feed," says Chesterman, "more so than desktops, and that's why we adopted this approach for browsing lots of content quickly."



PROJECT TIMELINE	
MILESTONE DATE	MILESTONE DESCRIPTION
Autumn 2010– February 2012	<b>Setting the stage:</b> As the joint venture between Orange and T-Mobile went forward, the combined organization conducted a review of the resulting communications channel mix and of its strengths and opportunities. Around this same time, team members started to research social intranet solutions as one possible approach, to address the communications shortcomings of the new entity. During this period the rebranding project began in secret; and the team had initial conversations with IMP’s team regarding possibilities.
March 2012	<b>Work begins.</b> Internal team begins talks with internal stakeholders and starts infrastructure planning: IT, HR and security. IMP takes brief for requirements.
May 2012	Response to brief accepted. <b>Development begins</b>
September 2012	<b>Alpha testing</b> of desktop and mobile solution begins
October 2012	<b>Beta release</b> of Splash for launch of EE
Ongoing	<b>Continuous development</b> of platform and exploration of new features, functions, and integration with other systems within EE.
Future	Possible <b>(native) app</b> for iOS, Android, Blackberry, and Windows Mobile devices

## MEASURING SUCCESS

### Measuring Value

The launch of Splash was intended to align with the company’s rebranding effort. That was October 2012. Since then, the site has attracted over 7,000 registered users (more than half the company’s workforce). But numbers aren’t the most important indicator that Splash is a success. It is not so much the numbers as the behavioral changes catalyzed by Splash that are making big waves at EE.

“It’s radically changed and improved how we communicate and work together,” says Hughes. “Our people are more aware of what’s going on around the business and now have a voice. Splash has removed a communication bottleneck and empowered business areas to own their content and communicate to specific groups of people, something we’ve never been able to do before.”

With Splash, EE employees can now have a say in sharing ideas and making improvements. For example, Brilliant Ideas, a group formed on Splash, is where employees can share and collaborate together on new ideas to improve business efficiency. The group has generated over 300 ideas, 45 of which have been taken on board and implemented. Users can use Splash to find answers and ask for help.

## Measuring Impact

The EE team uses a mix of analytics tools, including Google and human auditing, to measure not just the traffic within Splash but also patterns of behavior. “With a tool that can instigate such a significant cultural shift, it’s important to maintain the human connection to it,” says Hughes. Measuring usage in this way has revealed some interesting insights for the team.

“So, we know that more people read the news in Splash than they used to on the old intranet news feed—we can measure this,” he says. “But, for example, we also know that a significant number (nearly a quarter) of all the groups created by users are cross-functional workflow groups addressing shared interests and concerns, or business needs. This means that Splash really is building bridges and removing people from their communications silos. And this behavior is organic. We haven’t given any central support in the creation of these groups.”

That may not sound like a big deal, but for EE this kind of information cross-pollination is a dramatic change.

This mix of traffic numbers, combined with a human interpretation of the metrics, is what is helping the company understand the impact of Splash.

“Even nine months after we launched, we’re still feeling the shock waves of such a radical approach to internal communications,” says Hughes. “People are only just starting to get used to the idea that they can take a subject and talk to an entire organization about it without seeking permission or guidance on how they do it. We’ve opened up a whole new world.”

## Unchaining Users

Splash is the company’s first foray into accessing content and completing tasks away from the laptop/desktop, in a secure and supported environment. Ultimately, it’s this “unchaining” that has been radical for the organization.

“As a digital communications company it makes absolute sense that we live what we do as a business internally, and this effect ripples throughout the company,” says Chesterman. “Before Splash we had a fairly static intranet that was only accessible from a computer over the corporate network, we now have a mobile solution with a new set of social and collaboration tools, that’s always in our employees hands.”

## LESSONS LEARNED

The EE team share some of their lessons learned from the Splash project:

- **Choose your partners with care.** “The main lesson we’ve learned from the whole Splash project is the importance of working with the right people, and this wholeheartedly includes the team at IMP Media. We’re a small team, but that makes us agile. It means we can operate on a level that doesn’t create too much noise—until we need it to. It means we were able to bring the right people into the room when we needed them, not when we were told they needed to be there! This meant we tackle our challenges one at a time, in a logical order. This effectively paves the way for you to effect real cultural change without scaring the pants off everyone involved.”
- **Communicate early and often.** “When somebody said ‘such and such department will never agree to it’ and we could say, ‘we spoke to them first and they’re happy with what we’re doing’, the resistance to making significant changes dissolved bit by bit. The challenges we faced were huge, but not insurmountable. By making sure the right people, with the right skills, tackled each challenge in a sensible order, and never thinking that what we were doing was going to fail, we achieved something that even our own bosses thought couldn’t be done.”

## “ZON 4 Sales” (ZON Multimédia)

**Company Overview:** ZON is the leading pay-TV service provider in Portugal. With 1.6 million customers, it is the leader in next-generation broadband services, film distribution and exhibition, and it has a landline business that is growing.

**Headquarters:** Lisbon, Portugal

**Annual Sales:** €858.6 million (2012)

**Number of Employees:** 1,600

**Company Locations:** Lisbon, Portugal

### **Mobile Project Overview:**

“ZON 4 Sales” is a website to support door-to-door salespeople registering cable TV, Internet and telephone customers. It also enables sales reps to schedule technical and installation services with the service provider (when needed). The website was designed using a “mobile-first” approach, to ensure that the sales people have the best possible experience when accessing the site from smartphones and tablets.

### **Design team:**

A team of approximately 10 people, including external developers working as insourcing resources (third party resources who work inside ZON), executed the project. The design was created by Hugo Neves da Silva, with lots of feedback from the other members of the team.

### **Members:**

**In-house:** Hugo Neves da Silva, Design and Usability Analyst; Cecilia Silva, Business Analyst; Ana Margarida Almeida, Agile Factory (an internal team) Manager; Andreia Estrela, Business Account/Requirements Manager; and Pedro Matias, Technical Team Leader.

**Insourcing:** Hugo Torres, Systems Architect; Paulo Renato Santos, Developer; João Martins, Developer; and Bruno Félix, Developer.

## OVERVIEW

Many teams are tasked with taking a desktop website or business application and making it work on mobile devices. Retrofitting desktop applications for the small screen can be a series of difficult trade-offs. By comparison, the ZON design team was given a dream assignment: focus on mobile screens first, then design for bigger screens by rearranging the design elements and optimizing for the available space. This process of progressive enhancement enabled the team to design a mobile-optimized sales website that empowers its door-to-door sales staff in every step of the sales process, from identifying viable leads to closing the sale, all from the palm of their hands.

ZON door-to-door sales reps use ZON 4 Sales to register customers for the company's Cable TV, Internet and phone services. It also gives them the ability to schedule technical service calls with the service provider responsible for installation (when needed). In order to ease the seller's work, some mechanisms were implemented that allow the user to access additional information related to potential customers, giving him deeper knowledge about his target, and allowing him to optimize his time. With this website on his mobile device, the sales rep is able to

quickly identify which customers he should or shouldn't visit, and whether it's worth spending time trying to make a sale to a specific customer.

With the website, the rep can complete the following tasks:

- Register sales
- Track orders
- Perform queries (to qualify leads)
- Schedule services

**Type of project:** Mobile optimized website accessible from all devices. But the design team was aware that many users would use Android smartphones to access the site so it took extra care to ensure a better experience on those devices.

**Why This Approach:** The goal was unrestricted access, regardless of device, so the team chose to design the site with a mobile-first mentality, keeping the focus on mobile screens first, then designing for bigger screens by rearranging the different elements and optimizing the available space. In other words, the approach was progressive enhancement rather than mobile degradation.

**SALES**

**MAIN INFO**

UA (Address unit):  
7910292155  
(Search UA)

NIF / Customer Account:  
NIF 176859233

**CONTINUE**

**PRODUCTS/SERVICES**

Address: Goncinha, LT 18 - 19, 6ª I, Loulé, 8100 - 114 LOULÉ, PORTUGAL

Package:  
ZON FIBRA 100 LIGHT Iris (006) REMOVE

Mandatory equipments:  
ZON BOX 2.0 HD (ZON BOX 2.0 HD (Cabo) - rental)  
ZON HUB 3.0 (ZON HUB 3.0 - rental)

Additional equipments  
ZON CALL (PHONE WIRELESS) (ZON CALL payment in 24 months) REMOVE

Select equipments

**CUSTOMER INFO**

New customer  ZON Customer

Name:  
Pedro Rosa

Customer NIF:  
176859233

ID Card:  
BI/CC 11329912

Phone number:  
929258369

E-mail:  
pedro.rosa@gmail.com

**OTHER INFO.**

Contact time:  
10h - 12h

Portability:  
 Yes  No

Direct Debit:  
 Yes  No

Electronic invoice:  
 Yes  No  
pedro.rosa@gmail.com

Transfer address  
 Change of ownership

**VALIDATE REQUEST**

**SCHEDULING:**

Date:  
18 march 2013

Time:  
12:00

12h-14h - Thursday, March 14, 2013  
 14h-16h - Thursday, March 14, 2012  
 16h-18h - Thursday, March 14, 2012

**SUBMIT REQUEST**

ZON 4 Sales walks users through the sales process step-by-step, taking advantage of progressive disclosure to make information available just when the user needs it. This expanded view of the sales screen shows all the fields expanded, but users are shown the steps—as needed—in stepped increments. For example, when the sale screen loads, the user can see only the top section of the form: *Main Info*.

After they press the *Continue* button, the page loads the second step, and so on.

## Goals

The project goal was to create a mobile experience that would accelerate and optimize the selling process by reducing the time lapse between the customer negotiation process and services implementation. There is a growing desire across the organization to create mobile offerings. “First, to meet the needs of our customers and maintain a competitive advantage compared to our competition, and second, to simplify our internal processes, making them more efficient and effective,” says Hugo Neves da Silva, Design and Usability Analyst.

The goal of ZON’s mobile-first approach was to support the largest number of users possible, regardless of how they access the site (or from what device). Rather than limiting its reach to users on a specific device or platform, the mobile-optimized website allowed the team to focus its work on supporting the widest number of tasks and reach the widest number of users. While ZON provides devices to its partners in order to use the application, they can use their own equipment if they prefer.

Besides providing wide access, the team also set several qualitative goals for the project:

- Reduce the number of data-entry errors
- Reduce (by 25%) the number of calls to the support line made by sellers
- Restrict unauthorized users from accessing address reports (which contain a variety of valuable lead-generation information about a particular address and its sales potential)
- Increase overall information security
- Improve the user experience (when adapting the mobile experience from the original SMS-based application that 4 Sales is based on)
- Improve ZON’s image and sales potential when approaching clients in the field. For example, with the 4 Sales data in their hands, sales reps are able to effortlessly address customer sales questions in real time (schedule an installation, check the status of a request, etc.). It is expected that this type of efficient service will reflect a positive light back on the company in the eyes of its customers.

## Challenges

Bringing ZON 4 Sales to the small screen presented challenges that ranged from what the user sees to how the data is transmitted. The team explains:

- **Technical challenges:** “The initial request of the sales department was to change the communication technology of VPP (the rudimentary Java-based SMS application formerly used by the door-to-door salesmen) from SMS to packet data, so as to reduce transport-related errors. Thus, the first challenge was to seize that opportunity to improve/redesign the VPP application by finding new solutions (and corresponding business drivers) to substantially improve the tool used by door-to-door salesmen.”

- **Designing for a small screen:** “The biggest challenge was to organize all the elements on a small screen, with a width of 320px, in order to have an interface that suits the needs of door-to-door sellers, helping them in their daily tasks, making their work easier.”

## Users

Application users are mainly door-to-door sellers. These are salespeople whose goal is to sell products and services directly at the customer’s home. These sellers are divided into three groups:

- **Door to door:** Go to the customer’s house
- **Back office:** Register the sales of other sellers in the system, without going to the customer’s house themselves
- **Team leaders:** Usually don’t make house visits, though they are allowed to. These users also register other sellers’ sales in the system.



## THE MOBILE EXPERIENCE

### The Sales Process


The target user group are sales reps working door to door, so all content and functionality had to focus on helping them manage the sales process in the field.

The screens supporting the sales process take advantage of progressive disclosure to give users what they need one step at a time, giving them content on a need-to-know basis, paring down screen elements to only the basics. In ZON 4 Sales the sales process follows three steps/three screens:

The screenshot shows the ZON 4 SALES mobile app interface. At the top, there is a hamburger menu icon and the ZON 4 SALES logo. Below the logo is a shopping cart icon and the word "SALES". The main content area is titled "MAIN INFO" and contains two input fields: "UA (Address unit):" and "NIF / Customer Account:". The "UA" field has a search button labeled "(Search UA)". The "NIF / Customer Account:" field has a dropdown menu currently showing "NIF" and an empty input field. Below the form is a blue "CONTINUE" button. At the bottom, there is a footer section with the text "U10054117 [logout]", "CAV 12345678 [change]", and "© 2013 ZON". A "help" link is also present in the footer.

*For more information about this feature, see the [help](#) section.*

**Step 1**—At the start of the sales process, the user sees only a small form with two input fields. This screen is the first step for registering sales. It is mandatory to enter a Customer ID and Address ID (identified on the screen with the value *UA*). These two fields are important pieces of information to feed to the remaining steps. They allow the seller to know if the customer is already a customer, and therefore eligible for different offers. They also provide information about what technologies are available at that address, so the appropriate packages are offered to the customer. After users provide these two pieces of information, they press the *Continue* button.



**SALES**

**MAIN INFO**

UA (Address unit):  
  
[\(Search UA\)](#)

NIF / Customer Account:  
 NIF

[CONTINUE](#)

**PRODUCTS/SERVICES**

Address: Goncinha, LT 18 - 19, 6° I, Loulé, 8100 - 114 LOULÉ, PORTUGAL

Package:

Mandatory equipments:

Additional equipments:

**CUSTOMER INFO**

New customer  ZON Customer

Name:

Customer NIF:

ID Card:  
 BI/CC

Phone number:

E-mail:

**OTHER INFO:**

Contact time:

Portability:  
 Yes  No

Direct Debit:  
 Yes  No

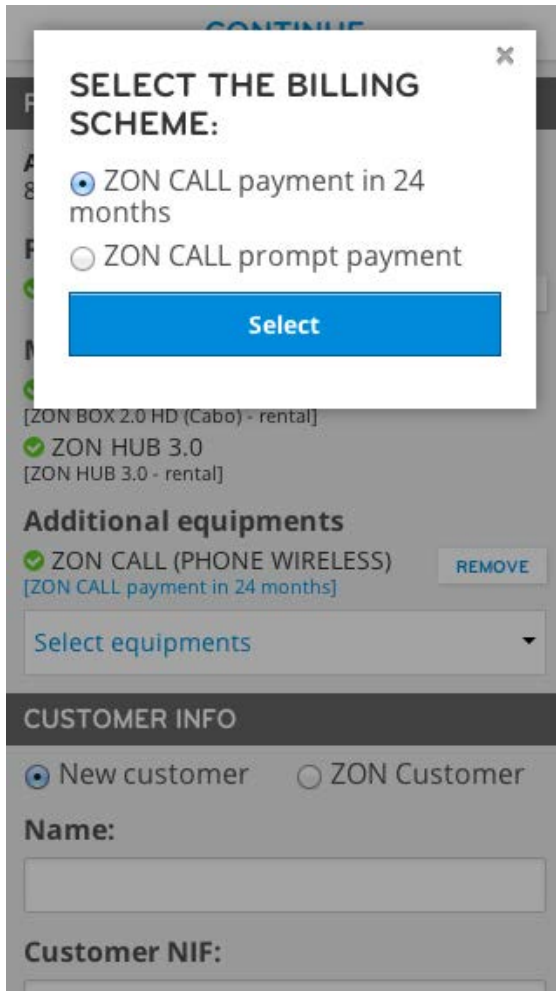
Electronic invoice:  
 Yes  No

Transfer address  
 Change of ownership

**VALIDATE REQUEST**

*For more information about this feature, see the [help](#) section.*

**Step 2**—After tapping *Continue*, the user sees the fields shown seen here. These include selecting which of the **products and services** the customer is interested in and registering **customer details**. This information, combined with the information entered in step 1, allows the system to identify which packages are available to this particular customer. Once the customer chooses a package, the sales rep proceeds to step 3.



Equipment can have several billing schemes. If the user chooses equipment with more than one billing scheme, he is presented with a modal window, where he can choose from the available billing schemes. After selecting a billing scheme, the user can always change it by clicking on the *billing scheme* link that appears beneath the equipment.

**OTHER INFO:**

**Contact time:**  
 10h - 12h ▼

**Portability:**  
 Yes  No

**Direct Debit:**  
 Yes  No

**Electronic invoice:**  
 Yes  No  
  
 Transfer address  
 Change of ownership

**VALIDATE REQUEST**

**SCHEDULING:**

**Date:**  
 18 ▼ march ▼ 2013 ▼

**Time:**  
 12:00 ▼

**12h-14h** - Thursday, March 14, 2013  
 **14h-16h** - Thursday, March 14, 2012  
 **16h-18h** - Thursday, March 14, 2012

**SUBMIT REQUEST**

For more information about this feature, see the [help](#) section.

U10054117 CAV 12345678 [help](#)  
[\[logout\]](#) [\[change\]](#)  
 © 2013 ZON

**Step 3**—Here (in the section highlighted at the bottom of the screen—*Scheduling*) the sales rep can schedule a time for the service provider responsible for the installation (as needed).

**ZON 4SALES**

## LAST RECORDS

Order by: Date CAV

**MARCH 15, 2013**

**José Manuel Fernandes Barreiro**  
 Impasse Joaquim Euleutério Gaspar Gomes, n.º 3,  
 1.º Esq., 2900 Belas >  
**Error: Systems unavailable**  
 CAV: 12345678

**Francisco Mendes Bota**  
 Rua Fernando Valle, lote 14, 2.ºB, 2700 Amadora >  
 Order id 123456 78  
 CAV: 12345678

**Francisco Assis da Fonseca**  
 Rua Corsário Ilhas Lote 3.27.02, Lisboa, 1990-249  
 Lisboa >  
**Error: Systems unavailable**  
 CAV: 12345333

**Pedro Fernando Sousa**  
 Rua Heliodoro Salgado, n.º 75, 3.º Dto, 1170-175  
 Lisboa  
 Processing  
 CAV: 12345678

**MARCH 14, 2013**

**Manuel Joaquim Teixeira**  
 Rua António Conceição Bento, 34, 2520-285  
 Peniche (Ajuda) >  
 Order id 123456 78  
 CAV: 12345678

**Fernanda Maria Fonseca**  
 Rua Batalhoz (EN114-2), 23 A - R/C, 2070-123  
 Cartaxo >  
**Error: Systems unavailable**  
 CAV: 12345333

**António de Almeida Fernandes**  
 Rua Manuel Joaquim de Avelar, 118, 2750-421  
 Cascais  
 Processing  
 CAV: 12345678

**MORE RECORDS**

For more information about this feature, see the [help](#) section.

U10054117      CAV 12345678      [help](#)  
[\[logout\]](#)      [\[change\]](#)

© 2013 ZON

**Last Records:** Checking on the sales orders one has recorded through ZON 4 Sales is easy using the *Last Records* screen. Here the sales rep can review his recent sales orders and at a glance see the status of any order with simple color-coded indicators:

- **Red:** The request is in error. By tapping on the order the user can go back to the sale and try to correct the error.
- **Green:** The request was submitted successfully and has already been assigned a CRM system Order ID. By tapping, the user can see the order detail.
- **Gray:** The request is still in progress.

The user can group these records by date or CAV (seller ID) (for scenarios where the user registers sales in another seller's name) by toggling the two fields at the top of the screen.

The integration service used to communicate with the backend system is asynchronous, so the user will never get an immediate response. The service is asynchronous because there are a set of actions taking place on the back end (create account, validate data, subscribe to services, etc.) that will take time to be executed. It would not be feasible to have the seller waiting for an answer. Also, note the *More Records* button (at the bottom of the screen), which is used to load more sales records.

## Queries and Reports

Before there is a sale, there must be a lead. Queries are what the sales reps use to qualify a lead. They do this by checking the address of the potential customer and qualifying the lead before trying attempting to sell to them. This saves them time by avoiding unqualified leads and gives them information so they can sell better to qualified households.

Queries are located in the reports section of the website, and as with the sales order process instead of presenting all the information in one screen and using rows that could expand with a tap, the team decided to have three sequential screens to present the results of the initial query.

**Q QUERIES**

Please, use one of the following fields to find what you are looking for:

**Customer (NIF):**

**UA (Address Unit):**

**Order number:**

**Activity number:**

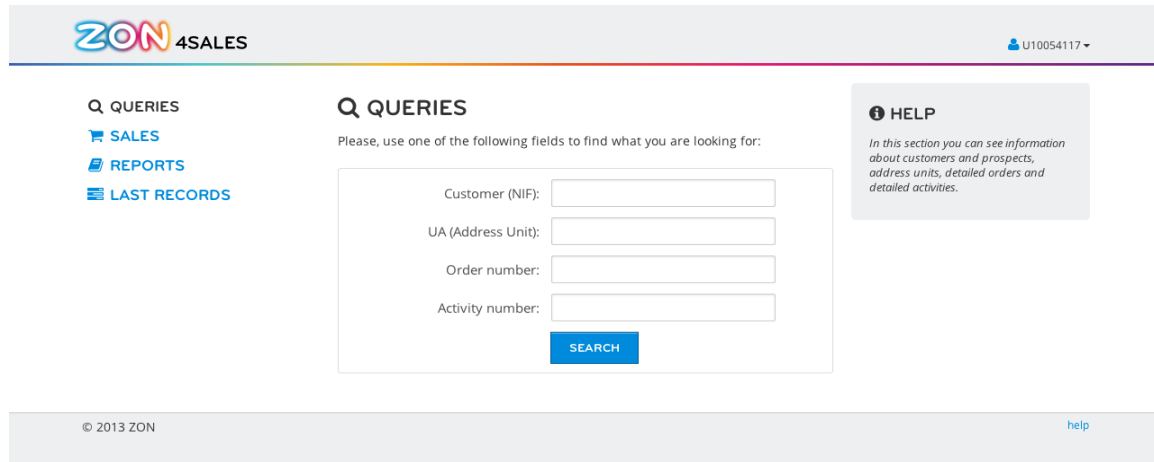
**SEARCH**

*For more information about this feature, see the [help](#) section.*

U10054117    CAV 12345678    [help](#)  
[\[logout\]](#)    [\[change\]](#)

**Query Home**—The initial query screen allows the user to get information about a specific customer, an address, an order number, or an activity number. Only one field can be used at a time. This screen contains only the form information, in order to focus the user and keep the screen uncluttered. Other navigation options are available through the menu button (the triple bar icon in the upper left). Other information is linked from the footer: *logout*, *change sales ID (CAV)*, and *help*.

Whenever possible, the application includes cross-links that allow the user to navigate through process screens without having to go back and restart the query. For example, in the detail screen of any address (unit), the seller has access to the last five orders and the last five activities associated with that address (unit). When the user clicks on one of these orders or activities, the seller is forwarded to the order detail screen or the activity detail screen, again without having to return to the initial queries screen.



This image shows the *Queries* home screen on a desktop display. The desktop view has the left-column navigation always visible and the contextual help on the right. In the mobile view, all the content (including the form) is presented in one column.

**REPORTS**

**Area:**

**Cell:**

**Zip Code:**

**SEARCH**

**Address search:** This screen is the first screen in the workflow to help the user get access to a customer's address details. The goal is to give the sales reps tools so they can look up addresses by building and street, in order to obtain the data necessary to determine which buildings and addresses they should or shouldn't visit. In addition to the address search fields on this screen, sales reps can also access contextual help to guide them through the process, if necessary. (*Cell and Area* refer to subsets of the customer's country address, as defined by ZON's address management system.)

You can only search by:

- Cell and Area
- Postcode (CP7)
- Cell, Area and Postal Code (CP4 or CP7)

For more information about this feature, see the [help](#) section.

U10054117 <a href="#">[logout]</a>	CAV 12345678 <a href="#">[change]</a>	<a href="#">help</a>
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The screenshot shows the ZON 4SALES interface. At the top left is a hamburger menu icon. The logo 'ZON 4SALES' is in the top right. Below the header is a 'REPORTS' section with a document icon. A navigation bar contains a 'BACK' button and a 'NEW SEARCH' button with a magnifying glass icon. A green bar highlights the postal code '1701-001'. Below this, there are four search results, each with a 'BEN' label and a street name, followed by a right-pointing arrow:

- BEN 01:** Rua B - Aeroporto
- BEN 01:** Rua C - Aeroporto
- BEN 01:** Rua D - Aeroporto
- BEN 02:** Impasse Joaquim Euleutério Gaspar Gomes

Below the results is a note: *For more information about this feature, see the [help](#) section.*

At the bottom, there is a footer area with the following text:

U10054117      CAV 12345678      [help](#)  
[logout]      [change]

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This screenshot shows the results of a postal code search, in which the results are all streets found in that postal code. When the user has selected a street, a list of all buildings on that street appears (as shown in the next image).

The screenshot shows the ZON 4SALES interface. At the top, there is a menu icon and the ZON 4SALES logo. Below this is a 'REPORTS' section with a 'BACK' button and a 'NEW SEARCH' button. The main content area is titled 'BEN 02 - 1700-001' and 'IMPASSE JOAQUIM EULEUTÉRIO GASPAR GOMES'. A list of building numbers (N.º 1 to N.º 8) is displayed, each with a right-pointing arrow. Below the list, there is a note: 'For more information about this feature, see the [help](#) section.' At the bottom, there is a footer with the identifiers 'U10054117', 'CAV 12345678', and a 'help' link.

The numbers shown here (n.1, n.2, etc.) represent building numbers. After the user selects a row, the details of the building appear, along with all available households living in that building (shown below).

## REPORTS

[← BACK](#)
[Q NEW SEARCH](#)

### BEN 02 - 1700-001

IMPASSE JOAQUIM EULEUTÉRIO  
GASPAR GOMES, N.º 3

#### SUMMARY


**Status:** Installation performed

**Solution:** PROC FI-DTH **Pendency:** 800691125

**Pendency type:** Cliente-Orç aceit Comerc/TV-C

#### Services Available:

Cable | ZON Fiber | VOD | NET TDC | WB TDC |


 Real estate agreement: #12345678 até 12-03-2013


#### UA'S - ADDRESS UNITS

R/C A - UA 230301672	>
R/C B - UA 230301682	>
1.º A - UA 230301702	>
1.º B - UA 230301712	🔒
2.º A - UA 230301672	>
2.º B - UA 230301682	>
2.º C - UA 230301692	🔒
3.º A - UA 230301672	>
3.º C - UA 230301692	>
4.º A - UA 230301672	>
4.º B - UA 230301682	🔒
4.º C - UA 230301692	>

#### LEGEND

 Address Unit with a real estate agreement

 Address Unit without a real estate agreement

 Do not contact

For more information about this feature, see the [help](#) section.

**Apartment report:** Finally, in the last step of search process, the user sees a new screen with the details of the selected building. The building's details (such as available services) are shown in the screen's header, along with all available households living in the building. In this list it is possible to see whether or not it is advisable to contact the customer. The Icons provide a key:

- **Black Lock:** Do not contact customer because ZON classifies that person as not worth being contacted. Here also, the sales rep is not able to see the address details.
- **No lock:** Customer can be contacted. In this case the user is able to see the address details. Clicking on the address loads another screen with the address details. Details include the complete address, the technologies available, the services and packages available at that address, etc.

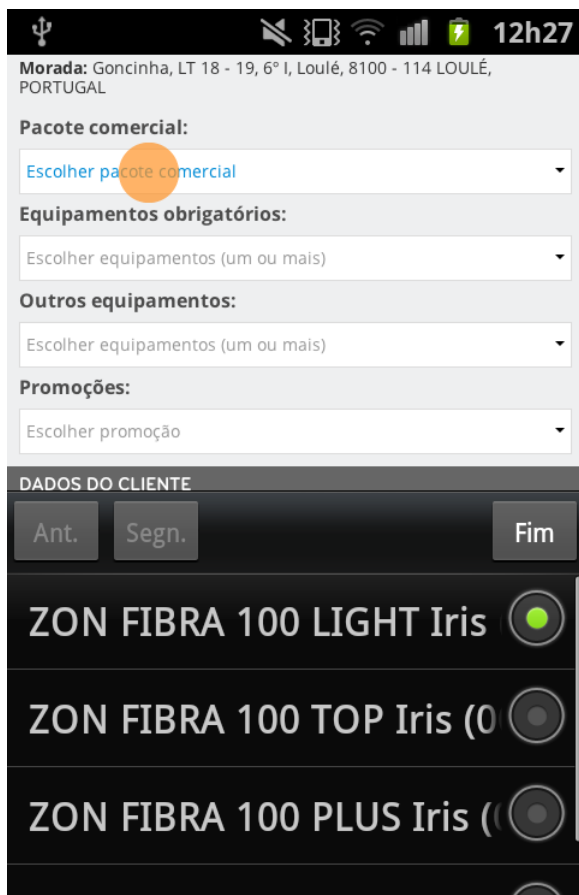
To avoid having really long pages, the design team decided to implement a solution that only loads items from a list according to user needs. It starts by loading 20 items. If users want to see more, they have to click on the *More* button.

## Skewing Toward Android

One of the paradoxes of mobile design is that even if you choose a mobile-optimized website approach (rather than a native app), you still don't get a free pass on making customizations for specific populations. ZON 4 Sales is designed to work well on any mobile device, but the design team was aware that a significant portion of the workforce would probably be using an Android-powered device. This presented several small opportunities to optimize for the idiosyncrasies of the Android platform.

For example, they replaced Open Sans (the font used in most of the ZON applications and internal portals) with Roboto (Android's new default font system). And to ensure good performance on a device with little processing capacity, instead of using images or even a CSS sprite for the icons, they used a custom icons font that they created using Fontello. That way, they could also ensure that the icons would look good, regardless of the screen resolution of the smartphone.

On the sales registration page, the team created a custom Select box to correct a limitation in the default Select boxes shown on Android phones, using an unordered list and some JQuery. As you can see on the image (shown immediately below), when the user clicks/ taps on the *Select equipment* link, a panel appears below, showing the options available. Then the user chooses an option, which appears above the custom Select box (shown in the second image below). With this solution, the end-user can always read the full text of the option, something that wouldn't happen if they had used the standard Select box.



This screen shows how the default (Android) select box appears on a Samsung Galaxy SII in the default browser. When an option is too long, the user can't read all the text because the information in parentheses is cut off. Those numbers, following the names of the items, are very important to the sellers because most of the time, they choose the package by looking for its number. They've found it easier to memorize the package's number rather than its whole name, so having this information visible is critical to their workflow.

Android status bar: 12h27, battery, signal, Wi-Fi, vibration, and USB icons.

Morada: Goncinha, LT 18 - 19, 6º I, Loulé, 8100 - 114 LOULÉ, PORTUGAL

**Pacote comercial:**

Escolher pacote comercial

- ZON FIBRA 30 Iris (024)
- ZON FIBRA 100 LIGHT Iris (006)
- ZON FIBRA 100 TOP Iris (001)
- ZON FIBRA 100 PLUS Iris (005)

Escolher promoção

**DADOS DO CLIENTE**

Novo cliente     Já cliente

**Nome:**

**NIF do cliente:**

**Documento de Identificação:**

BI/CC

**Telemóvel de contato:**

**Email de contato:**

Example of the custom select box that was created to overcome the limitation (shown in the prior screenshot) of default select boxes on Android phones (specifically, in the default web browsers of Android smartphones).



The team worked hard to ensure the little design touches were executed in the interface. For example (as shown here), making sure the right keyboard (text or numeric) is launched according to the data input requirements of any given field.

## Security and Authentication

ZON had an unusual challenge in designing for its users, since it was important to ensure that the information was not shared with third parties.

To address this issue, “the application works on a ‘you see only what you need’ basis and it has a mechanism that limits the number of queries by a user. Use reports allow the company to identify system abuse. Also, multiple logins are not allowed. This limitation is achieved through the use of the session ID already opened. Since users have to connect first to the company’s VPN, the authentication is first done in Active Directory, enabling the single sign-on in the application.” says Business Analyst Cecilia Cruz da Silva.



Please, select your CAV to continue.

VPP	12 345 578
WEB	12 345 123
STORES	12 345 456
OUTBOUND	12 345 987
INBOUND	12 345 654
OTHER CAV	

For more information about this feature, see the [help](#) section.

U10054117 <a href="#">[logout]</a>	CAV 12345678 <a href="#">[change]</a>	<a href="#">help</a>
© 2013 ZON		

In order for sellers to make full use of the application, they must have a userID and password to log into the VPN (as well as the tool) and have at least one seller ID (identified in the application with the value "CAV"). Sellers may have one or more IDs, one for each channel. The existing sales channels are:

- **VPP:** Door-to-Door
- **Web:** Web sales (for example, through an online store)
- **Stores:** Direct sales (at physical stores)
- **Outbound:** Sales made through outgoing calls (ZON's initiative)
- **Inbound:** Sales made through incoming calls (customer's initiative)

Although the application's main target of door-to-door "VPP" channel sales reps, the site maintains a scalable solution in order to support the other sales channels as needed.

The login process needs to account for several special scenarios:

- If the user has only one CAV (seller ID), the ID will be automatically chosen (bypassing the screen above).
- If the user has more than one CAV, he can select any of the existing CAVs.
- If the user has a profile that allows him to register sales in another seller's name, he must select *OTHER CAV* in order to switch to another seller's CAV.
- If the user has more than one CAV or a profile to register sales in another seller's name, the user can go back to this screen any time he wants.

## DESIGN PROCESS

### Mobile First

Because the main focus of the project was to create a website to be used primarily by mobile devices, the design team chose to follow a mobile-first approach, starting by optimizing the interface for small devices with small resolutions (such as

320x480px) and including only those items that were absolutely essential—and only then moving on to design the desktop experience.

The mobile-first approach seemed inevitable, given the intended audience door-to-door salespeople using smartphones. This was a departure for the ZON team, which had been using responsive Web design for previous projects. “In our recent projects, for instance My ZON (a ZON self-care portal), we have been using a responsive Web design approach,” says Hugo Neves da Silva, “where we started by designing the desktop version and then we re-arranged the different elements of the interface for smaller devices, using CSS and media queries.”

“Through the use of a mobile-first approach, we focus on the most important content,” he says. “If we had used an RWD approach, focused initially on desktops, we would have started by designing the interface for desktops and then we would have suited this interface for smartphones. Given our primary audience, that would not make sense.”

With the success of ZON 4 Sales, the team is likely to continue with the mobile first approach. “I believe that in our next Web projects we will try to use a mobile-first approach,” says Neves da Silva, “starting by focusing on the content (pure and simple text), and then progressively improve the user experience. Given the growing number of Internet users on smartphones, we will try (whenever possible) to use a mobile-first approach so that we can focus on what is most important, taking advantage of the main features of the device, such as geo-location, for example.”

## Testing with Users

Usability testing is a standard part of the ZON design process. “Usually we try to engage end users as soon as possible, so that they feel involved and part of the process,” says Neves da Silva. “Then, we have a pilot stage, which involves some specific teams, whereby we obtain feedback to improve the final solution. Finally, we use these teams as success stories, to promote the spread of the application by the remaining organizations/users.

ZON 4 Sales was tested with users. The team tested the *Sales* and *Last records* screens with 15 door-to-door sales reps from Lisbon and Oporto. In this first usability test, they were asked to complete three activities:

- Register a sale using a smartphone (Samsung Galaxy Ace).
- Register a sale using a desktop computer.
- Check on the status of the last orders they entered.

The result of this usability testing was positive. All the users managed to accomplish their tasks without major difficulties. The team did uncover a few small issues that must be improved. One of the findings regarded type size and mobile screens. The smallest type size they use for mobile is 13px. Originally that size was smaller, but through testing on actual devices, the team realized they needed to bump up the size by 1 or 2px.

Subsequent to these initial test sessions, the team tested the *Queries* and *Reports* sections (prior to the tool's go-live date in June 2013). This involved a round of usability testing with five users. The results were good. In fact, none of the users had any trouble accomplishing the five tasks.



## Technology Testing

In addition to testing with users, the team also tested the design using mobile simulation tools and actual mobile devices. Initially, some Google Chrome extensions, for example Ripple, were used to test the interface. Later they used Android Emulator and, more recently, a seven-inch Samsung Galaxy Ace and an iPhone, among others. Each of these approaches has its merits; it's mostly a matter of knowing when to use which tool.

"All of these tools have their role in the process of creating a mobile-first website," says Neves da Silva. "If I had to propose a workflow for testing a mobile-first website/app, it would be something like this," he says:

- **Emulator testing:** "Start by testing the initial concept in a browser or emulator. I like to design in the browser as soon as I can."
- **Prototype testing:** "With the concept approved, create a prototype in HTML/CSS/JavaScript with the main templates, which must be tested on mobile devices, as soon as possible."
- **Usability testing:** "Once you have consolidated the prototype, conduct an initial session of usability testing with end users, to find potential issues that require correction."

## LESSONS LEARNED

The main lesson the team learned is one that many teams learn when embarking on mobile projects: it's better to test on real devices rather than simulators.

- **Test on real devices.** "The main lesson we have learned from this project is that we should test the interface on a physical device, early in the project, as soon as we have a first prototype in HTML/CSS. The biggest challenges are related to the performance of the application on mobile devices, especially on smartphones with little processing capacity or those with older versions of Android like 2.2. or 2.3. To ensure a decent performance, I suggest start testing the interface and the application in physical devices, as soon as possible."

## “VZWeb” (Verizon Communications)

### Company Overview:

Verizon Communications (NYSE, NASDAQ: VZ) is the world leader in delivering innovation in communications, mobility, information and entertainment. Verizon provides superior broadband, video and other wireless and wireline services to consumers, businesses, governments and wholesale customers around the globe.

**Headquarters:** New York, NY, USA

**Annual Sales:** \$116 Billion (2012 revenues)

**Number of Employees:** 200,000 across the US, Europe, South America and India

### Mobile Project Overview:

VZWeb, Verizon’s intranet, uses responsive Web design (RWD) to provide a consistent user experience across delivery platforms from desktop to tablet and mobile devices. The website delivers critical employee communications information to the entire Verizon community. eDirectory, a part of the VZWeb experience, is a mobile version of the company directory.

### Number of employees the app/mobile website supports:

Approximately 100,000 Verizon employees.

### Design Team:

In-house, a design and development team of 25 worked within Verizon’s Chief Administrator’s office, with support from members of the Verizon Employee Communications team. The project was completed in partnership with a Drupal development team from Acquia.

### Members:

**In-house:** Miguel Quiroga, Director; Lolly Chessie, Design Team Lead; Gus Attar, Development Lead; Rachel Knickmeyer, Lead Information Architect; Radoslaw Wilk, Lead Designer; Alan Masters, Content Strategy and Training; Nicholas Maxwell, Project Management; Chethan Makam, Intranet & Search Lead; Christopher Andrews, Architect; Chinna Grandhi, Content Systems Lead; Dawei Zhang, Video & Metrics Lead; Kevin Davis, Business Partner – Director Employee Communications.

## OVERVIEW

The Verizon team decided to redesign the company’s corporate intranet (VZWeb), using responsive Web design (RWD) techniques. RWD is an effective design approach for content that must look good on any kind and size of device, but it is not a one-and-done design solution. Scaling a single design to meet many layout requirements is more art than science. The Verizon team found its success through careful planning and an iterative process of design/test/refine, which they performed again and again until the design met the needs of the most possible users across various viewport sizes.

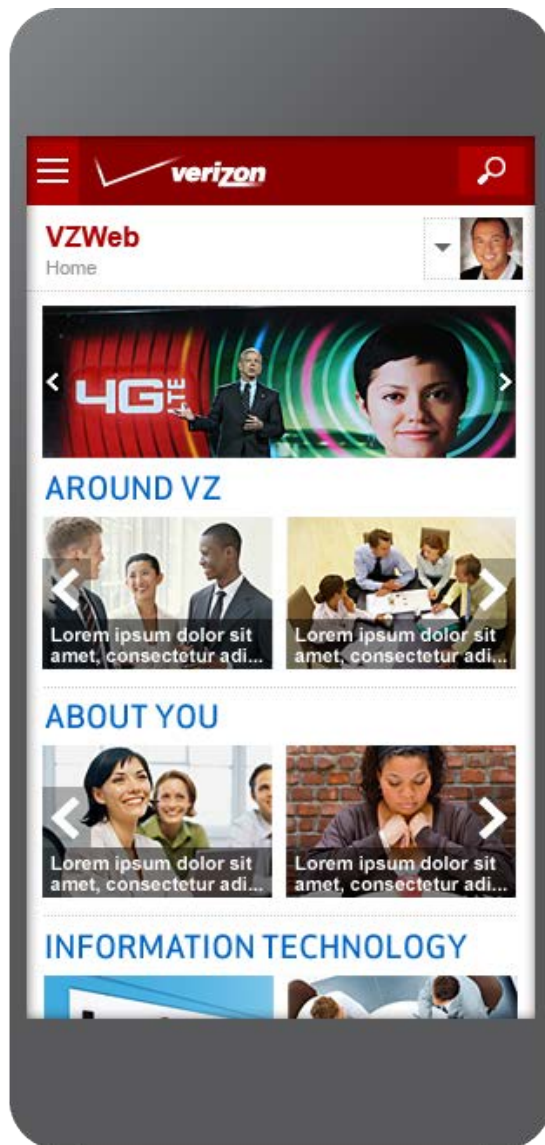
VZWeb is an employee communications site, so the emphasis is on news, but as an intranet homepage it is also a critical platform for delivering links to productivity tools used by employees. These tools can include to-dos, email and calendar, employee self-service tools, and training resources, among others. These tools and other business applications are powered by back-end systems that are not necessarily mobile-friendly. So, while VZWeb writ large was translated into a

responsive framework, the limitations of some of these business application tools meant that the team had to trim their presentation from the mobile interface. This was accomplished by creating a links area on the homepage that could be hidden when the user was on a mobile device. As the mobile optimization of some of these tools is increased, the team will be able to bring those links back into the mobile design.

**Type of project:** VZWeb is an intranet site designed to scale for seamless viewing across all devices (mobile and desktop), using responsive Web design (RWD). eDirectory is a mobile-optimized version of Verizon's company directory. Both VZWeb and eDirectory are designed to work on any browser or operating system and are certified to work for IE 7, 8 and 9; Safari MacOS, Firefox, iOS (iPhone and iPad), and Android.

**Why this approach:** With a wide range of devices accessing VZWeb, building a native application for either Android or iOS would have required the creation of at least three code bases, in addition to the desktop website. By taking the time to design and build a responsive framework for VZWeb, the company could reduce maintenance costs and create an experience that would be consistent across devices and fluid on any device.

Verizon employees access the intranet from a wide range of mobile devices, including a mix of company-provided and personal devices (BYOD), accessing the network through its extranet. Supporting this wide range of access made it critical to design VZWeb in a manner that would be flexible enough to deliver a great experience to all users.



VZWeb's mobile interface is simplified for display on small screen devices. Users can swipe to scroll through each row of stories, making for a touchscreen-friendly layout.

## Goals

The reasons behind Verizon's decision to use RWD to increase VZWeb's mobile enablement were numerous. They included a desire to save money on software support by moving to an open source platform and enhance the usability of the intranet space. In addition, there are several thousand Verizon employees and technicians who do not have desktop computers and are purely mobile-device users. It was important to get them access to company news. These practical goals dovetailed with a more high-minded aspiration: that a company with Verizon's expertise should be delivering a sophisticated level of mobile experience to its employees.

“Both Employee Communications and CAO-IT felt it was critical for Verizon, a company with a strong reputation for mobile solutions, to provide our employee base with a sophisticated mobile experience,” says Miguel Quiroga, Director. While there were several mobile applications available to employees prior to the VZWeb project, those were targeted to extremely specific use cases and user groups. VZWeb presented the first opportunity for the organization to try a responsive solution and to offer a rich mobile experience to the entire Verizon community, for the most frequently accessed site within Verizon’s ecosystem.

## Challenges

Deciding to launch a brand-new design on a new platform, using an entirely new framework, was a serious challenges. It was a huge amount of work to take on all at once and required a lot of planning, training, and long hours. Bringing in Acquia to assist was critical in overcoming these challenges, but the learning curve for this project was still quite difficult to manage. Unfamiliarity with the technology meant that project team members were often learning as they went along and couldn’t always anticipate everything during the planning phase. Problems had to be redressed post-launch. There were challenges specific to both the front-end technology and the back end:

- **Responsive Web design:** The task of delivering the website in a responsive framework was itself a giant hurdle for the design team. It required dramatic adjustments to the team’s processes. Translating design layouts for a large-scale intranet into a fluid, scalable design is no easy undertaking.

“This is the first time we introduced mobile responsive design, so this project required much more detailed and extensive design planning for the layouts and UI elements,” says lead designer Radoslaw Wilk. “We had to translate complicated desktop views into much simpler mobile views.”

- **Drupal:** The transition to Drupal presented a formidable learning curve for the team, which had to train on the new platform and transition from the company’s former CMS (Oracle UCM). With Drupal, the company could develop faster and piggyback on a broad library of existing modules and templates to create a responsive site that would also provide authors with an easier content-management experience. The benefits were great, but they came with a lot of upfront effort.

“The benefits going forward will be great, Drupal being a much more flexible platform than the previous platform,” says Wilk, “but learning the new system was a tremendous challenge.” In order to ease the transition, Acquia (an industry leader in Drupal), was brought in to assist with setting up the Drupal environment and getting the Verizon team through the first launch of the new system.

## Users

Because VZWeb is the company’s intranet, the user base is comprised of the entire employee population, working in roles ranging from IT, sales, marketing, and front-line technicians to customer service, human resources, and legal. Each group is unique and accesses the website in different ways. IT employees may access the site through their desktops when they launch their browsers first thing in the morning,

while a technician is more likely to load VZWeb on a tablet between jobs, out in the field. Other employees check out VZWeb on their mobile devices for a quick snapshot of the news while commuting or waiting for a flight. The use cases are wide-ranging and required the team to look at the website from many different angles.

The site has 100,000 users daily and more than 10 million page views monthly, approximately 70,000 of which are from mobile devices. The mobile page views are likely to increase, as Verizon is in the process of deploying more than 15,000 “ruggedized” tech tablets in the field. In addition to the employee communications features supported by VZWeb, these tablets give technicians immediate access to the tools and information they need to do their jobs.

## THE MOBILE EXPERIENCE

VZWeb is the homepage for all employees. As such, the site truly had to work for any user type and on any device. That’s is a tall order in this era of mobile fragmentation.



Every month 70,000 users access Verizon’s intranet homepage from their mobile devices and land here, on a site that was not fully optimized for their phones. Instead of creating a separate mobile-only experience to correct this issue, the Verizon team decided they would create responsive intranet sites to accommodate the needs of both desktop and mobile users simultaneously.

## Different Device for Different Needs

While RWD is adaptive, it is not one-size-fits-all. A good example of adapting the design to accommodate the user experience of different devices is how the Verizon team handled the new news layout to accommodate tablet users vs. mobile phone visitors.

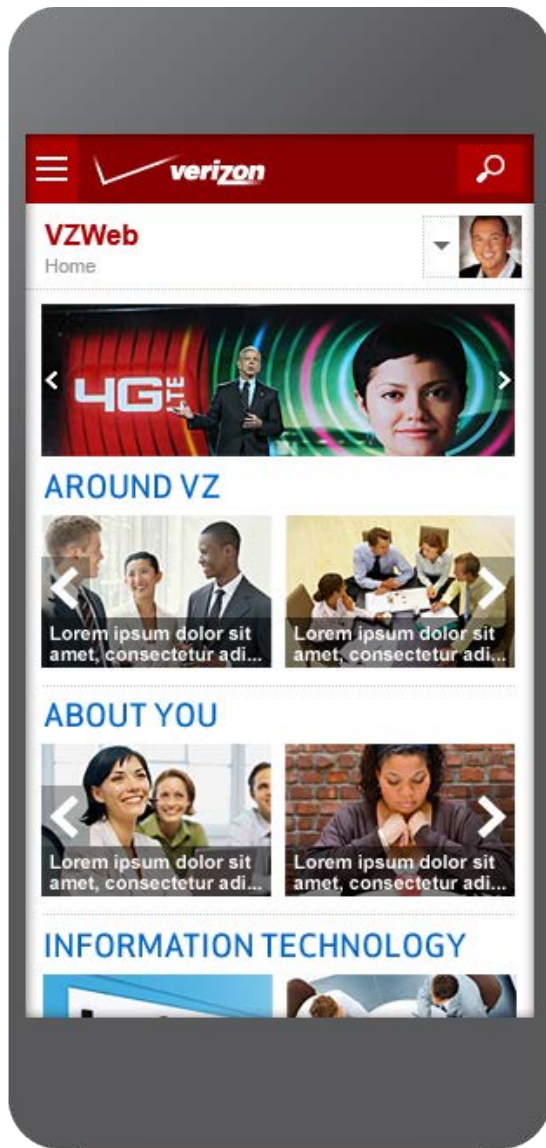
User interviews revealed that tablet users tend to prefer interfaces that are more visual and which employ swipe navigation, rather than the click-to-navigate style of a desktop user. For this reason, the designers decided to give tablet users a layout where they would see the grid view of an article listing, instead of the list view. From the article, tablet grid users can then swipe to browse through stories within a particular news feed. This small change gives the tablet interface a strong visual appeal.





On the tablet version of VZWeb, the interface defaults to showing users their news feeds in a grid structure, which can be navigated using a swipe-to-scroll action. This visually focused experience has tested better with tablet users, who are an ever-increasing part of the company's intranet user base.

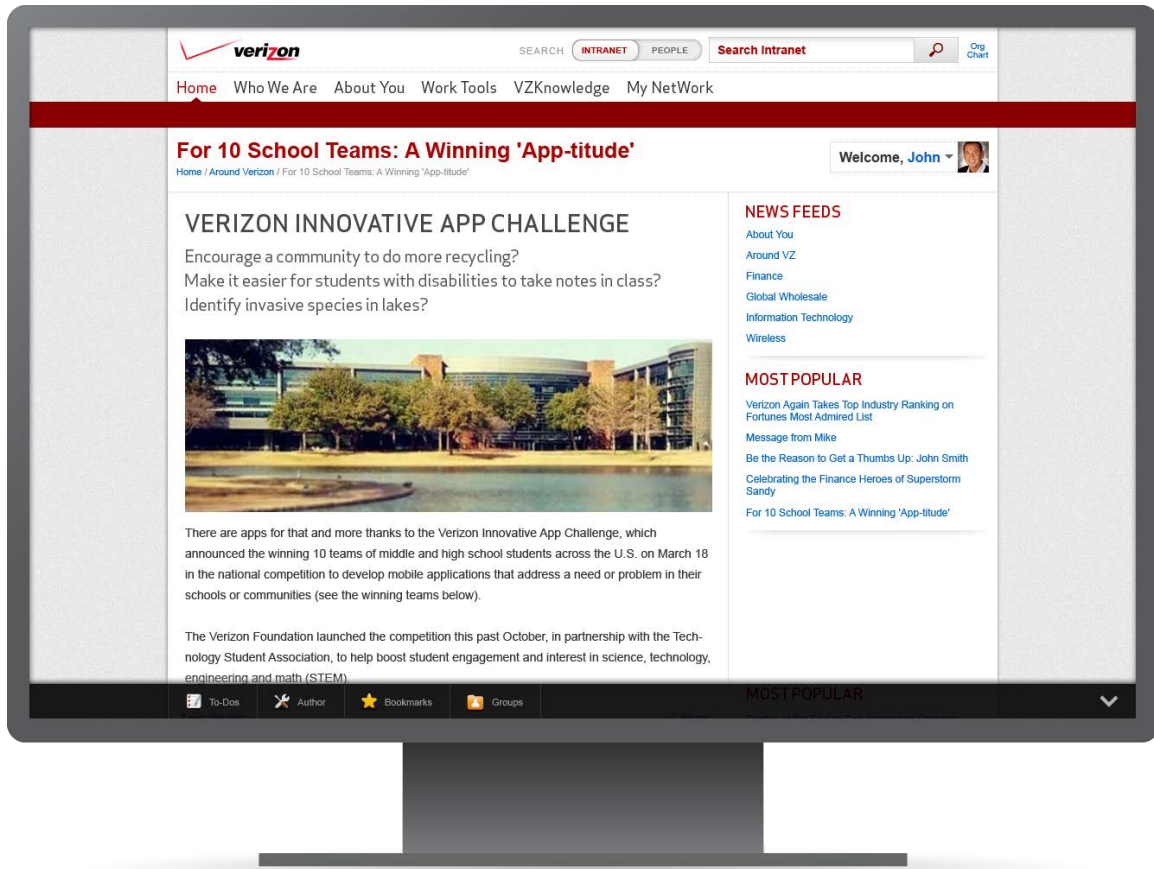




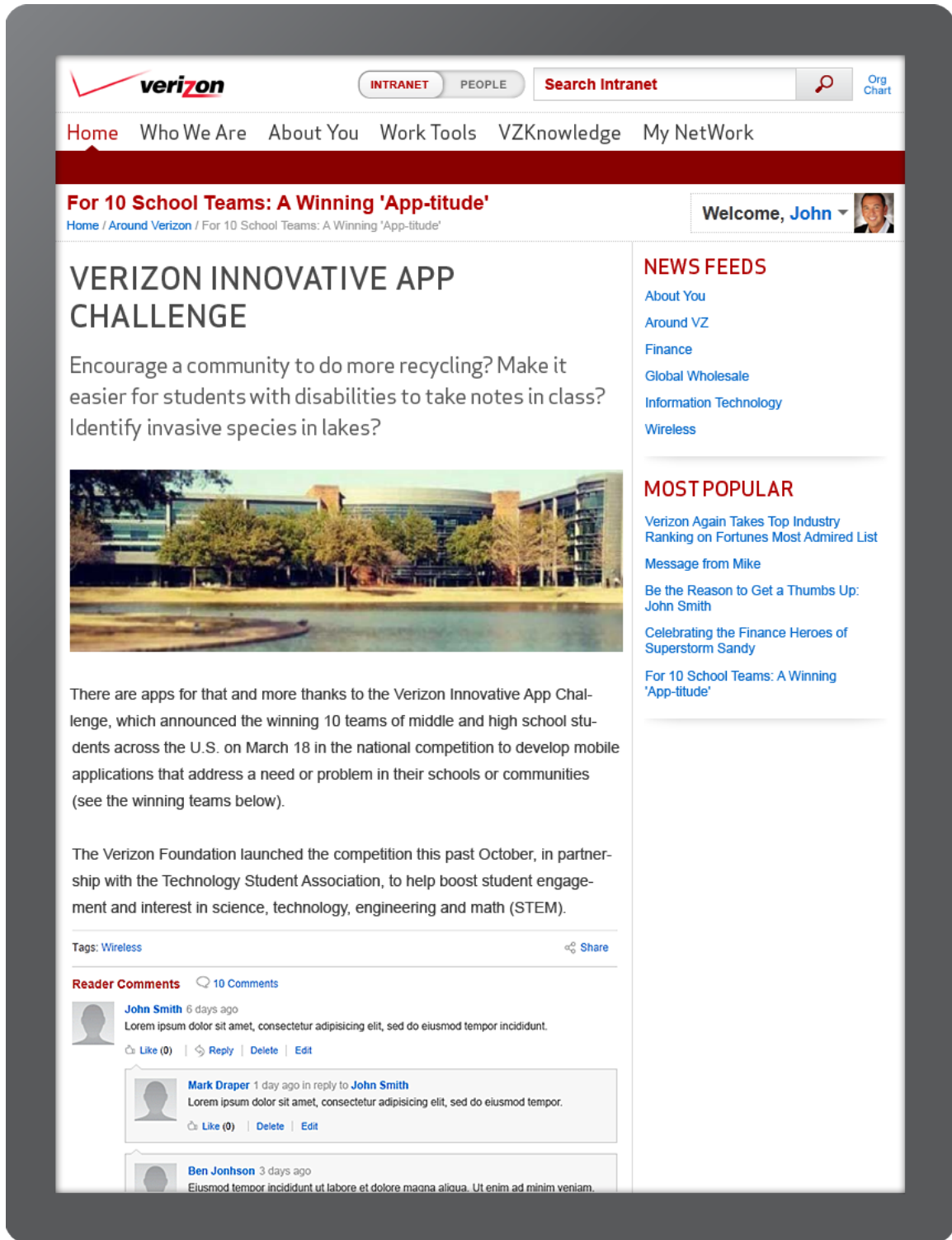
In the mobile (phone) view (shown here on iPhone 4), the interface simplifies further (from the tablet layout shown above). It shows the news stories in a single list view, with the featured stories still at the top, where a user can swipe to navigate between them. Given the limited display space on a mobile phone, the design team decided to remove some of the content that was not truly mobile-optimized, such as to-dos and links to some productivity tools that, at this stage, are not mobile-enabled. Instead of laying out articles in a list, they are grouped into separate feeds (by category) and displayed in a grid format. Users can swipe to scroll through each row of stories, making for a touchscreen-friendly layout.

Beyond browsing the headlines, another primary focus of VZWeb is the presentation of the news stories themselves. It was important to get these pages right, as most VZWeb users will scan or read new stories on the site.

In both desktop and tablet views, articles are presented with a right-hand column that provides additional navigation options and features lists of frequently viewed and recently commented-on stories. Commenting features, one of the most popular aspects of the VZWeb experience, are shown below each article. They work seamlessly on both desktop and tablet.

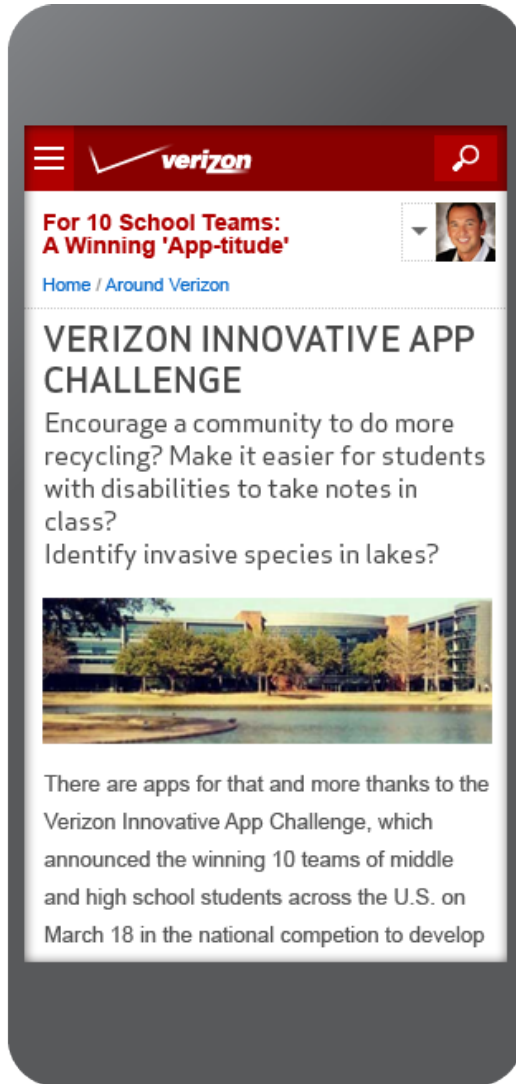


The news article details pages are also fully responsive, with the desktop version showing a right column for navigating between news feeds.

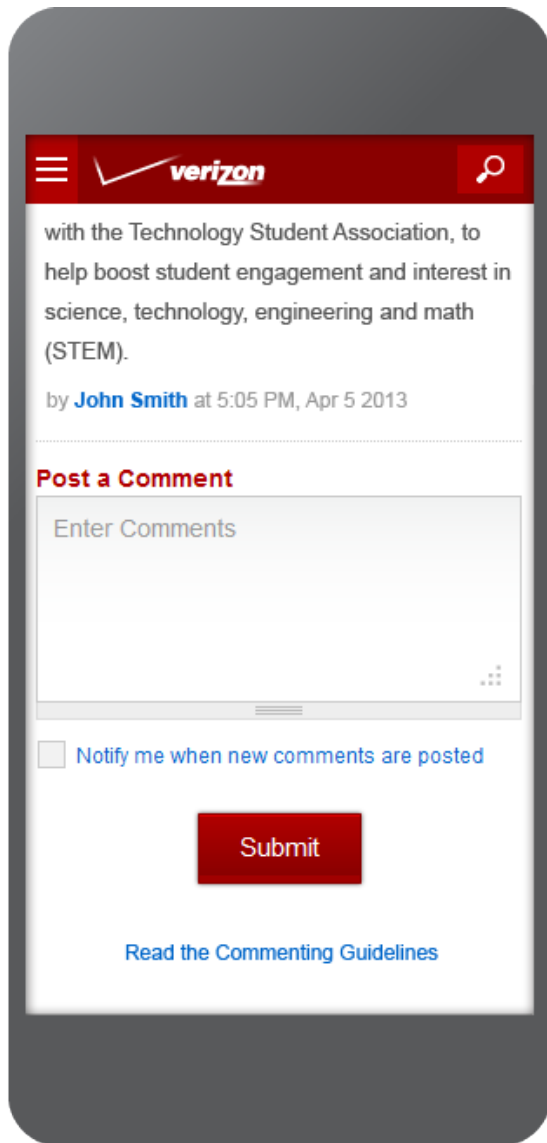


VZWeb maintains all the same features in the tablet view of the article pages while simply scaling the design to fit the smaller real estate.

Initially, the team debated whether or not to hide commenting for mobile users. There was some concern about how these comment threads might display and whether it would affect loading time. However, it was decided that commenting was one of the most important aspects of the VZWeb experience because it provided a two-way communication mechanism, enabling employee engagement and collaboration. Today the site receives hundreds of comments a week, up from barely a trickle a year ago, so bringing that experience to the mobile site was important in providing a more compelling and useful experience. To keep the pages light, the design team removed the right column. That content was considered less compelling than the critical commenting features.



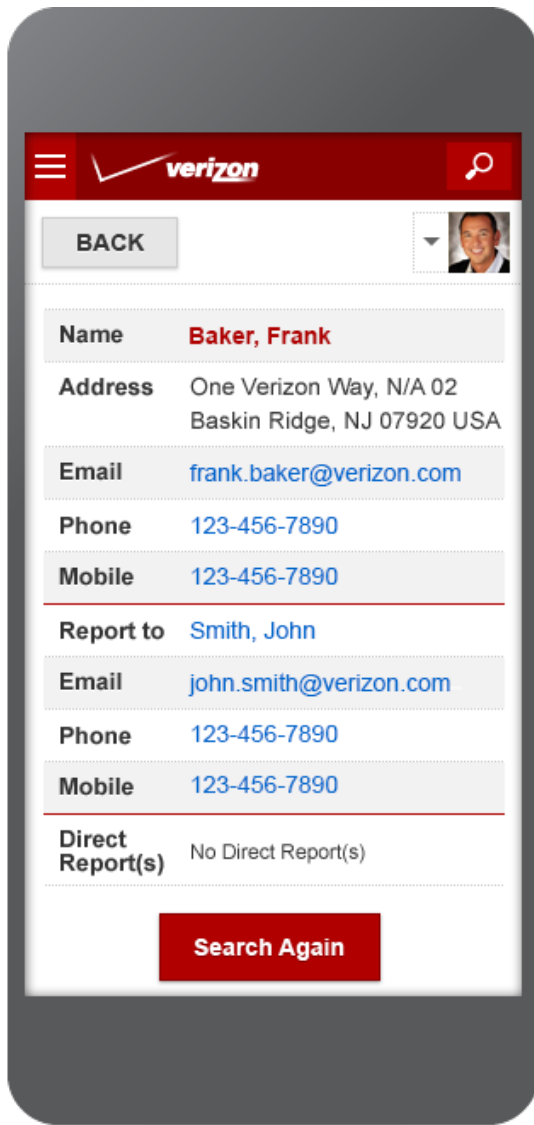
When reading articles on the mobile phone, users can quickly scan through multiple stories, using a swipe gesture to load the next or previous story contained in the current feed.



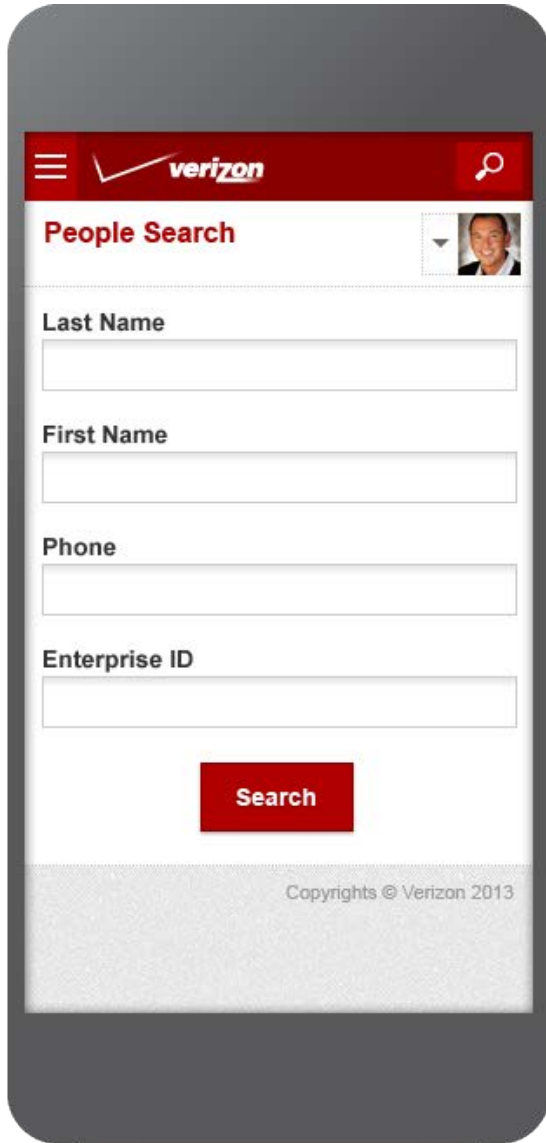
Every article shown in the mobile view continues to offer the same commenting features as on the full desktop version, but in a more simple layout.

## eDirectory

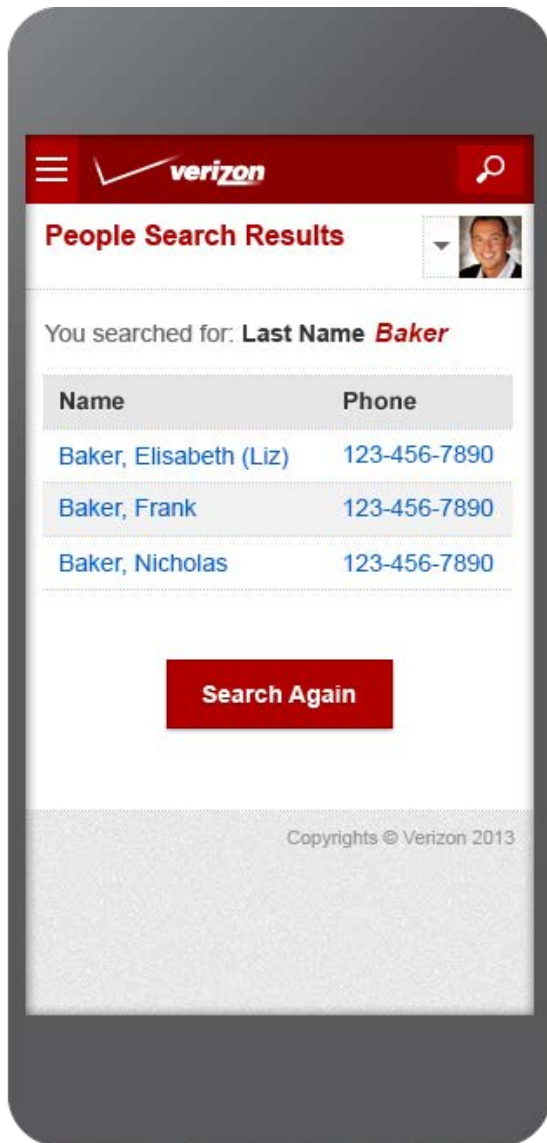
eDirectory, which currently serves 3.9 million page views a month, provides contact, organizational, and biographical information for all members of the Verizon enterprise. Providing quick access to this information was deemed critical for the company's mobile workforce, so, alongside the VZWeb launch, the design team refreshed the mobile eDirectory design. The team concentrated on improving the layout of the existing mobile-only site, with plans to overhaul the design later this year. For Phase 1, it focused on delivering light versions of the search pages, trimming out the less critical information and giving users quick access to phone numbers and email results. The refresh was done with an eye toward making eDirectory responsive as well, with a projected launch date of 2013.



eDirectory's employee details page offers a streamlined list of important information about the employee, with a focus on contact information, which has proven to be the most critical data for mobile users.



From the mobile VZWeb experience, eDirectory is accessed through a header link, where anyone can search for employees. This functionality is, by far, the most critical mobile feature for Verizon, enabling employees to find contact information from anywhere they might be.



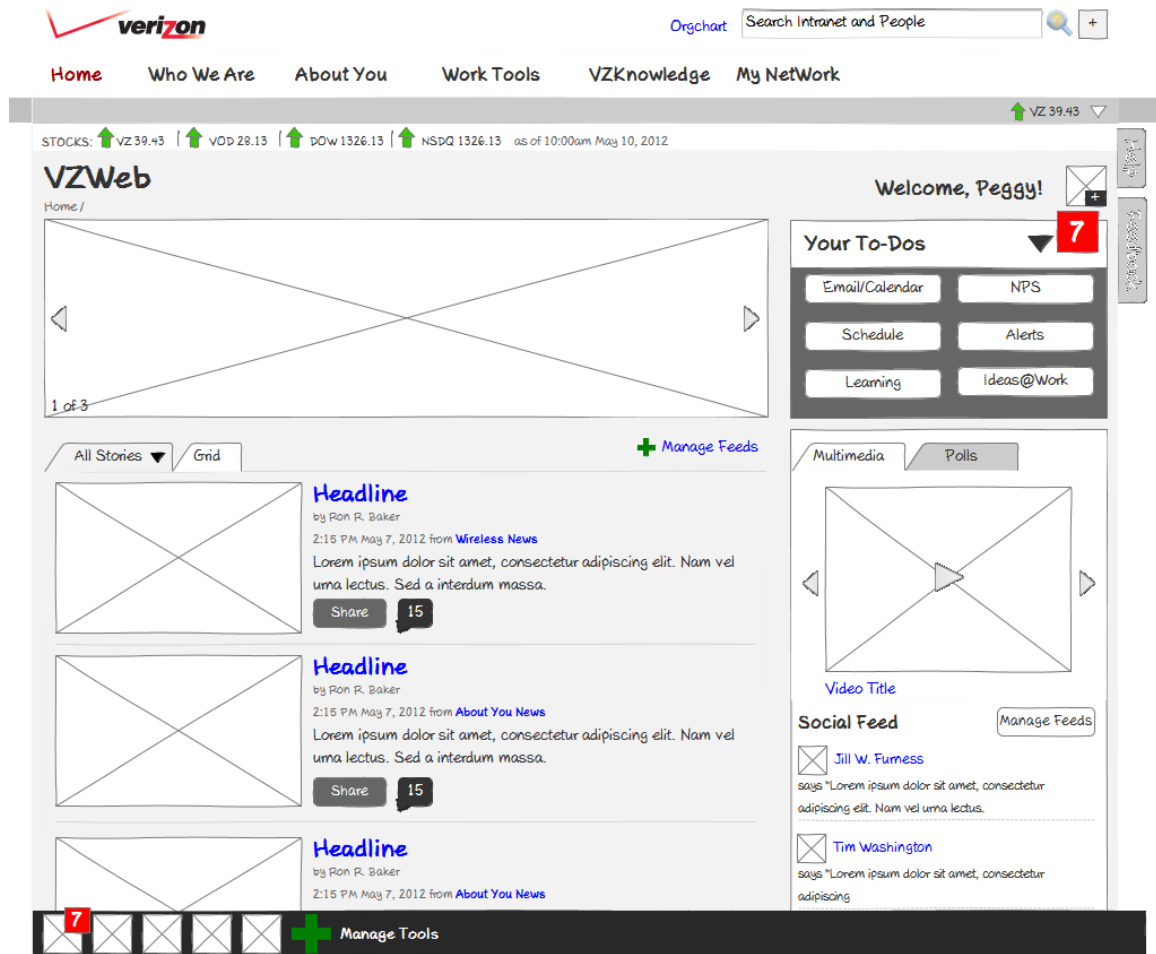
When an exact match can't be found, eDirectory returns an easy-to-scan list of potential matches, as shown here. Sizing is adjusted to make navigation easy on any mobile device.

## DESIGN PROCESS

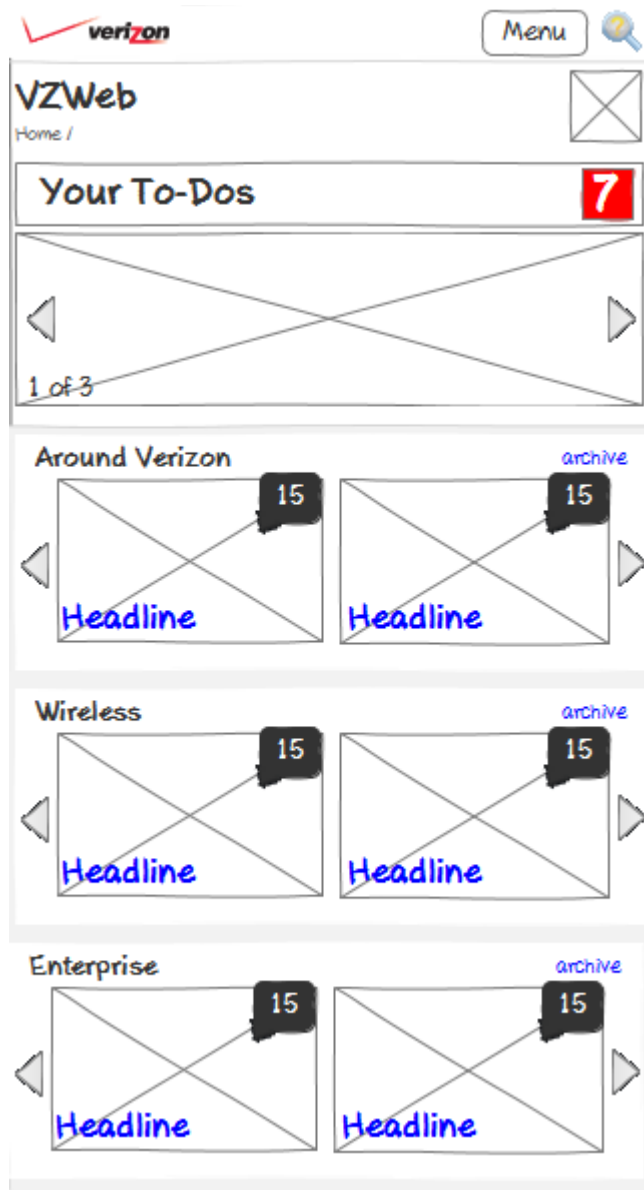
### Usability

Once the decision had been made to use responsive Web design for VZWeb, the design team had to make a few adjustments to the way it normally delivers designs. First and foremost, the designers had to identify how many different versions of the interface they wanted to support and at what resolution the break points would be set. At both the wireframing stage and the graphic design stage, they had to work to account for differing target dimensions, as well as detecting tablet devices in order to serve the grid view of our display.





Initial planning for the responsive design was done in Axure, allowing the team to test across devices using a rough interactive prototype that was easy to iterate with.



It was necessary to build wireframes and designs for each target resolution, to ensure that they accounted for all necessary layout changes.

Using Axure as a wireframing tool allowed the design team to update and test layouts across devices relatively quickly. “At the beginning, we focused on two primary layouts: a combined desktop/tablet view and a separate mobile view,” says Knickmeyer. “As we worked through these with some of our users and key stakeholders, it became apparent that we needed to provide some differing functionality for tablet users. This is when we decided to flip the grid view—by default—for those users, essentially introducing another breakpoint we had not initially planned on.”

These types of design-and-test sessions were critical to refining the design.

“The ability to test interactive designs at the wireframe stage really helped the team understand the differing-use cases for different device types, before we had invested

a great deal of time on graphic design or HTML,” says Knickmeyer. “Iterating through wireframes early on proved essential to streamlining development later down the line. While adjustments were made in both the graphic design and development phases (primarily due to unanticipated requirements), we had a solid framework to build from and good knowledge about how our site would perform across devices.”

This approach took longer than the typical design process the team had used for non-responsive site designs, but the effort and attention to detail were well worth it. “Any team attempting a responsive design approach would be advised to build into their project plans increased time both for design and for testing,” she says.

As the project progressed through HTML and into the Drupal environment, the team continued to test at each stage to make sure the site was displaying as designed. “We focused our testing on real devices, to get the most accurate experience possible,” says Knickmeyer. “We worked mostly with two versions of the iPad (Gens 1 and 3), an iPhone 5, and an Android Galaxy Tablet. Using a remote system, we also accessed additional devices, including a range of Android smart phones.”

## **Device Testing**

Perhaps one of the most difficult aspects of a mobile rollout is anticipating and testing for the huge array of devices that must be supported. When an organization is BYOD (bring your own device), it is nearly impossible to test every device that would potentially access the website. Verizon’s team tried to mitigate this problem by approaching the design not strictly with target devices in mind but with a range of targeted resolutions instead.

“This approach kept us flexible in the face of a difficult testing situation,” says Quiroga. “When troubleshooting on the desktop, there are a number of great tools that can assist a developer in tracking down issues, developer tools for IE and Chrome, or Firebug on Firefox. The process for troubleshooting issues in a secure mobile environment are less stable, and there was no easy way to work within the browser to see how it was interpreting code. For the most part, if we encountered an issue in the mobile browsers, we would have to take a best guess, adjust, and retest until the problem was solved.”

## Timeline

PROJECT TIMELINE	
MILESTONE DATE	MILESTONE DESCRIPTION
2009	<b>Original VZWeb Launch:</b> Original homepage launched without any mobile enablement.
December 2012	<b>Responsive VZWeb Design:</b> Planning, requirements and design for new responsive website
April 2013	<b>Pilot Launch + Mobile Optimized eDirectory:</b> A pilot version of the responsive VZWeb was launched to the Verizon community and was available in production, along with a refreshed, mobile-only eDirectory.
May 2013	<b>Full VZWeb Rollout:</b> The new VZWeb was launched to the whole company.
September 2013	<b>Responsive eDirectory:</b> eDirectory will be redone with enhanced features for user profiles, along with the same responsive framework as VZWeb, for a single consistent experience across the applications.

## MEASURING USE

Verizon tracks a number of Key Performance Indicators (KPIs) on VZWeb, including view counts on articles and pages and number of comments per page. Through the company's Opinion Labs, it has enabled a feedback survey which provides reporting on a number of dimensions including perceived usability, ease of finding information, and look and feel of the site. Opinion Labs is currently set up on VZWeb to randomly sample a small percentage of Verizon users, soliciting their feedback on the site. "We are still early in our rollout at this time," says Knickmeyer, "but already we have seen good responses through this channel, as well as excellent recommendations we are already working into future releases. It is still relatively early in our rollout, but we are seeing continued growth in our metrics and have run follow-up focus groups that indicate users are having a good experience with the new site, in line with our original goals."

## Usage Metrics

**Total user base for VZWeb:** 100,000 employees

**Mobile-only user base:** 12,000 employees

**Mobile site traffic:** Goal → 100,000 mobile page views/month

## LESSONS LEARNED

Every team has its share of on-the-job learning. VZWeb proved to be a difficult but successful project for the Verizon team. Here, team members share some of the lessons they learned along the way:

- **Keep a close eye on requirements.** “Managing requirements may be one of the most important aspects for a project of this scale and complexity. In the future, we’d like to ensure fewer gaps in the requirements during our initial planning and reduce the amount of additional new functionality during the development period.”
- **Using industry standards will pay off.** “We were really satisfied with the platform direction we took (Drupal), because it gave us the ability to control many more aspects of the desktop and mobile user experiences. We took advantage of the latest industry standards, bringing HTML5 and CSS3 into the mix, and made sure everything works uniformly across desktop and mobile platforms.”
- **Leave time for testing.** “We learned that it’s critical to allocate a considerable amount of time for testing (and regression testing), to ensure changes won’t inadvertently break pages viewed on different devices.”
- **Short sprints are more manageable.** “Using an Agile development model helped us reach our goals. By focusing on short sprints with limited feature sets, we were able to better manage our time and make solid, progressive enhancements as we moved toward the release date.”
- **Find the right partners.** “Bringing in Acquia, the industry leader in providing Drupal solutions, was a critical factor in our success. Having skilled and experienced developers and architects familiar with this open source platform helped us to reach our goals.”

## Field Service Engineer Mobile Ticket System (Service Express, Inc.)

**Company Overview:** Service Express, Inc. (SEI) specializes in customized on-site data-center maintenance of mainframe, midrange, and Intel-based servers for IBM, DEC, HP, Sun and Dell, as well as for EMC, STK, Hitachi and NetApp storage. Additional services include data center relocations, OS support, and hardware sales solutions.

**Headquarters:** Grand Rapids, MI, USA

**Annual Sales:** \$39.8 million in 2012

**Number of Employees:** 215 across the United States.

**Company Locations:** Multiple regional offices throughout the Midwest and Southern US including Florida, Georgia, Illinois, Indiana, Kentucky, Michigan, Missouri, North Carolina, Ohio, Pennsylvania, Tennessee, and Wisconsin.

**Mobile Project Overview:** The Field Service Engineer Mobile Ticket System is a mobile Web app designed for cross-platform usability. The application allows Field service engineers (FSEs) to search inventory and order mission-critical parts quickly with their company-issued mobile phones.

**Number of employees the app/mobile website supports:** 80+ Field service engineers.

### **Design team:**

In-house, a six-person core team is responsible for the design and development of the applications used within the organization. Since 2001, this team has been writing Web applications to streamline business processes and increase functionality and profitability at SEI.

### **Members:**

**In-house:** Project team included Greg Bonham, Web Application Developer; Michael Bender, Web Application Developer; Pete Terry, Support Manager; and Jason Coppens, Director of IT.

## OVERVIEW

Transferring users from a person-dependent process to a self-service app can be a tricky proposition in the best of circumstances. Doing so with a user base that has a wide range of comfort levels in using mobile devices requires a design team willing and able to attend to the nitty-gritty details and support users throughout the experience. Big fingers on tiny screens means typing can be a terror, so the design team created an application that demands as little typing input as possible, requiring users, in most cases, only to tap to view data and navigate through the ordering process. SEI's mobile ticketing app also takes advantage of native device functionality, such as click-to-dial and GPS. It anticipates where users may need a helping hand, providing that assistance at just the right time and place.

Engineers use the mobile Web application for the following tasks:



- View service ticket details
- View inventory levels and additional details for specific parts
- Schedule part transfers from an SEI part distribution center
- Request part orders from established SEI vendors

The app takes advantage of native phone features to provide quick access to frequent tasks. For example:

- **Click-to-dial:** The app takes advantage of click-to-dial whenever phone numbers are listed.
- **GPS:** Maps link to native GPS navigation in the user's mobile device.
- **Persistent navigation:** *Back* and *Home* buttons are present on every page, allowing the FSE to navigate to *Home* and return easily to previous pages.

**Type of project:** Web app optimized to support company-issued Android and iOS devices. Originally, the app was supposed to be optimized for the HTC Thunderbolt, but the team has expanded its design to support other handsets and platforms, such as the Motorola RAZR MAXX and iPhone 5. Tablet support is also increasing as the app matures. The team originally tested only for iPad2, but as some users are now using the app on Android tablets, the design will evolve to meet this need.

**Why this approach:** The range of company-issued mobile devices was a key determining factor in choosing between a native app and a Web app. A native app would have required multiple designs and a greater investment in development time. Since the development team was already well versed in creating Web applications and the initial design did not require use of any of the onboard phone functions, such as audio or video, the choice of a Web app seemed like a prudent decision.


**Service Ticket**


Back
**Ticket View**

**ABC Technologies, Inc.**  
 M - 328294

**Contact**  
Jason Coppens

---

**Contact Phone**  
[\(616\) 765-4321](tel:(616)765-4321)

---

**Equipment**  
POWEREDGE 2950 DELL POWEREDGE 2950

---

**Problem**  
Dell PowerEdge 2950 voltage errors

**Caller**  
Michael Bender

---

**Caller Phone**  
[\(616\) 123-4567](tel:(616)123-4567)

---

**Location**  
Corporate Data Center  
4845 Corporate Exchange Blvd  
Grand Rapids, MI 49512- [\[Map\]](#)

---

**Internal Notes**  
Event Category: Instrumentation Service  
Event ID: 1054 Date: 3/22/2009 Time:  
3:20:58 AM Temperature sensor  
detected a failure value Sensor location:  
Backplane Location 2

---

**Service Office**  
Grand Rapids

[\[Less Info\]](#)

**Parts**
Add

No parts on this ticket

This screen shows FSEs all information necessary to service an open customer ticket. This functionality combined with the various parts ordering functions offered by the app give the company's field engineers a self-service model that empowers them to complete tasks in the field with little help from home office staff.



## Goals

One of the primary goals of the project was to free up time in the company's purchasing department and, by doing so, delay the need to hire an additional purchasing agent. Giving Field service engineers (FSEs) a self-service tool to order their own parts automated and streamlined a formerly manual process that put purchasing agents in the role of phone center middleman between FSEs and the inventory system.

## Challenges

There were several challenges in building the ticketing app:

- **Interfacing with the purchasing system:** The basic logistics of interfacing with the purchasing system were a challenge. Making sure every step of the purchasing pipeline was smooth, from quotes to shipping, required a precise level of detail. Simple things such as shipping options were confusing and required knowing how to interact with FedEx, for example. In the app, shipping had to be converted from proprietary names such as "Priority Overnight" and "Ground" to more descriptive and recognizable terms, such as "Next day by 3PM" or "at hold by 9AM".
- **Managing expectations:** While the technology was challenging, setting proper expectations also required some effort. Users had to be brought around to the idea of a Web app, which was not as familiar to them as a native app.

"I think for many of our users, apps (native apps) were just the expected norm," says Greg Bonham, Web Application Developer. "When we were approached originally to write the application, it was requested that we write a native app. The expectation was that native apps ran much faster because they were local to the device. The engineering team and their leaders were concerned that a mobile Web version would be slow and unresponsive at times. To address this, we built a small test application that simply allowed a user to search for contacts and retrieve their information. The pages were so small, in terms of file size, that responsiveness was not an issue."

"Since then," he says, "We've learned that when two sides disagree about what approach is best, testing each theory is the most important way to determine the best direction to go."

- **Transferring user behavior:** The final hurdle was helping users move from what was previously a person-to-person process of ordering parts to an automated self-service model. Taking the middle person out meant changing ingrained work habits. "A number of engineers were unsure about whether or not they would use the tool, because they were used to being able to receive help directly from people," says Bonham. "Computers do what you ask them to, good people share your goals and try to help you achieve them."

But the transition was only a concern up front. “Our test group was able to communicate their successes through our corporate social network tool Yammer,” he says. “This directly impacted the momentum of our adoption rates.”

## Users

The mobile ticket system is used by field service engineers whose job is to repair SEI customers’ failing data center hardware. Many times this requires them to order parts to replace failed components. The software they use to do this allows them to locate those parts within SEI’s inventory and have them shipped directly to their location, or order the part if it cannot be found in SEI’s inventory. The Web app enables them to do all this at the customer work site, without having to engage any additional resources.

There are approximately 80-90 FSEs, ranging in age from 22–65. Among that group there is a wide range of skill level and experience with using mobile devices.

## THE MOBILE EXPERIENCE

### Anticipating User Needs

Because SEI’s Field service engineers previously (prior to the app) spoke to a live agent to place their parts orders, the mobile system needed to give them the same level of confidence that talking to a person would provide. To accomplish this, the design team determined that reducing the base set of options would optimize the mobile experience and help keep the interface simple.

The app also takes advantage of native phone features to provide quick access to frequent tasks. For example:

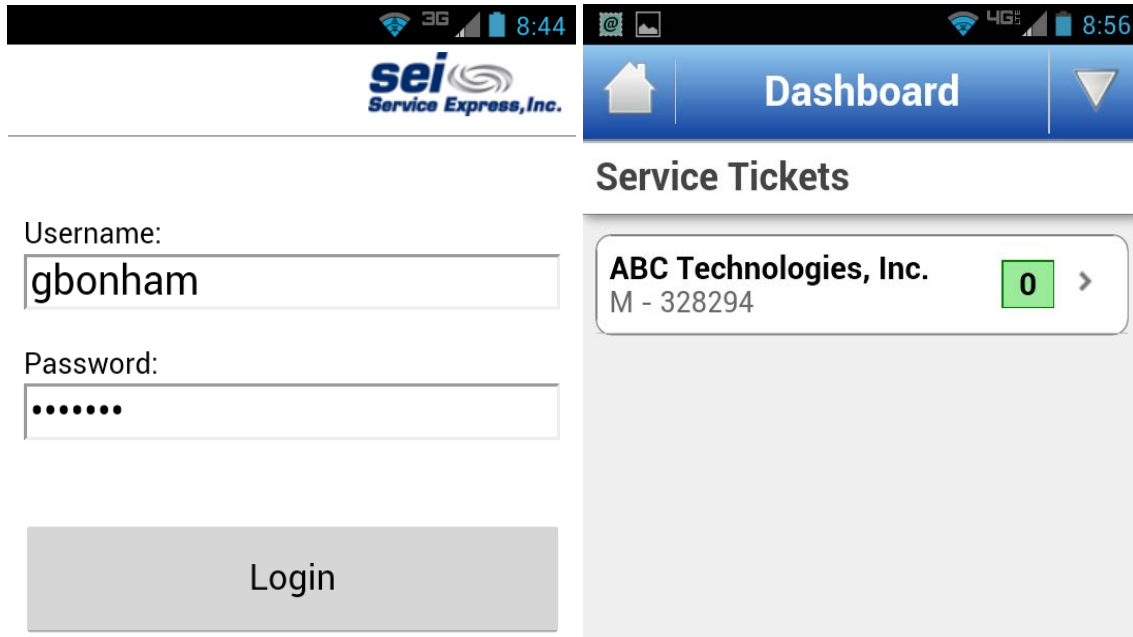
- **Click-to-dial:** The app takes advantage of click-to-dial whenever phone numbers are listed. This gives the engineers easy access to call their customers without fumbling to find and dial the phone numbers. It also provides a safety net, should they reach a point in the ordering process where they need to speak with a live agent. Recognizing that not all options were accounted for in the system, the design team determined that FSEs should be offered the option to speak with a live agent directly. If they reach the end of a workflow path, they are presented with a *Call* button allowing them to be put in contact with a live agent.
- **GPS:** Maps link to native GPS navigation in the user’s mobile device.
- **Persistent navigation:** *Back* and *Home* buttons are present on every page, allowing the FSE to navigate to Home and return easily to previous pages. This feature alone required design considerations, because building a Web app meant providing compatibility with both iPhone and Android devices, which have very different hardware interfaces.

One of the key features that make the design stand out is its search functionality, which assists the engineer by finding parts in nearby stock locations and identifying any possible alternative part numbers.

Headings at the top of each page help orient the users, providing context for whatever task they are doing on any given page. For example, when users are searching for parts, the upper heading displays *Service Ticket* and the subheading displays *Part Search*.

The screens shown below illustrate how the SEI team has put these features to good use throughout the application and how the application supports the users at every step of the ordering process, right down to giving them an opportunity to talk to a live agent when the need arises.

## Tickets



**Left:** Generic login page for the application. At login, the FSE is directed to a custom dashboard presenting features specific to the user's job function. This single authentication also grants the engineer access to the rest of SEI's corporate intranet from a mobile device. **Right:** The users' *Dashboard* default view when they log in on a mobile device. Here they see all of their open tickets. If users push the down-arrow button (in the upper right area), they see options to log out or view the full website version of the intranet. This screenshot shows maintenance ticket number 328294 for the customer *ABC Technologies, Inc.* This ticket is currently zero days old (shown in the green box) and is within a safe age threshold. As the ticket ages, the box on the right changes from green to yellow to red. The engineer can tap on the ticket for more detail.

Service Ticket

Back Ticket View

**ABC Technologies, Inc.**  
M - 328294

**Contact**  
Jason Coppens

**Contact Phone**  
[\(616\) 765-4321](tel:(616)765-4321)

**Equipment**  
POWEREDGE 2950 DELL POWEREDGE 2950

**Problem**  
Dell PowerEdge 2950 voltage errors

[\[More Info\]](#)

**Parts** Add

No parts on this ticket

In the unexpanded ticket view, the FSE can review the most commonly needed information for that ticket and tap the phone number to initiate a call. At the bottom of the screen, any allocated or ordered parts for that ticket will be displayed (none are allocated for this ticket). The FSE can use the *Add* button to add additional parts to the ticket.

A *More Info* link will display additional information for this ticket (see next screen). Without clicking the *More Info* link, the user will see information required to help the customer on this visit. The information contained in the *More Info* area is administrative.

Service Ticket

Back Ticket View

**ABC Technologies, Inc.**  
M - 328294

**Contact**  
Jason Coppens

**Contact Phone**  
[\(616\) 765-4321](#)

**Equipment**  
POWEREDGE 2950 DELL POWEREDGE 2950

**Problem**  
Dell PowerEdge 2950 voltage errors

**Caller**  
Michael Bender

**Caller Phone**  
[\(616\) 123-4567](#)

**Location**  
Corporate Data Center  
4845 Corporate Exchange Blvd  
Grand Rapids, MI 49512- [\[Map\]](#)

**Internal Notes**  
Event Category: Instrumentation Service  
Event ID: 1054 Date: 3/22/2009 Time:  
3:20:58 AM Temperature sensor  
detected a failure value Sensor location:  
Backplane Location 2

**Service Office**  
Grand Rapids

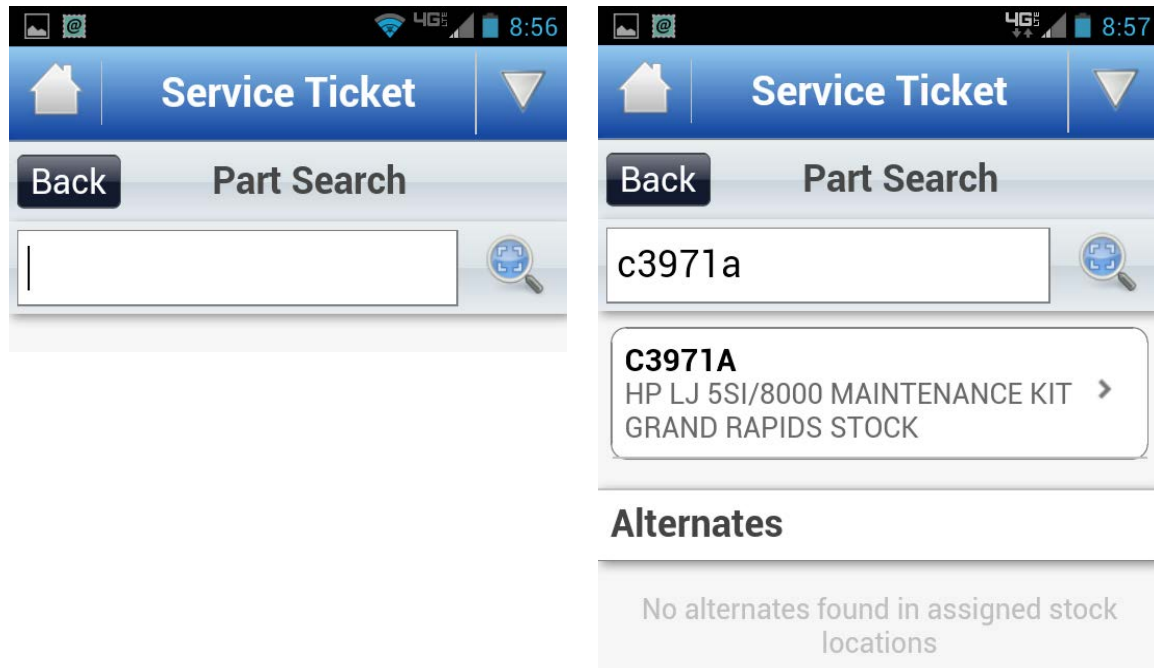
[\[Less Info\]](#)

**Parts** **Add**

No parts on this ticket

Here the user has clicked on the *More Info* link. This screen provides the FSE with all information available for that ticket. Note that the ticket information is not editable. This was one of the features the team specifically decided to limit, because editing the data is a keyboard-intensive task. Given the limitations of typing on mobile screens, the team's goal was to allow engineers to order the parts from their phone (in the field) and save the more keyboard-intensive data entry for when they were back at the office.

## Ordering



**Left: Part search**—The part search screen is a simple interface containing an input box and a search button. The user simply enters the desired part number and taps the search button. Generally, users know the part number they are looking for. Many times (but not always) they are replacing a failed hard drive, so the part number is printed right on the existing drive. On occasion, they have the part number, but the company doesn't stock that exact part number; that's where *Alternates* are useful. If there is another part number that is a perfect one-to-one replacement, the engineer can allocate the alternate part. This helps engineers so that they don't have to be part number experts. The system makes the proper recommendation for them. SEI employs a team of people at its headquarters who populate (and update) the alternate parts list.

**Right: Part found**—If the desired part is found in any of the FSE inventory locations, the part will display in the upper set of results. If an alternate part is found that the system has determined is a direct replacement for what the user is looking for, those results will also appear. The user can then tap on the part for additional detail.

Service Ticket

Back Allocate Part

ABC Technologies, Inc.  
M - 328294

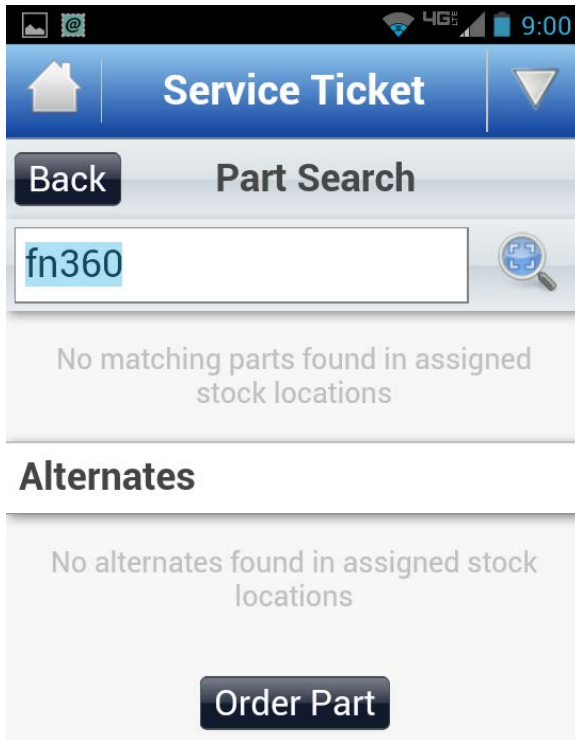
**Part Number**  
C3971A  
HP LJ 5SI/8000 MAINTENANCE KIT

**Stock Location**  
GRAND RAPIDS STOCK  
Bin: A-03

**Quantity**  
1

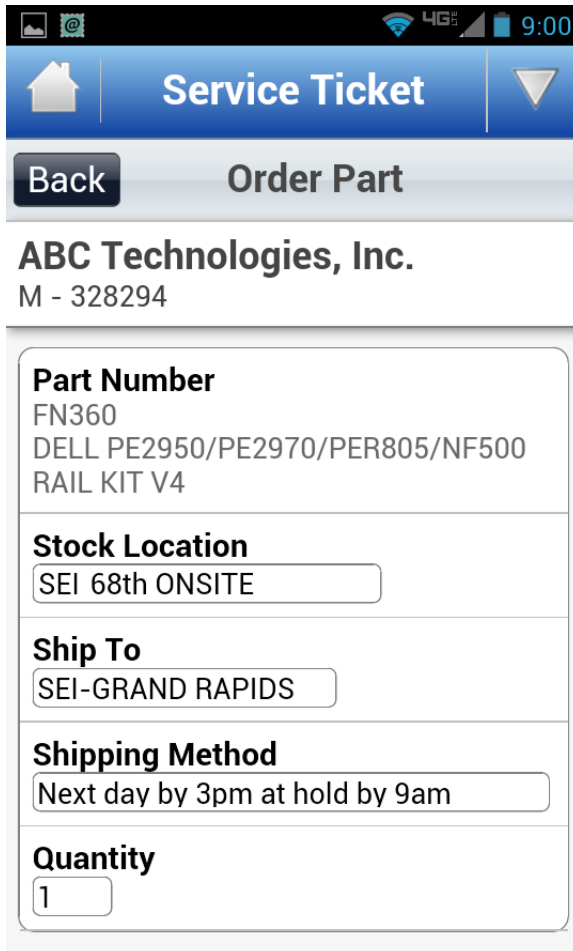
Allocate Part



**Inventory transfer**—If the part is found in SEI inventory, the engineer can create a transfer. The user selects the desired quantity to transfer and then taps *Allocate Part*. This triggers an internal process with the SEI warehouse team to ship the part to the FSE.



**Part not found**—If the part is not found, the FSE will be shown an *Order Part* button.






**Service Ticket**


Back
Order Part

**ABC Technologies, Inc.**  
M - 328294

---

**Part Number**  
FN360  
DELL PE2950/PE2970/PER805/NF500  
RAIL KIT V4

---

**Stock Location**

---

**Ship To**

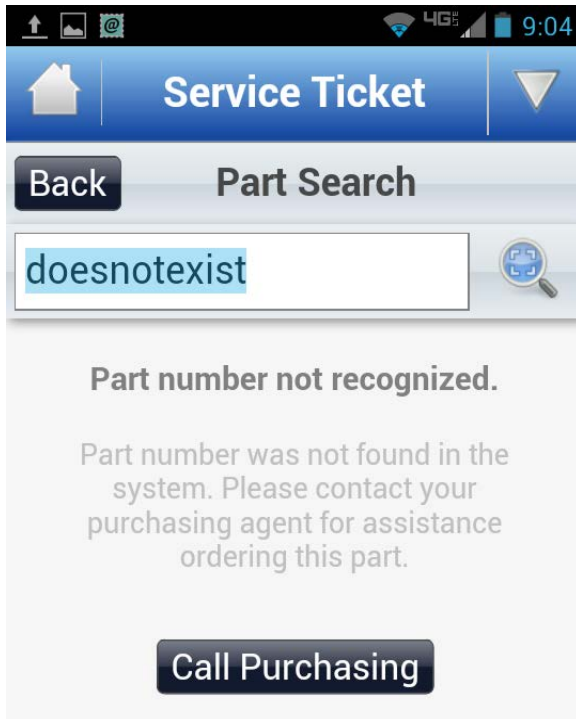
---

**Shipping Method**

---

**Quantity**

**Out of stock**—If no suitable parts are found during the search, the user has the option to place an order to request the part. The user simply needs to select where the part should be sent, and by which shipping method. Because available shipping methods are spelled out clearly with descriptive text, it helps set expectations for when the engineer can expect to receive the part.



**Manual ordering**—While the mobile app puts the purchasing process in the hands of the FSEs, it does not completely take the human touch out of the equation. If a part number is not recognized by the system, the engineer will be directed to contact a purchasing agent and can do so by pressing the *Call Purchasing* button. The button will dial the number of the purchasing agent who is currently on call.

## DESIGN PROCESS

### Accommodating a Range of Users

With a user base that ranges in age from 22–65 comes an equally wide range of comfort in using mobile devices. Accommodating those varying degrees of familiarity meant that the design team had to take care to design a visual interface that users could easily understand and manipulate.

“We forcibly kept the feature set small and the fonts large,” says Bonham. “The buttons were kept fairly large to support differing levels of manual dexterity. We had heard complaints from other engineers about ‘fat fingering’ information very easily on the devices because there is no true tactile response on the on-screen keyboards, as well as because of the size of the buttons.”

The main concern was making the font large enough to read but small enough that it didn’t take up too much of the screen.

Using the warehouse of data they had in their inventory system, they tried to determine the largest possible font size while still attempting to store as much content on a single viewable page without scrolling, and with minimal word wrap. The solution was to set the smallest font size in the app at 16px. This, of course, can

result in different physical sizes, depending on the device, but according to test results, that size seemed to track well across devices.

Making specific UI accommodations like this was one way to facilitate user adoption. Another was to take care in using terminology and a workflow that would mimic what was found in the off-line purchasing process.

SEI FSEs are not required to use the system. The company encourages them to use the app, because of the efficiencies it creates, but does not force them to. When testing the app, the team also tested users' comfort levels as they performed functions. Approximately 40% of users identified themselves as "less comfortable" users, 10% as "comfortable," and 40% as "expert" users.

"The numbers were representative of the testing team, not the entire FSE staff," says Bonham. "Our testers were hand-picked by their managers to meet our 'comfort level' criteria, as well as for their ability to provide candid feedback. We're a technical company, and the managers and FSEs are constantly engaging in technical training and certification programs. The FSEs' managers have more existing knowledge of the individual technical abilities of their employees than other managers would."

## Device Testing and Iterative Design

The design team recognized that the mobile browser becomes an extension of the operating system and thus can create just as many challenges as the app itself. So, by default, the team tested the app using the native browser of each specified device. The mobile ticketing app required a lot of testing because of the number of browsers and devices it was required to support. All device testing was performed on actual devices, not simulators. Some testing (during the development phase) was done on a standard PC, with a Web browser set to a screen resolution similar to the one on the mobile phones.

In the early phases (after whiteboarding was complete), the team used paper prototypes to develop an overall page flow. Specifically, they used 3x5 index cards as the paper for the prototype, because users could hold them in their hands, much like a mobile phone (and because they had the same approximate dimensions). The team tested the paper prototypes with project stakeholders and two engineers who work out of the local office, just as a "gut check" to make sure they were on the right track.

After that, the team developed higher-fidelity prototypes for all the screens. The stakeholders reviewed these before the design went into full production. The team walked groups of users (three FSEs at a time) through the high-fidelity prototypes, and the walk-throughs were mostly conversational. "We asked them questions about how appropriate the content on the screen was, and flow of information," says Bonham. This process typically took two to three iterations.

"We kept the groups small so that there was a greater level of interaction with each person," he says. "When groups get much larger, we typically lose feedback from individuals. The smaller the group, the greater the ratio of people contributing to the conversation."



iPad 10:30 PM 49%

m.seitrakker.com/servicetickets/?t=328294&mc Search

SEI Mobile

### ABC Technologies, Inc.

M - 328294

<b>Contact</b> Jason Coppens
<b>Contact Phone</b> <a href="tel:(616)765-4321">(616) 765-4321</a>
<b>Equipment</b> POWEREDGE 2950 DELL POWEREDGE 2950
<b>Problem</b> Dell PowerEdge 2950 voltage errors

<b>Caller</b> Michael Bender
<b>Caller Phone</b> <a href="tel:(616)123-4567">(616) 123-4567</a>
<b>Location</b> Corporate Data Center 4845 Corporate Exchange Blvd Grand Rapids, MI 49512- <a href="#">[Map]</a>
<b>Internal Notes</b> Event Category: Instrumentation Service Event ID: 1054 Date: 3/22/2009 Time: 3:20:58 AM Temperature sensor detected a failure value Sensor location: Backplane Location 2
<b>Service Office</b> Grand Rapids

[\[Less Info\]](#)

**Parts** Add

No parts on this ticket

The unexpanded ticket view as seen on an iPad. No special modifications were made to accommodate the tablet view, aside from making sure the buttons and text would shrink and grow appropriately for various devices and orientations (portrait vs. landscape mode).

## Timeline

PROJECT TIMELINE	
MILESTONE DATE	MILESTONE DESCRIPTION
July 2011	<b>Proof of concept:</b> Developed first proof-of-concept mobile website as an extension of the existing in-house CRM product. It allowed salespeople to look up contact information.
September 2011	<b>Limited-functionality production app:</b> Developed first production of mobile Web app allowing FSEs to acknowledge service tickets from their phones. Users could see only limited information in very raw HTML and there was no cohesive interface. The idea of creating a mobile dashboard for tickets and part lookups was beginning to be formulated.
January 2012	<b>Lookup system:</b> Released a production-ready version of the CRM contact lookup system, including CRM calendar with integration into Microsoft Exchange Server. System was released to five test subjects but never made it to full production, because SEI began reviewing potential outside CRM vendors to replace the in-house software.
March 2012	<b>Project planning for Web app:</b> Assembled project specifications and business processes for a service-ticket and inventory search system. Determined that the application would work best as a mobile-optimized Web application. Identified a usability testing team comprised of volunteer FSEs.
May 2012	<b>Design phase:</b> Designed and tested initial wireframes and screenshots with FSE testing team.
June 2012	<b>Development phase:</b> Began full development on the production application.
July 2012	<b>Beta launch and testing:</b> Released to FSE testing team for testing and usability feedback.
September 2012	<b>App released:</b> Released full production app to all FSEs.
Ongoing	Looking to release a mobile Web application similar to previous demo applications. Tablet support will be expanded, as management use of tablets is increasing (iPad and Microsoft Surface).

Users drive many initiatives at SEI. In the case of mobile, the end-users were requesting greater access to information. Since they all have a company-issued mobile device, the only limiting factor is what the IT software dev team has time to create for them. One of the driving goals behind this type of initiative at SEI is, as Bonham says, "truly to do everything we can to help our customer resolve their data center issues." That means there is no specific urgency for mobile offerings, as such, but rather an overall drive to increase revenue, reduce/maintain margins, improve

customer service, and engage employees. And if a mobile solution meets these needs, then it's a mobile solution that gains support.

"The only limiting factor in our organization is the time availability of our developers," says Bonham, "If the strongest business cases are made for mobile-centric applications, they will receive the greatest attention."

The idea behind the mobile app was an evolutionary process. The team worked incrementally, building from an initial kernel of an idea to a proof of concept and evolving the overall concept over time to realize the current ticketing Web app.

## **MEASURING SUCCESS**

With this type of application, where a user process is being transferred from a manual workflow to a self-serve environment, there are two easy ways to measure whether it's working: a reduction in calls to the purchasing department and an uptick in orders placed through the app. By all accounts, this app is a win on both fronts.

"Five months after the release of the project, we pulled data regarding the number of purchase orders processed," says Pete Terryn, Support Manager. "Purchase orders are a measurable way for us to determine the amount of work done by the purchasing team. Previously, every purchase order was the result of a phone call from an engineer. The new process allows the part orders to automatically load into our Request For Quote (RFQ) broadcast system (previously manual) or circumvent it entirely to have the order fulfilled by our Distribution Center."

Prior to the app, the purchasing team was averaging 1,100 purchase orders each month. Over the five-month initial period after the launch of the app, 1,043 purchase orders were automatically loaded into the RFQ system; and 821 bypassed the team completely and were fulfilled by the Distribution Center.

"This amounted to a 34% reduction of the number of initial orders processed by the purchasing team," he says.

The application is a success, and it hasn't taken long to catch on and return results. After the first week the application was released, 24% of purchase orders requested by Field service engineers were placed online. By the end of the second week, that number had jumped to 55%.

"As engineers became more confident in the tool, they used it more and began to share their successes with their fellow engineers," says Terryn.

That kind of aggressive uptick in usage has already resulted in quantifiable cost savings. Given a four-person purchasing staff, that reduction in manual processing of purchase orders saved the company the salary of one individual in the first year.

## LESSONS LEARNED

Bonham shares lessons the team learned from the project:

- **Improvisational techniques work.** “3x5 index cards make for fantastic paper prototypes for cell phones. I would highly recommend it to anyone.”
- **Social tools provide a great forum for feedback.** “We received a great response from our testers with our use of social tools like Yammer for collaboration. It had more of a crowdsourced feel, and the transparency helped keep everyone on the same page constantly. When a new screenshot was developed, it was posted to the group for feedback.”
- **Success stories breed success.** “When it came time to release, we had solid communication with the FSEs through Yammer. They were able to give direct feedback as to what worked with them and what didn’t work. Fortunately for us, we received a great deal of good feedback. We made sure to internally communicate the percentage of users and success stories once per week for three weeks, so that FSEs could see the momentum.”



## “Suma” (North Carolina State University Libraries)

### Organization Overview:

With two main libraries and three branches, the North Carolina State University (NCSU) Libraries are the gateway to knowledge for the NC State University community and its partners. The libraries define the leading edge of information services and collections to support the university's mission and to further knowledge in the world.

The NCSU Libraries employ 280 people and are visited over two million times a year. With more than 34,000 students and nearly 8,000 faculty and staff, North Carolina State University is a comprehensive university known for its leadership in education and research, and globally recognized for its science, technology, engineering and mathematics leadership.

Headquarters: Raleigh, NC USA

### Mobile Project Overview:

Suma is an open source, mobile, Web-based assessment toolkit for collecting and analyzing observational data about the usage of physical spaces and services. Suma's goals include streamlining existing data collection, enabling fast, hassle-free mobile data collection, providing sophisticated data analysis and visualization capabilities for non-technical users, and promoting observational data analysis as an integral part of service and space design and day-to-day planning.

### Number of employees the mobile experience supports:

Several dozen internal users and at least ten external pilot projects are using the open source version of Suma.

**Design team:** The core Suma team is comprised of roughly five people, as well as two former team members who have moved on to other positions. All project members had a range of responsibilities outside of the Suma project as well, but their contributions to the project are noted below.

### Members:

**In-house:** Jason Casden, Lead Librarian, Digital Services Development, NCSU Libraries (project lead, developer); Joyce Chapman, Communications and Data Analysis Consultant, State Library of North Carolina (data analysis and library assessment specialist, community engagement lead); Bret Davidson, Digital Technologies Development Librarian, NCSU Libraries (technical lead, developer, data visualization specialist); Rob Rucker, Head, Research and Information Services department, NCSU Libraries (Stakeholder representative); Eric McEachern (Backend developer, responsible for much of the development of the server-side components.); Rusty Earl (Backend developer and technical consultant).

## OVERVIEW

Many libraries produce manual head counts or transaction counts for their physical spaces but struggle with the challenges of collecting, organizing, storing, and analyzing such data, thus significantly limiting its use. Daily headcounts are done several times each day, by dividing the library into many zones and providing specific metrics for a given reading room or lab. Previously these initiatives were recorded as hash marks on paper templates by staff and later entered into a

spreadsheet by an administrative support staff position. Saving this labor was a driving factor for creating Suma.

The Suma team transformed a simple tool (a clicker counter that counts, for example, how many people enter/leave a space such as a library) into a mobile-enabled application. Suma is optimized for tablet use, but can also be used on smaller-screen mobile devices or a desktop browser. Suma streamlines data collection and data management activities and enables rapid, sophisticated, quantitative data analysis so the data can be easily employed to inform space and service design decisions.

While Suma has a mobile client to facilitate data acquisition, the mobile application is only one part of an overall application stack comprised of three major components:

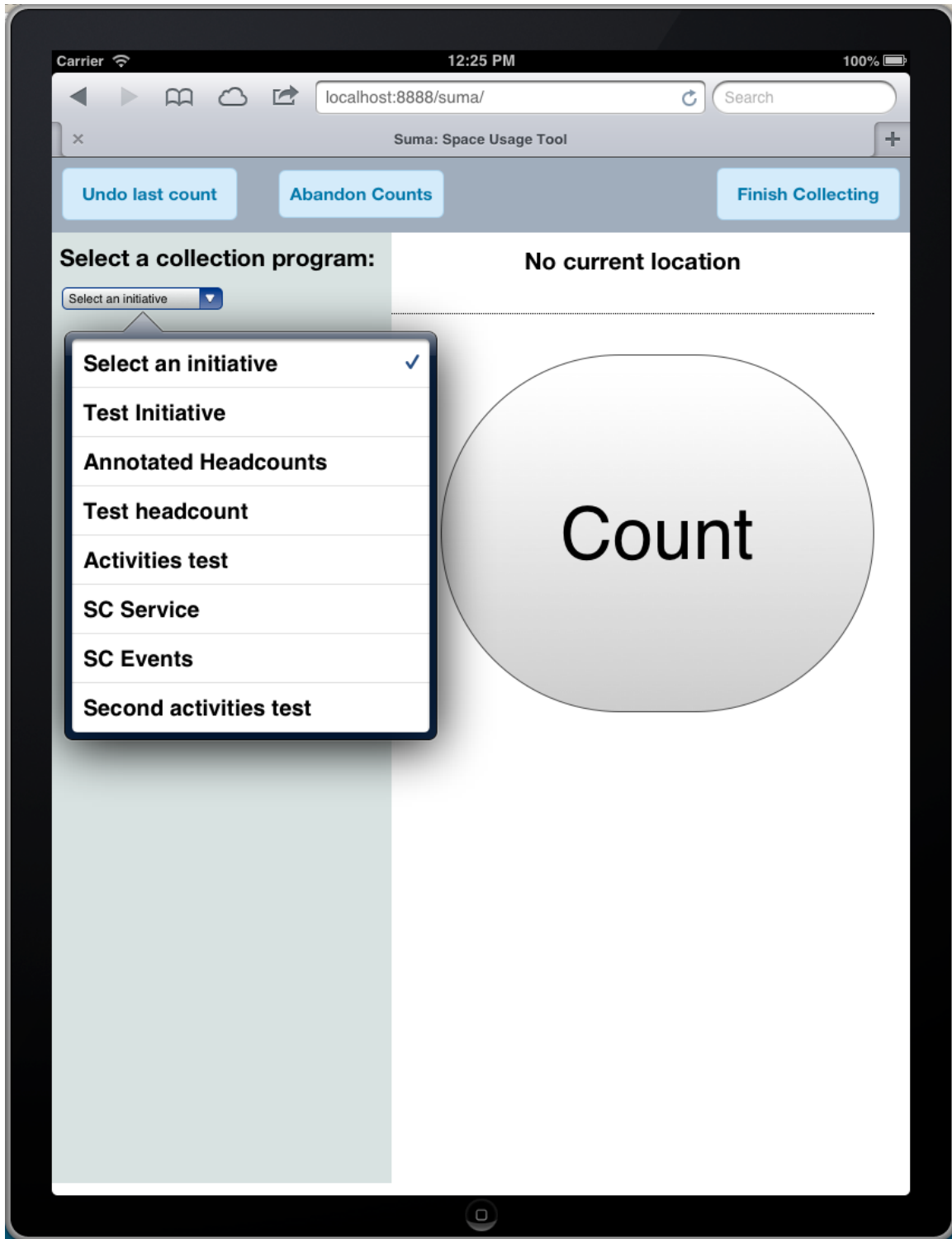
- data-collection tools
- a data-management server
- a data-reporting and analysis framework

The mobile (data collection) component of Suma features an enormous *Count* button. This feature is a “blind thumb” interface that serves as a virtual clicker. When deployed on a tablet device, it is an extremely reliable counting tool that provides clear tactile and auditory feedback and can be used without any visual checks, dramatically speeding this routine and time-consuming process of counting people as they enter a space. Suma users use the *Count* button by holding the device at their side and “thumping” the button with their thumb, without diverting their eyes. An in-browser database (Web SQL DB) combined with the clicker create an extremely responsive interface, even across network outages, while preserving data across browser sessions by asynchronously uploading data to the server.

On the reporting side, the desktop Suma client provides a robust dashboard (utilizing D3.js) that presents multiple dimensions of the data using zoomable time-series charts, activity and location bar charts, and data tables, as well as image and CSV (Excel) exports. Comparative and experimental charts are currently under development, including a calendar heat map and charts for comparing data across multiple collection initiatives.

**Type of project:** Suma is a mobile, open source observational data assessment framework. It is optimized for tablet devices (for data collection) and desktop (for data analysis). While Suma can be used on a tablet or smaller-screen mobile device for data collection and viewing aggregated data and usage reports, Suma’s data analysis tools are currently optimized for desktop Web use.

**Why this approach:** The team first set its sights on a native app, but the release of the iPad, along with the rapidly increasing capabilities of Web-based mobile applications, led them to shift their development efforts toward the Web. “We felt that a Web-based mobile application would be more likely to support additional platforms (and Suma does now support Android-based tablets, for example) and to attract both internal and external developers who are much more likely to be comfortable with Web development technologies than with Objective-C and Cocoa Touch,” says Jason Casden, Lead Librarian, Digital Services Development.



Suma's data collection application gives users tools to define the parameters of their collection activities and a clear, easy way to collect the data using the tool's "blind thumb" interface.

## Goals

The central goal of the project is to improve the library's knowledge of its users, especially users of its spaces and services. Other related goals include:

- **Streamline collection, storage, and reporting of physical space data** to assist management in decision-making. "For example," says Casden, "how to staff library reference points based on the volume and type of transactions at particular times of day, or how to configure collaborative and individual study spaces based on user behavior patterns."
- **Assist all library staff in better understanding its customers and their needs.** "Libraries are unique in that they offer a plethora of services to a wide variety of customers," says Joyce Chapman, Communications and Data Analysis Consultant, State Library of North Carolina. "The 21<sup>st</sup>-century academic library has evolved to provide numerous services such as online databases, technology lending, specialized software, information-finding assistance, and physical spaces for activities ranging from teleconferencing and collaboration to coffee breaks and maker spaces. On an average workday, most library staff interact with a very limited slice of the library, both physically and temporally. We have no idea how customers use library spaces that aren't visible from the main thoroughfares, how usage patterns change after hours, or how customers use new experimental spaces versus traditional ones. While Web usage statistics help us understand how our customers interact with our digital space and transactional data tell us how they interact with our materials, Suma provides the first mobile tool to help staff collect and analyze the missing piece: data about how customers are using our physical spaces. Without all of these puzzle pieces, we can't claim to have a full picture of customers' interactions with the library and its services, nor can we make informed management decisions about physical spaces."
- **Integrate data analysis into both tactical and strategic decision-making processes centered around spaces and services.** In order to achieve this goal, the project team strived to dramatically lower the barriers to entry for both data collection and analysis. Suma eliminates paper-based data collection, which both reduces the costs of hand-coding data and allows for the collection of richer data that would be difficult to represent on a paper-based form. Suma also eliminates spreadsheet-based data management and analysis. By storing all data in a centralized system and in a consistent format, the Libraries team is able to build powerful and reusable data-analysis tools that can be applied to all collecting programs within an institution. Gone are the days of tracking down spreadsheets, performing awkward manual analysis, and dealing with fragmentation in terms of both time and data format.

## Challenges

Suma is all about data: the collection of data, the storage and management of data, the analysis of data, and the presentation of data, but dealing with all that information is challenging. Among the team's many challenges were:

- **Data Collection:** The most critical and potentially blocking challenge, with Suma, was the team's ability to construct the data collection and presentation workflow without compromising the integrity of the data itself. "While we were confident in our ability to manage the data on the server, we were quite concerned about the collection and transmission of data from a variety of mobile clients," says Casden. "We identified several dimensions of this problem early in the project."
  - "Will the data-collection client perform well enough to encourage compliance by data collectors and the enthusiastic adoption by stakeholders that would be critical to the growth of the project?"
  - "Can we preserve the data before it has been uploaded to the server? What if someone closes the browser, reloads the page, or restarts the device? What if there is a prolonged network outage?"
  - "Can we preserve data across interruptions? This may be a face-to-face interruption, where a reference question is asked of a data collector performing a head count, who will now need to switch collection initiatives in order to record the question and return to the head count. This also includes wireless access-point handoffs during mobile data collection, or possible occasional wireless dead spots deep within book stacks."

"We were able to sufficiently address all of these issues through the use of in-browser database technology, touch-based events, batched asynchronous client/server data synchronization, and the development of server data-recovery features," he says. "In two years of heavy internal use, we have not had a single case of lost data, despite constant simultaneous use from a variety of platforms (primarily iPads, iPad Minis, desktops, and laptops)."

- **Data analysis:** Once the data-collection client was performing well, the next challenge was to meet the team's goal of providing data-analysis and reporting tools that were easy for non-technical users to use and reusable across all potential Suma data-collection initiatives; all within a consistent data-collection interface.

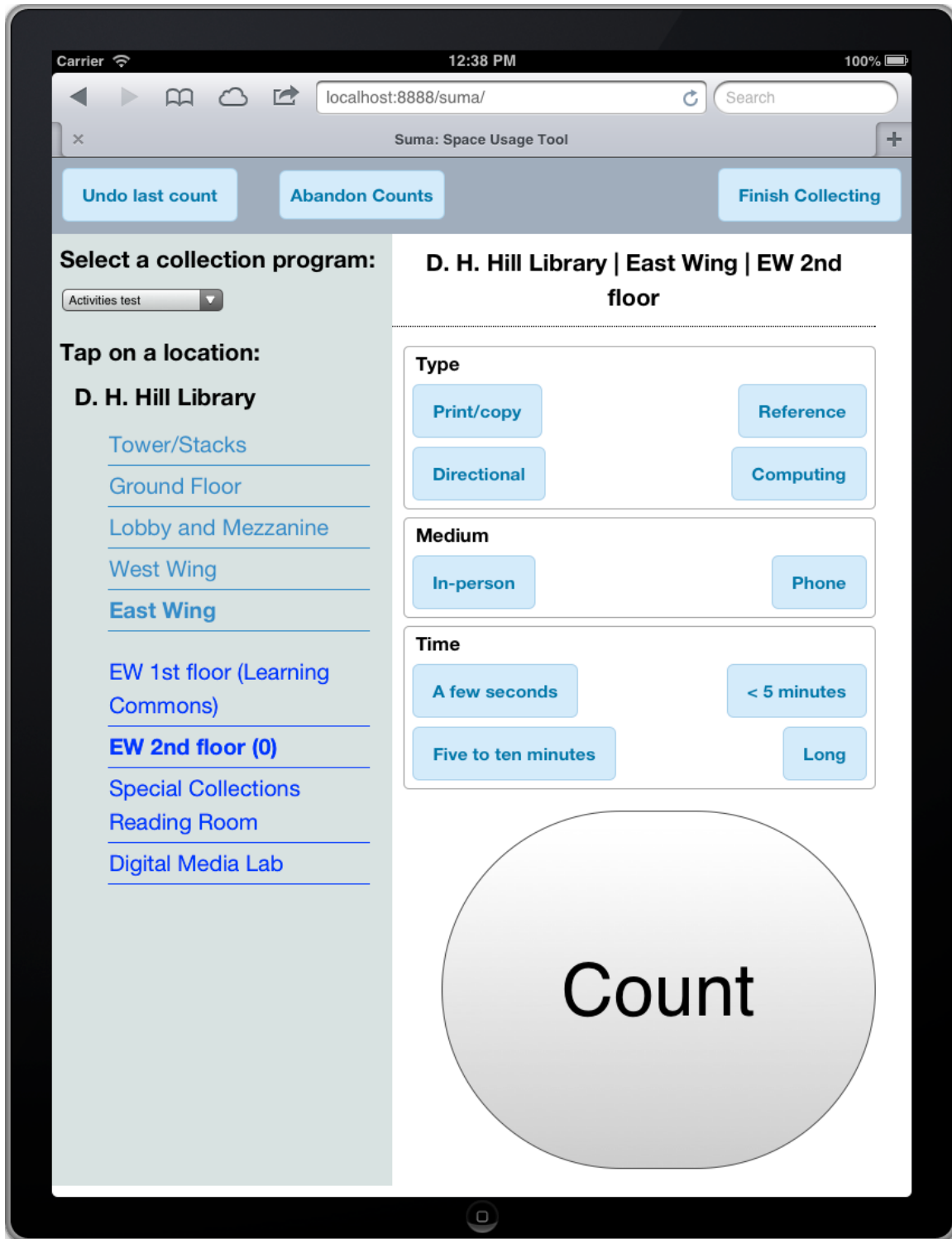
"In order to achieve both of these goals without sacrificing the potential range of collection initiatives, we designed a simple but very flexible schema to which all collection initiatives will conform," says Casden. Simply put, there are two types of properties that can be associated with any count: location and (collection) activity.

- **Locations** are simply selected from a hierarchical list of possible collection locations (for example, DH Hill Library → East Wing or EW 2<sup>nd</sup> Floor → Digital Media Lab, etc.).

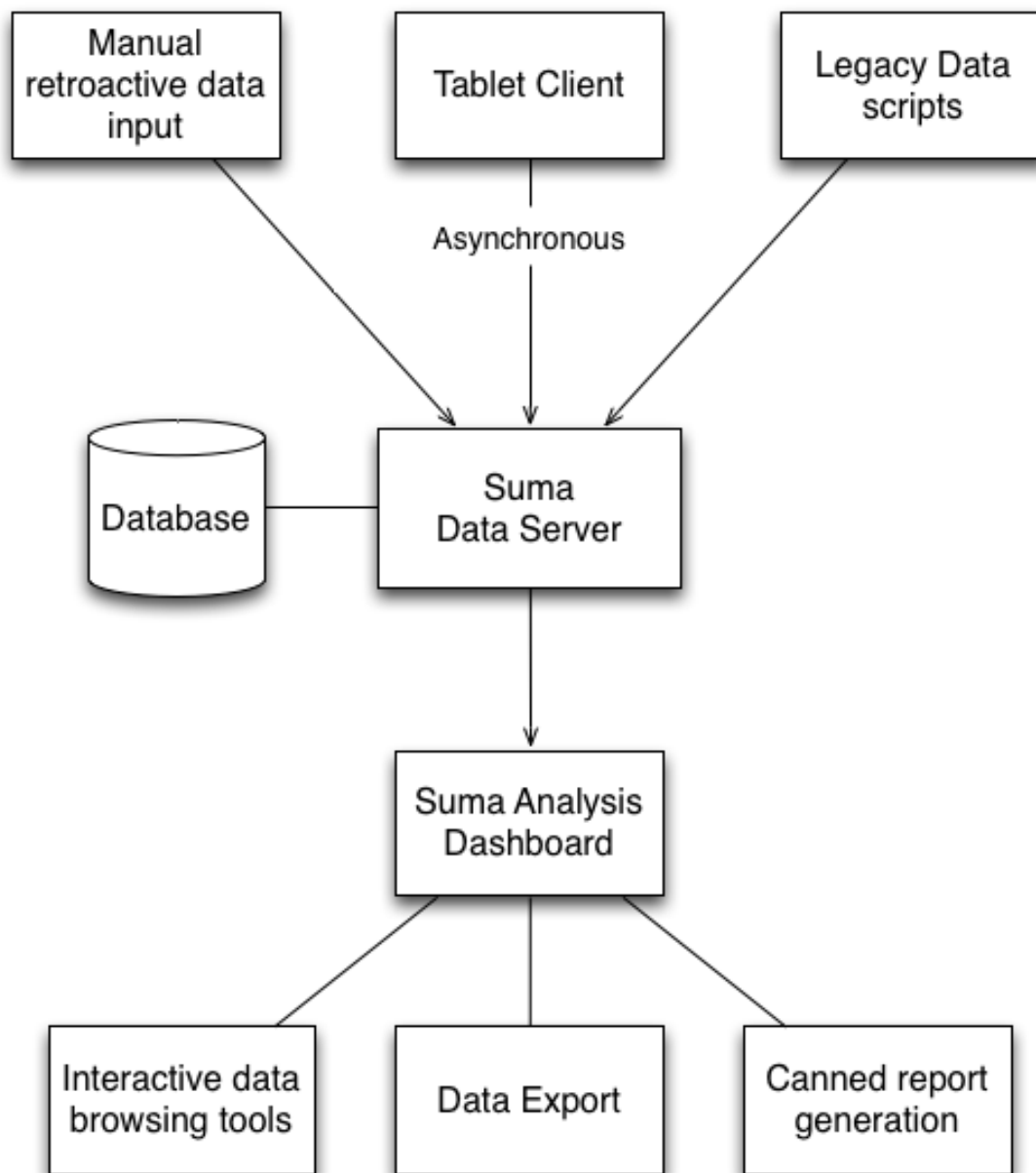
- **Activities** are more complicated. They are essentially Boolean (true/false) flags that can be associated with a particular count. But each activity belongs to a group, and each count can have more than one activity associated with it. Each activity group can have its own rules: it may be required, and it may allow only one or more than one activity within that group to be associated with a given count. The scheme accounts for these permutations so that the tool can produce sophisticated data visualizations from a wide variety of initiatives.

“Consequently,” says Casden, “despite the fact that we have avoided any textual or numeric fields in our minimalistic schema in order to develop a system that emphasizes collection efficiency, we can track transaction times by describing time as a categorical variable: *< 1 minute, 1–5 minutes, 5–20 minutes, or > 20 minutes*. We can also use activities to track transaction types, contact medium, technologies being used (for example, *laptop, desktop, tablet*), activities being performed (for example, *group study*), furniture, open vs. closed doors, or anything else that can be answered with a yes or no question. Although there is some loss in granularity when compared to free-text fields, I feel that the ability to very quickly collect and analyze deep, multidimensional data easily justifies any schema-related limitations. Furthermore, this type of multidimensional data (for example, a user is in room A at 10 a.m., has a laptop and a tablet, is in a group and is eating) is extremely difficult to record using spreadsheets or paper-based forms, while it is trivial to collect and analyze using Suma.”

- **Data processing:** As the project has progressed, the challenge has moved from data collection to the challenge of processing large quantities of data. “An active Suma deployment will quickly reach hundreds of thousands and then millions of database rows,” says Casden, “and the ability to conduct longitudinal analysis of this is a major advantage of Suma. As the amount of data under analysis grows, however, the processing times also grow, leading to slower and slower queries. Although we have spent a significant amount of time optimizing the data-querying and processing code, we will soon need to address this issue in other ways, including caches, batch (nightly) partial pre-processing of data, or distributed data processing.”



This screen illustrates the *Activities* function in action. On the right side of the screen users can associate various activities a count at any given location. In this example users can associate type, medium and time activities with the count that will be taken.



This is a high level Suma system diagram, emphasizing the three main architectural components (data collection, data management, and data analysis).

### Users

Several dozen staff at NCSU Libraries currently use Suma, and as it is an open source project, there are at least ten external pilot implementations at other large academic libraries. Within NCSU, users include undergraduate and graduate student staff, full-time public services staff working all shifts during a 24-hour period, archivists and librarians providing research services, librarians managing spaces in



the university's main or branch libraries, and a variety of stakeholders interested in the data, including managers and assistant directors.

## THE MOBILE EXPERIENCE

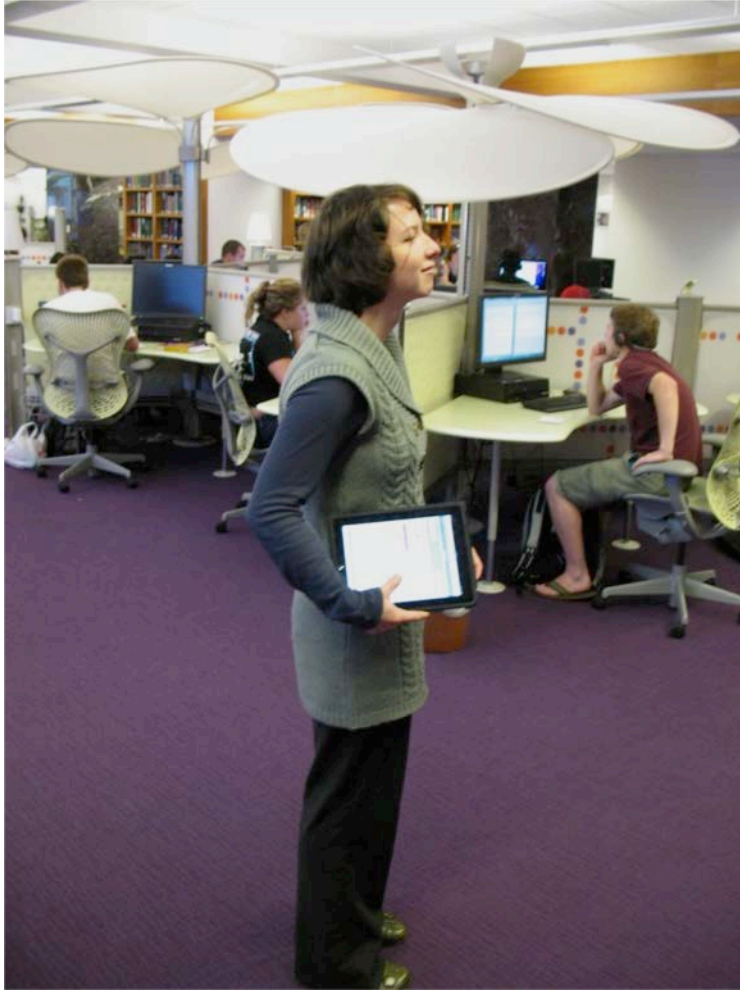
### Data Input with the “Blind Thumb”

The mobile client is the driving force behind Suma's data collection. The interface shown below is a result of iterative design cycles and was modified in accordance with findings from usability studies. One major change from the original wireframes was the development of a large user-interface component called the ‘blind thumb.’ Originally, the team designed the collection screen with a much smaller button counter that was sized similarly to any typical button found in a desktop application. “Guerrilla usability testing quickly proved that the mobile collection interface couldn't hold a candle to the clicker counter,” says Chapman, “a simple handheld device with clear tactile and auditory feedback that tallies counts, because the new tool required the user to *visually* affirm each tap (count) of the onscreen button. Users needed a way to quickly log counts without visual confirmation, and so the blind thumb interface was born.”

The counter button now takes up roughly one fifth of the screen real estate, allowing users to hold an iPad at their side and quickly log counts by tapping their thumb at the bottom of the screen with no visual confirmation required for each count.

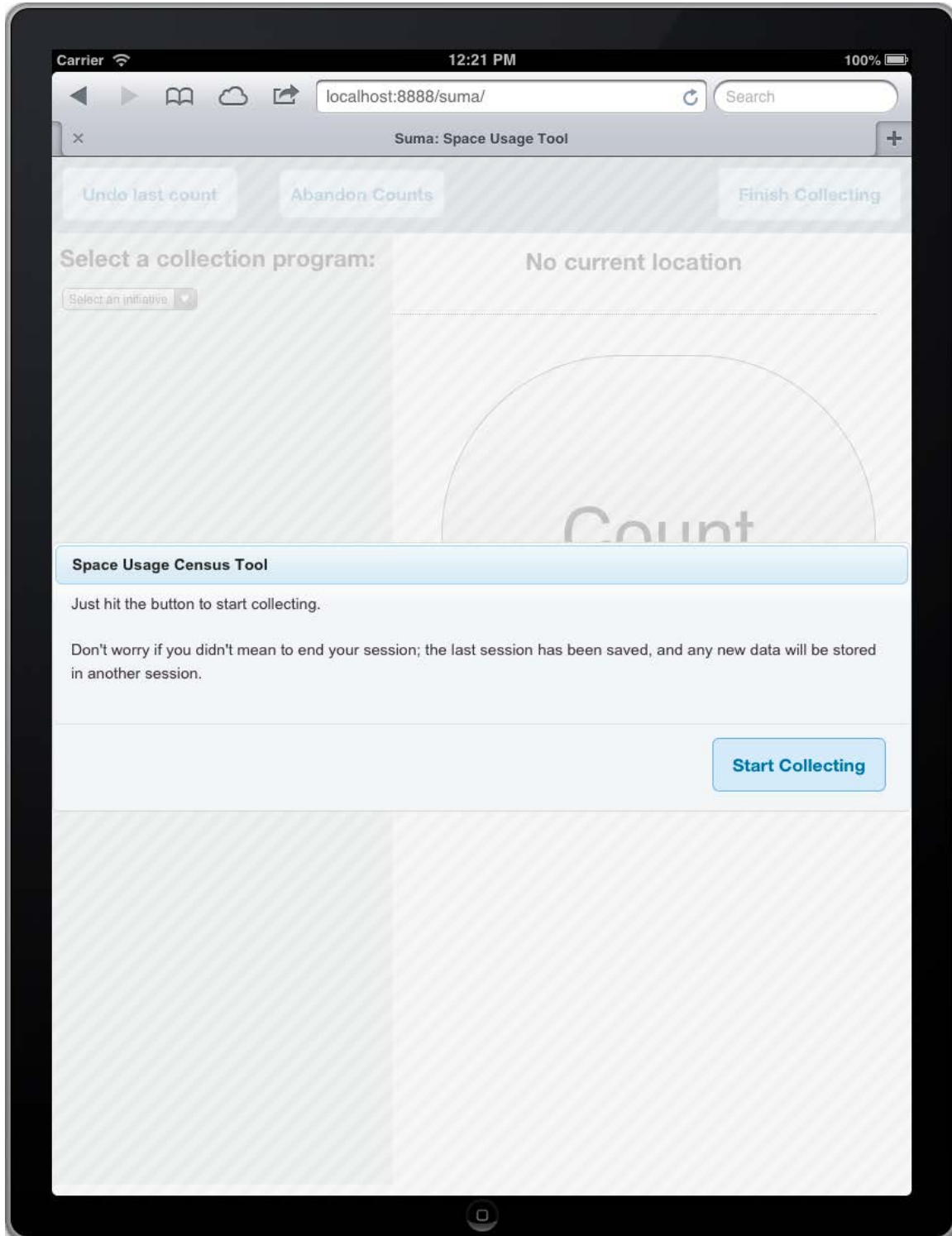
“There are two particularly noteworthy aspects to the design of the mobile client,” says Casden. “A clicker is an extremely reliable device that provides clear tactile and auditory feedback and can be used without any visual checks, dramatically speeding this routine and time-consuming process. The new Suma *Count* button provides the same advantages. Users who hold the device at their side can thump the button with their thumb without diverting their eyes (though there is no sound associated with the click.”

“Secondly,” he says, “we utilized in-browser database technology (Web SQL DB) and touch events to create an interface that is extremely responsive, even across network outages, while preserving data across browser sessions by asynchronously uploading data to the server.”

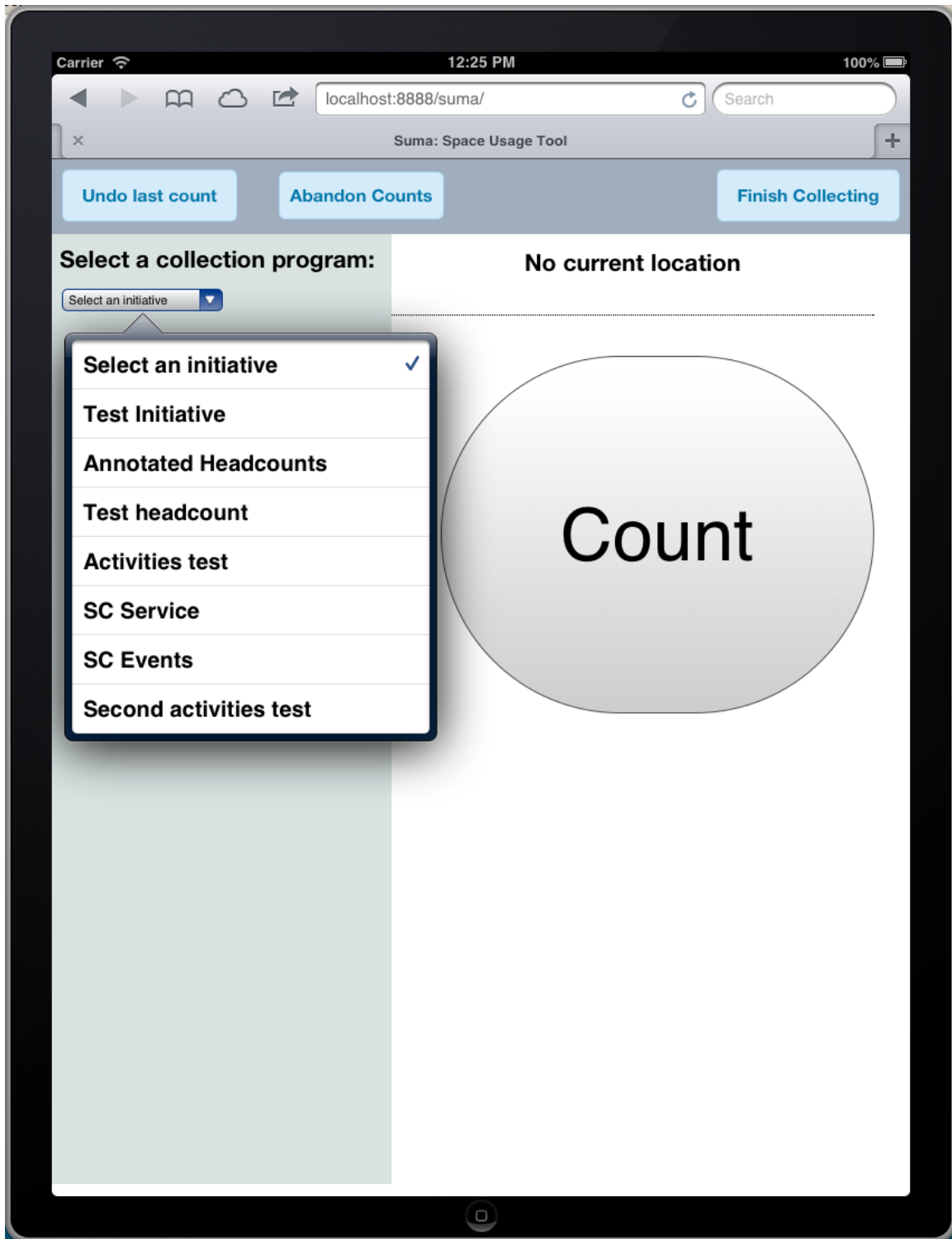


This is an example of the “blind thumb” counting interface in use on Suma. Staff members can be seen walking through the NCSU libraries with iPads and iPad Minis held this way.

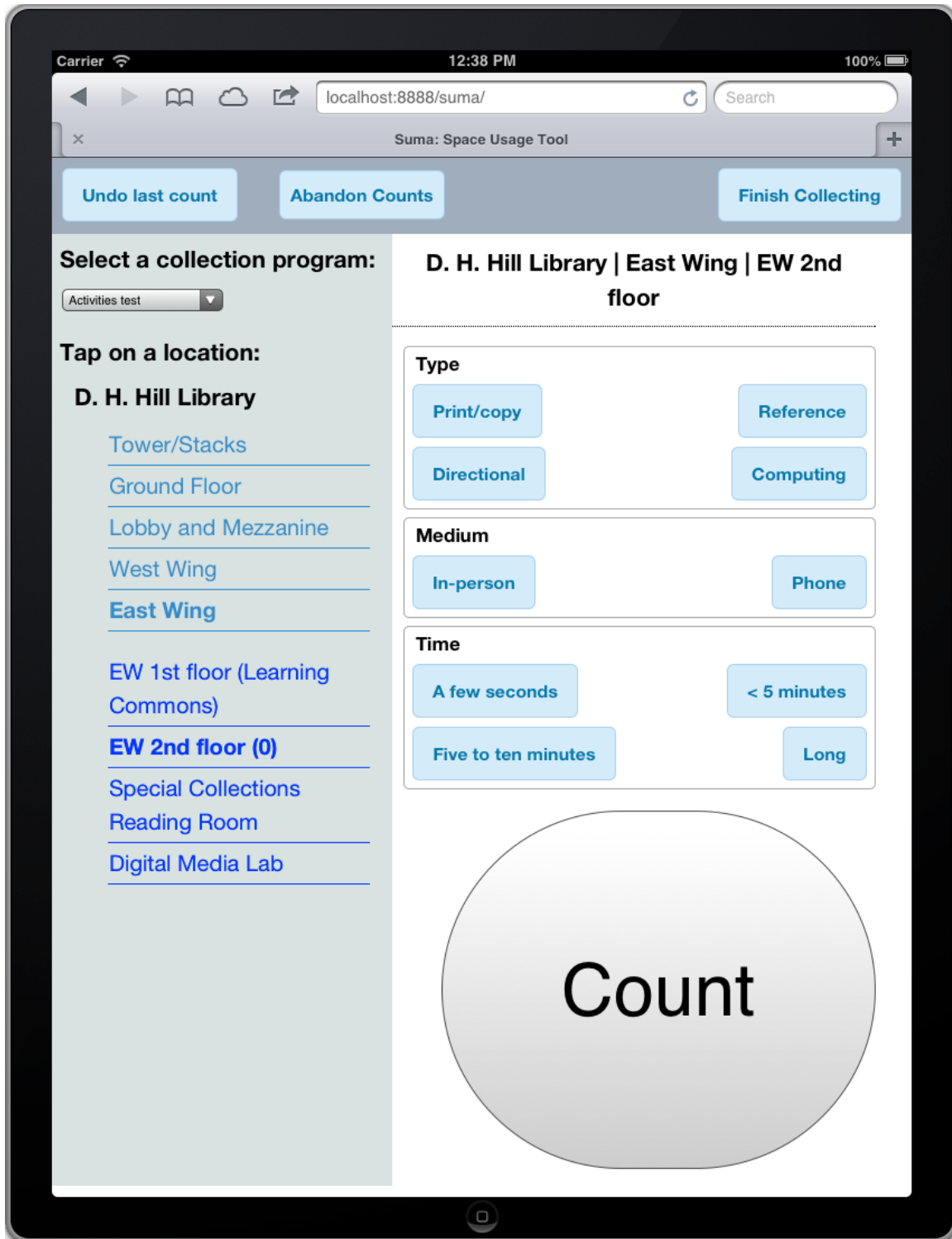
## The Collection Workflow



Suma start screen.



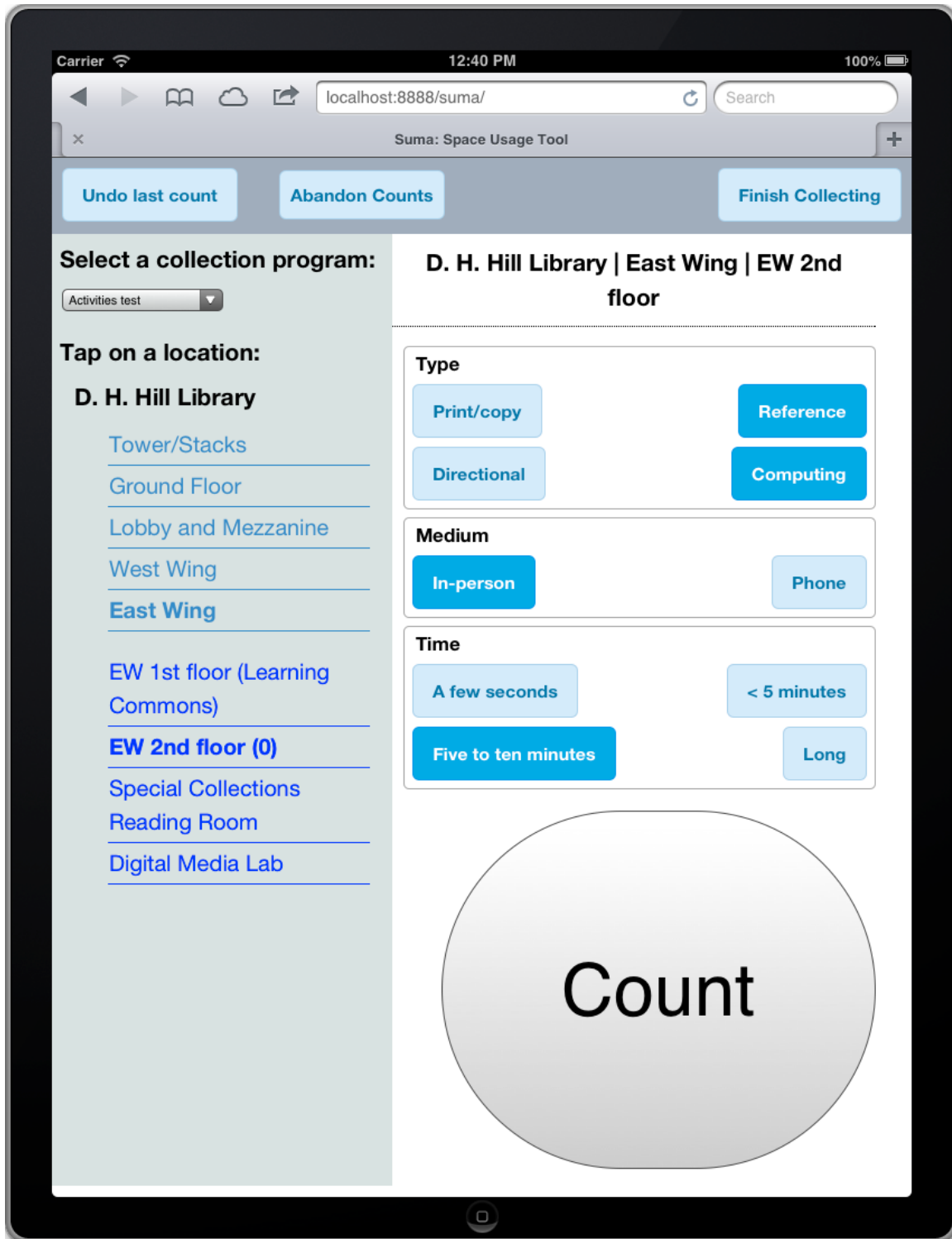
After users open the application, they are prompted to start a collection session by first selecting an initiative from the drop-down menu.



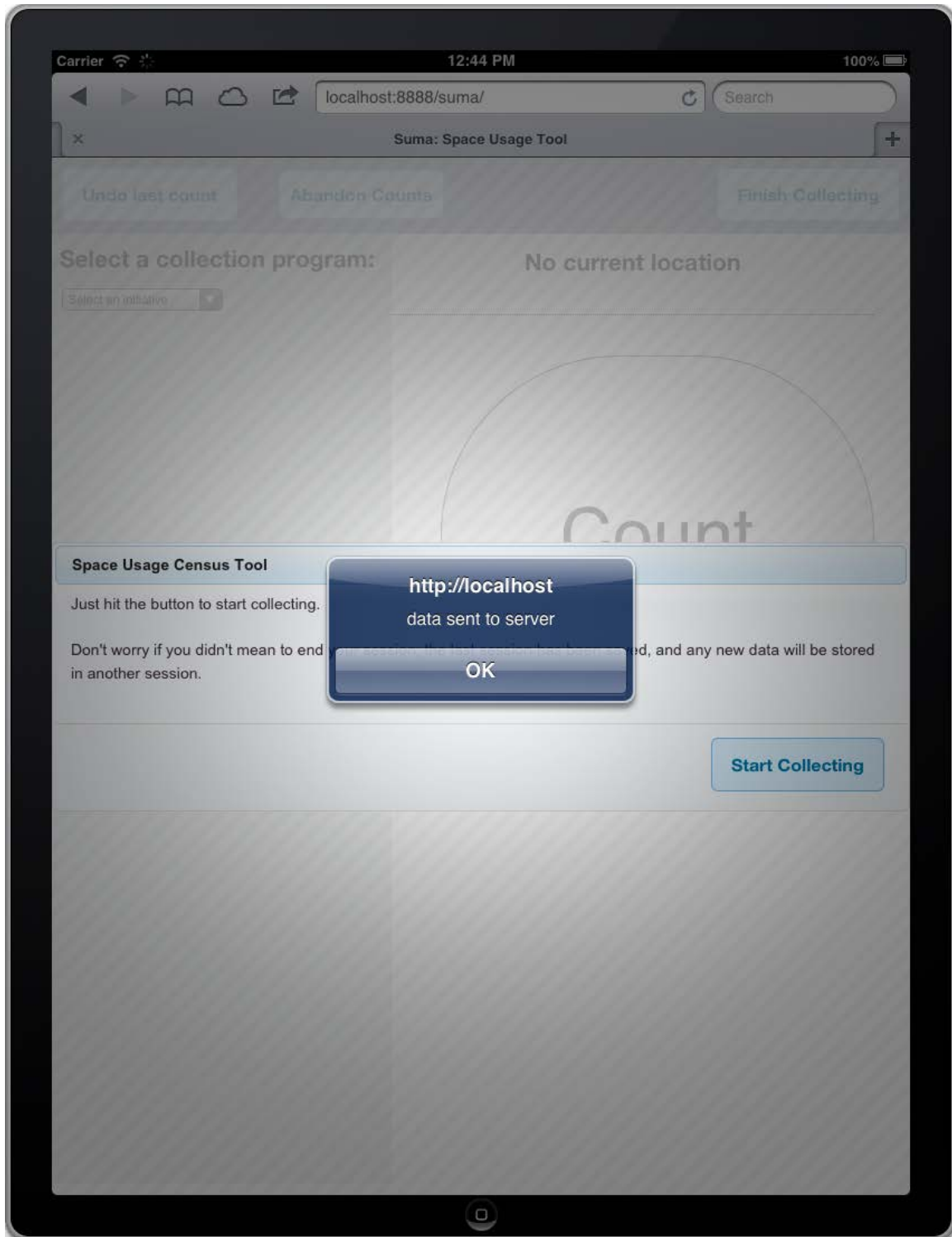
After choosing an initiative, the user can select a facility/building and a specific location within that facility/building. Here the user is going to collect data for the *Activities test* initiative in the D.H. Hill Library → East Wing → 2<sup>nd</sup> floor.



This is what a user would see after changing the initiative from *Activities test* to *Vet Med Headcounts*. Note the new locations and activities.

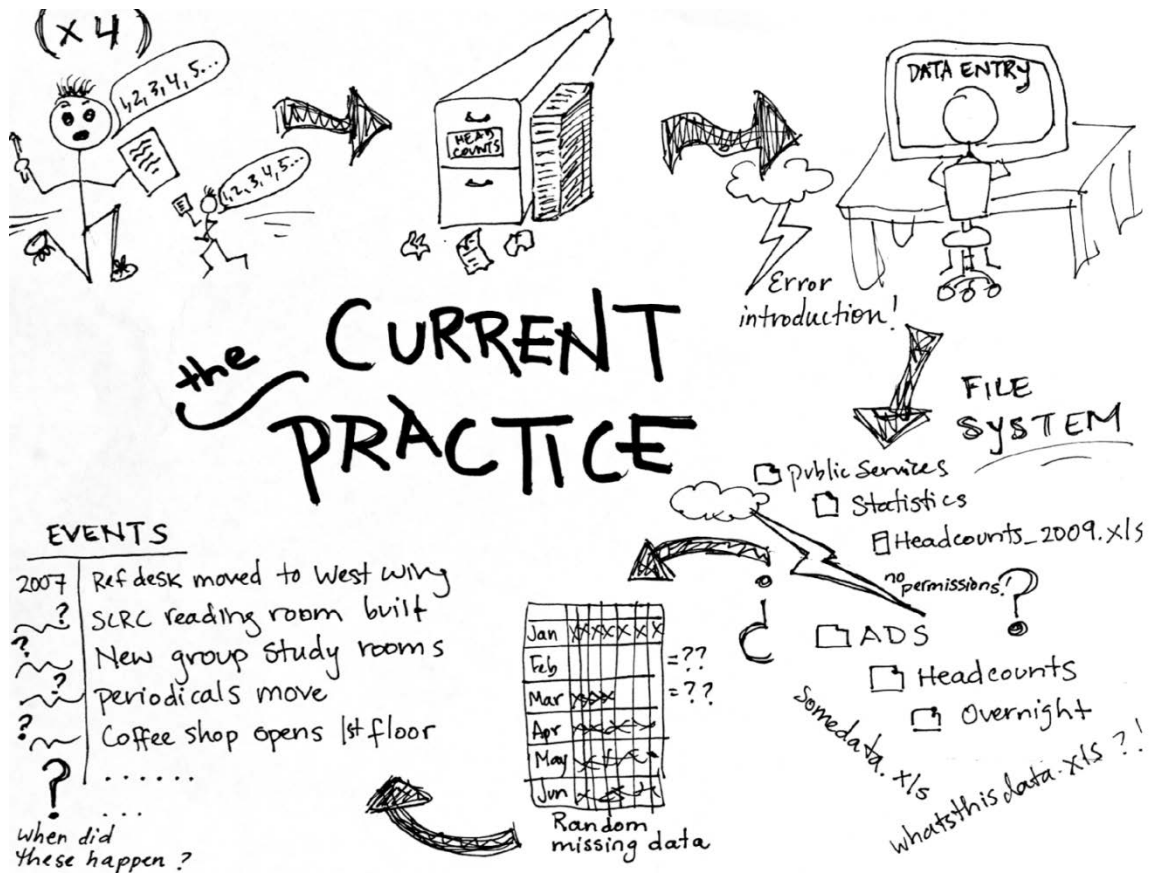


The next steps designate the type, medium, and time when the count will take place. In the example shown here: reference and computing, in-person for 5 to 10 minutes. After making these selections, the user can begin the count by pressing the *Count* button.



Here the user has hit the *Finish Collecting* button in the upper right corner and is given a confirmation prompt to announce that the data is being sent to the server.





Project member Joyce Chapman created this comic to illustrate the way observational data was generally collected without the help of Suma.

## Data Reporting and Analysis

Suma's data-reporting capabilities (for mobile devices) currently have limited functionality compared to the desktop. This point is not trivial, as the ability to interact with the data is where the real meat of this project lies. While the mobile capabilities are limited, the Web reporting and data-analysis functions of Suma are robust; and the possibility of marrying more reliable headcount data with robust analysis tools is where the project delivers on its promise.

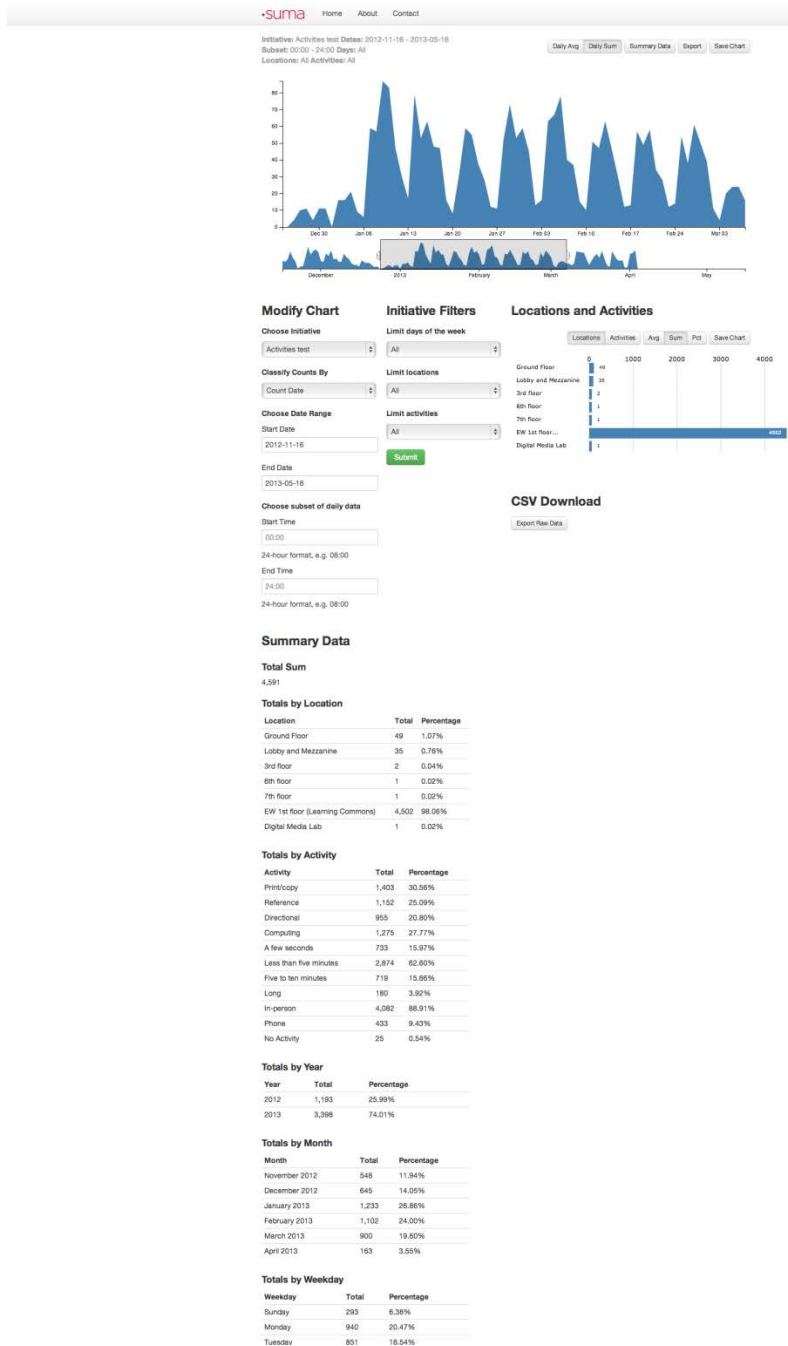
"The real compelling force was the promise of an interface for the client, such as myself, to interact with the data," says Rucker. "I was also interested in pulling our retrospective data into the application for analysis. These can inform current and future staffing levels, argue for expanding or contracting library hours, show changes in long-term use, and in some cases reveal the effects of major landscape changes."

"The headcounts also promise value in an overcrowded facility with many different kinds of user spaces," he says. "Use densities—headcounts compared to number of seats—could help us identify the most and least desirable areas of the building. Experimental spaces with deliberately undefined programmatic goals (for example, 'sandbox spaces') can be measured for use, and the effect of events can be measured. These events might include the installation of a new piece of equipment, a change in visibility (such as advertising or replacement of drywall with glass), or the rearrangement of furniture."

“We deliberately set up Suma to gather data at a fairly granular level,” says Casden, “so we’ll be able to see how our users choose from a variety of spaces over time. As we look at those spaces least recently renovated—and therefore possibly next on the list—we’ll be able to make resource decisions informed by user impact.”

Although the reporting tools for Suma have not been optimized for mobile display, several of the supporting technologies were selected, in part, for their cross-platform functionality on desktops, tablets, and mobile phones. Bret Davidson, Digital Technologies Development Librarian (NCSU Libraries) explains: “The visualization library, D3.js, drives several of the reports, and many of the features and functionality it provides transfer very well to tablet display. For example, the primary line chart report features a ‘brush’ navigation interface, for exploring the data at different levels of granularity, that works equally well with touch or mouse input. Also, D3.js is built on common Web technology including HTML, CSS, JavaScript and SVG (scalable vector graphics). Because the visualizations are rendered in SVG, there is no loss of resolution while zooming in on smaller devices. That said, any interaction based on mouseover events does not transfer well to touch-based platforms, making some of the interactions much more difficult or impossible.”

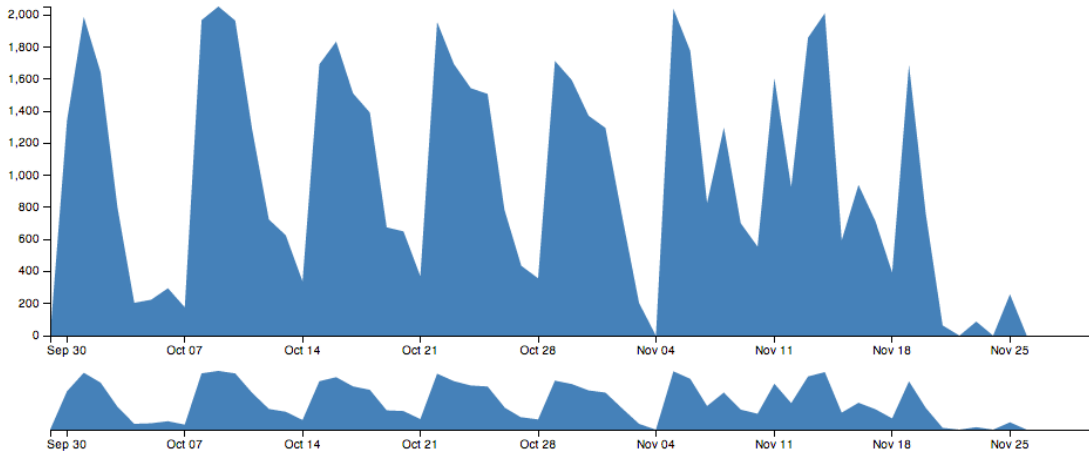
The screens below show some of the analysis and interpretation currently available through the Web interface.



This screen shows part of the main Suma analysis dashboard with zoomable area chart, interactive accessory chart, data tables, query form, and spreadsheet and image exports.

Initiative: Library 1 Head Count Dates: 2012-09-29 - 2012-11-30  
Subset: 00:00 - 24:00 Days: All  
Locations: All Activities: All

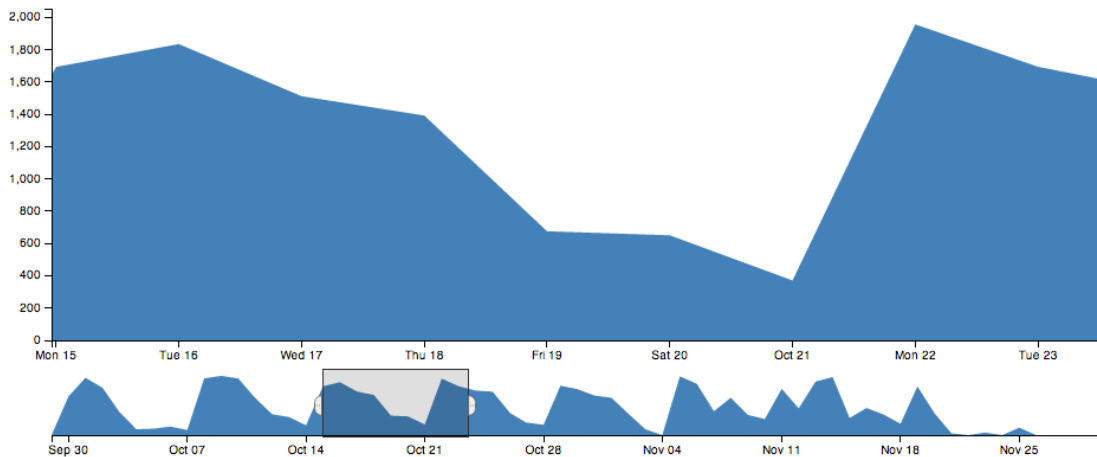
Daily Avg Daily Sum Summary Data Export Save Chart



This is the main (zoomable) area chart on the primary Suma data analysis dashboard (shown unzoomed).

Initiative: Library 1 Head Count Dates: 2012-09-29 - 2012-11-30  
Subset: 00:00 - 24:00 Days: All  
Locations: All Activities: All

Daily Avg Daily Sum Summary Data Export Save Chart



This is the same chart as above, shown zoomed.

## DESIGN PROCESS

### Testing Data Input

Guerrilla testing helped the team make modifications to the data-collection interface. The team asked staff and students, who would be likely users, to test each feature of the collection interface, and integrated their feedback into subsequent design phases. At the time of testing the server was not yet in a functional state, but the team was able to conduct an informal test using the functional data-collection client prototype.

“We asked two staff members who were responsible for collecting paper-and-clicker head counts to attempt to simultaneously collect the same data with the Suma client and with the older clicker-and-paper method (one person using each method),” says Casden. “In addition to noting differences in count times in various building regions, we asked the participants to think aloud as they used each tool. We were surprised to find that the participants preferred the Suma collection client in nearly every way but one. The large *Count* button was still too small to confidently tap without a visual confirmation, while the mechanical clicker required no confirmation at all.”

In the original design, the clicker button was no bigger than an average button size on an iPad screen. This finding led to the design of the large “blind thumb” counting interface, which was shown to resolve the reliability issue in a subsequent test.

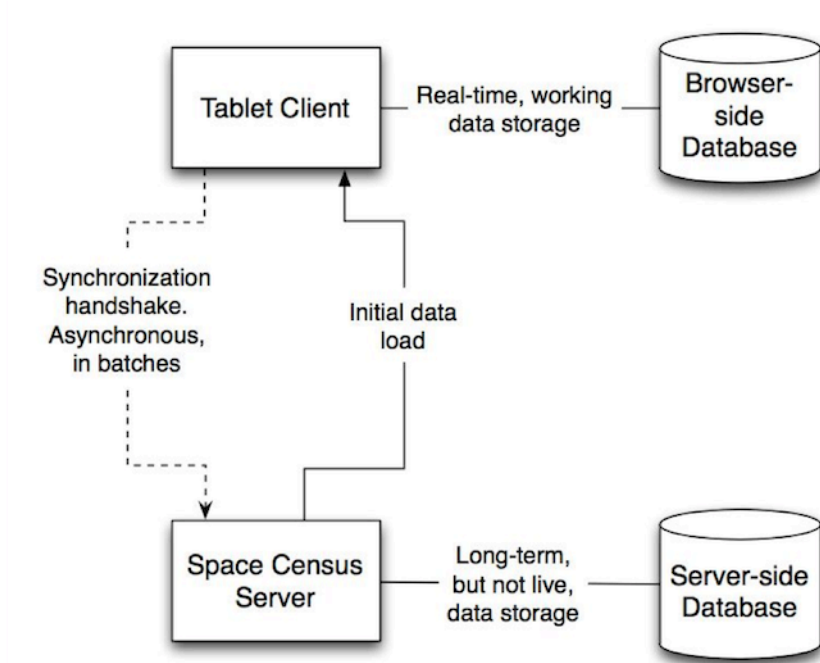
## Refining the Reporting Interface

Though the reporting tools have only been informally tested with users, casual feedback from internal users and early pilot participants has already enabled the team to clarify labeling of filters and report elements, identify new features, and improve documentation. The team has also identified several challenges that it will seek to address as its members continue to refine the reporting interface. Chapman explains:

- **How best to expose data without knowing how it will be used?**  
“While we can talk to our own staff and understand how they want to use the data, this is an open source software project and must be designed to meet the needs of unknown library staff around the world. Working with pilot partners will help us collect usability data outside our own institution.”
- **What level of granularity?** “Different users want different levels of data. Some may want access to the raw data to export into other tools for analysis; others may want to see trends by year, semester, month, week, or hour of the day. Some want to see the data visualized, others want the numbers in table format. Designing an interface that allows users to choose any of these options without confusing the users or overloading them with data is challenging, and testing will show whether we have done so successfully.”

## Device Testing

Mobile testing was done primarily on the actual devices being used. Because Suma was originally designed for browsers with Web SQL Database support (for example, Chrome, Safari, iOS and Android browsers), and specifically the iPad, it was straightforward to test natively, using a single device. Suma is currently used on iOS and Android tablets and small-screen mobile devices, as well as on laptops and desktops. Report testing consisted of testing behavior on the desktop and then trying to replicate the behavior or interaction on the mobile device. This work was done iteratively during the development process, not as a separate usability study.



This diagram describes the application's client/server data collection synchronization workflow. Suma makes use of in-browser storage technology to dramatically increase data stability.

## Timeline

PROJECT TIMELINE	
MILESTONE DATE	MILESTONE DESCRIPTION
February 2009	Initial iPad wireframes
June 2010	<ul style="list-style-type: none"> <li>• Project proposal</li> <li>• iPad wireframes created</li> </ul>
October 2010	Project team formed
January 2011	Working data-collection client prototype completed
January–February 2011	Data-collection client tested (technical and UX)
May 2011	Suma server completed
June 2011	Initial pilot data-collection initiative
July 2011	Pilot initiative replaces existing data collection
August 2011–present	Multiple new data-collection initiatives established
December 2011	Open source release
January 2012	Initial reporting infrastructure and interface
September 2012	Enhanced data analysis and visualization dashboard
January 2013	Small tablet and handheld device support
January 2013	Opening of new James B. Hunt Jr. Library brings additional, extensive use of Suma.
Current	<ul style="list-style-type: none"> <li>• Data-analysis tool enhancement, additional data-analysis tools, improved mobile support for data analysis.</li> <li>• Continually improving installation process for open source users.</li> </ul>
Upcoming	<ul style="list-style-type: none"> <li>• Removal of WebKit restriction for data collection.</li> <li>• Survey of current users and usability testing on reporting tools.</li> </ul>

## MEASURING VALUE THROUGH IMPACT

The Suma team is not tracking ROI numbers in a traditional sense. However, it has already experienced progress toward its main goal: increasing the use of physical space and service data by managers in decision-making. Suma has proven to be far more efficient for staff than previous methods of data collection. Suma has decreased data-collection time, increased data reliability, and simplified and enhanced the data-interpretation process.

"Previously, data was gathered on paper and then entered into a spreadsheet by hand," says Chapman. "Suma combines the collection and entry stages of the process, decreasing error introduction and saving staff time. Suma synthesizes and visualizes data for staff in ways that were not previously possible because of lack of time or staff skill sets."

Suma adds value to observational data analysis in at least four major areas:

- Improved decision-making with regard to service and space design
- Error reduction and improved data-collection compliance
- More extensive data collection and analysis possibilities at a reasonable cost in time
- Cross-departmental availability of data previously encapsulated by departmental silos

When explaining the value of the project to potential users, the Suma team has adopted a Web analytics analogy. "The primary goal of Suma is to provide for the designers and managers of spaces and in-person services what Web developers have taken for granted for years: a reliable, easy-to-use system for interrogating prior user behavior," says Casden. "Our hope (which is supported by our own internal use) is that Suma will not only be used to answer isolated, high-value questions (such as yearly transaction counts), but will also be integrated into the day-to-day discussions that result in making better decisions to support users (with regard to space, services, and technology), by virtue of better knowing our users."

While Suma has already made great inroads in improving data collection, it is its data-analysis capabilities that are having the most impact on the organization. "It's really the promise of easy and transparent interaction with the data, by managers and others, that supports the goal," says Rucker. "Increasing our understanding of users helped us to plan staffing levels for existing service points and the opening of the new James B. Hunt Library, and supported an expansion of our summer hours in 2012."

The NCSU implementation of Suma is the current epicenter of where the application's value will be felt. With at least ten pilot implementations under way at other large academic libraries, its impact will cause a greater ripple effect as these institutions contribute their own knowledge and experience to extending the toolset.



## LESSONS LEARNED

The Suma team shares some of the lessons it learned:

- **Focused restraint.** One challenge the team grappled with was just how much data to collect. By focusing on what types of questions they were hoping to answer through the data collection activities, team members were better able to focus on just how much data to collect and down to what level of granularity. “Lesson learned: just because data can be collected doesn’t mean it should be collected. Before planning data collection, you must first understand the questions that the data will be used to answer.” (Chapman)
- **If you don’t know what you don’t know, involve a variety of users to help you figure it out.** Closely related to the question of how much data to collect is the question of just what types of data will be useful in making management decisions. In planning Suma, the team quickly realized that because this type of detailed usage data had never been available before, it was difficult for staffers to project what their reporting needs might be, once they had access to this type of data. The solution they found was to bring together a group of staffers with disparate skills to play off one another’s knowledge in developing potential uses for data. “In this case we brought together managers and users of the tool with data analysis and visualization experts, software developers, and experts on mobile applications.” (Chapman)
- **Let people know what you’re doing.** Not everyone is comfortable tracking people (or being tracked). Tracking simple head counts and service transactions present few issues but in-depth space analysis may sometimes require the collector to pause long enough to draw the attention of the person under observation. In these cases, Suma users (data collectors) have generally limited these kinds of in-depth space assessments to sampling windows and have described the purpose of those collecting periods to users, with clearly visible signage.
- **You don’t have to plan for every possible unmet need in advance.** “One lesson learned is that users of any data-reporting system are going to have unmet needs. Data-export tools can be a great way to help support edge cases and promote open access to collected data. It is easy to say that data-export tools should be built first, before any reporting system, but it is often just as difficult to know how data should be exported as it is to know how data should be displayed. As a result, our data-export tools have grown alongside our reports as needs have been discovered.” (Davidson)

- **Training an intermittent workforce means devising ways to keep people involved over time.** “Both the headcount and the service transaction initiatives are completely dependent on manual human activities. Success in gathering these metrics depends wholly on training the public-services staff to use the application reliably and correctly. The actual act of training is fairly simple, as the application is designed to be intuitive and easy to use. Staff, both full-time employees and part-time student staff, train new staff members and usually accompany them the first few times they do the building-wide headcount. Staff at the service desk can watch to be sure colleagues are counting transactions. The difficulty is that the staff involved span a 24-hour schedule (except for closing on Friday and Saturday nights), report to five different departments, and have a number of supervisors.”

“Student staff, in particular, work different shifts occasionally, so they may go months without doing a headcount (given that we only do a few per day) and then suddenly take a shift that includes one. Keeping awareness of these initiatives can be challenging. This spring semester, a single student forgot or failed to realize that we do an 8:00 pm headcount, and his [un]reliability working his Friday evening shift ensured a complete lack of data for Friday counts at our main library. In response to this, we’ve added a daily email update to key administrative support staff and managers for review. It doesn’t prevent a missed headcount, but it will alert us to them as they happen and will prevent repeating missing data points.” (Rucker)

## “12View” (Applied BV)

**Company Overview:** Three entrepreneurs founded Applied on 11.11.2011. The company’s mission is to add mobile and “social” to the business model of its customers. Applied serves a wide range of private and non-profit healthcare companies with its services. Its main service offerings are in the areas of: mobile strategy assessment, interaction design, detailed design, project management and outsourced product development. Applied focuses its mobile (application and Web) and social media services on design, content management and implementation.

**Headquarters:** Amsterdam, the Netherlands

**Annual Sales:** €95.000,00 (for 2012, its first full year of operation).

**Number of Employees:** 6

**Mobile Project Overview:** The 12View application was built for Applied’s client VDV, the largest sewer cleaning organization in the Netherlands. It enables inspection teams from municipalities, and VDV employees to locally check and report on sewer system incidents, maintenance issues and statuses.

**Number of employees the app/mobile website supports:** Approximately 150

### **Design Team:**

Application planning and design was done by a project manager and user experience designer at Applied. An outside agency, InfoStretch, was responsible for the development work.

### **Members:**

**In-house:** J. Peregrín Emparanza; UX designer and A.D.S. Beijer, project manager.

**Outside Development Assistance:** Ashok Karania (InfoStretch India) and P. Noe (webservices, NMPO, The Netherlands).

## OVERVIEW

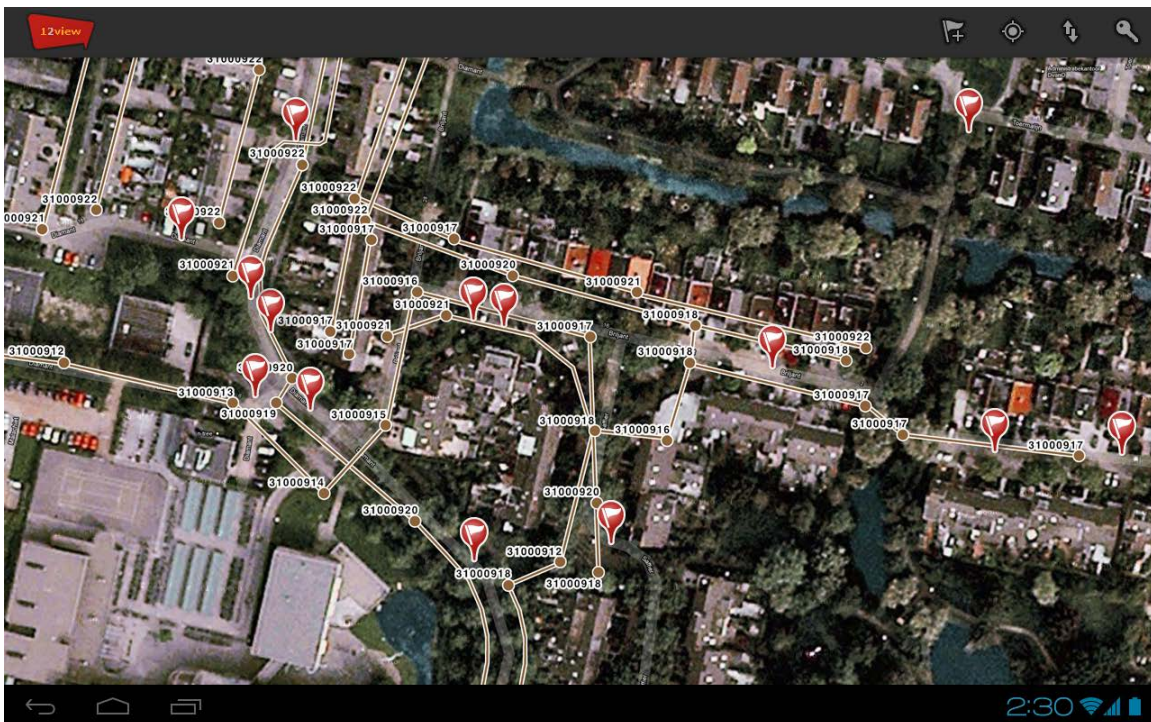
Native apps can be time-consuming and expensive to build, and they are most successful when they support a very targeted group of user tasks toward a specific goal. 12View does that. From the choice of a specific Android tablet (to minimize cost) to decisions around how to store and transfer the data (to minimize load time and maximize performance), the 12View team was precise in every step of their decision-making.

The 12View tablet app gives municipal inspection teams and VDV (Applied’s client) employees the power to check and report on sewer system incidents and maintenance activities from above ground, using an Android tablet. That means users (above ground) can see the actual sewer status (below ground), access detailed information about every single sewer track and the various issues found in them, take notes on above-ground issues (including photos), and access and edit notes.

Every day VDV trucks drive a planned route, to inspect and clean sewer systems for municipalities across the Netherlands. Information on the work done (where, when and what) is collected and put online using the Web application. In order to get more insight into the relationship between the above- and below-ground issues, inspectors regularly perform street inspections themselves. The 12View tablet app empowers these inspectors by giving them the ability to see the actual state of the sewer network while inspecting the streets. It also allows them to create notes for actions that must be taken back at the office.

The interface was designed to be responsive to users needs while working in the field, offering a number of useful features:

- **10 closest tracks:** All closest tracks and manholes are displayed (10 by default). When an inspector logs into the app, all specific sewer data has to be downloaded based on the location of the inspector. That is a lot of data, so the team decided to limit this download to the closest ten locations, leaving out systems that are farther away from the inspector's location. This provides better performance for the app by requiring less downloading. Sewer systems in streets farther away from the center are not shown.
- **Flag icons** in the map show notes created by inspectors in the past.
- **Optimized for touch screen interaction.** The user interface is optimized for touch interactions and high-resolution display.
- **Custom observation icons (customized for mobile):** All visuals, including the "observation icons" (shown below on the map at each sewer location) were redesigned (from the original desktop version) to preserve the existing meaning inside the website, yet improve user recognition and understanding in a mobile environment. The desktop version still works with the old icons, which use a letter-based system. The team realized there wasn't enough space on a tablet for an extensive letter-based coding system.
- **Integration with Google Maps:** 12View features seamless integration with Google Maps to provide a sewer network overlay and offers performance optimization without an onboard database. The app talks to the website using JSON integration with a Web back end.



This is the 12View start screen. It shows the 10 sewer locations nearest the inspector. The buttons in the action bar (top right) allow the user to: (from left to right): create a note, center map view on user's location, force-sync data, and logout.

**Type of Project:** Native Android app optimized for the ASUS 300 Transformer Pad (Android tablet).

**Why this approach:** The ASUS tablet for which this application is optimized is given out free of charge by Applified's client, VDV, for use by its customers (the municipalities). The decision to optimize for Android was driven mostly by the cost differential between tablet devices on the two major operating systems, iOS and Android. The ASUS tablets cost roughly 50% less than a comparable iPad. In the beginning of the project, options for optimizing the 12View Web application for mobile Web were discussed. Together with the client, Applified decided that a native mobile experience would be better suited than a Web solution. The arguments in favor of this decision were better performance, a richer user experience, and several offline features.

## Goal

12View was used on the desktop before Applified created a mobile version for use on tablets. One of the main drivers for the mobile project was to help VDV increase demand for 12View licenses by increasing use of the app and creating added value for the system.

## Challenges

The 12View project presented a few technical challenges for the Applified team. Lex Beijer, Applified's co-founder, explains:

- **Data transfer:** "The data transfer challenge was: do we choose an online database or downloading structure? In the end, to save on costs, we decided, after much discussion with team, development partners and VDV, to go for the latter. The app shows where the user is situated in relation to the 10 nearest sewer systems. The other systems, farther away physically, are not needed for direct use anyway."
- **Communication challenges:** "Working with two development partners (one for coding and one for Web services), it turned out that Applified, as core organization, was crucial in communication between the two partners. Sometimes, certainly viewed with hindsight, this part of the project could have been organized better."
- **Interface challenges:** "The challenge with enterprise apps is that there always is an interface needed, with some sort of administrative backend system. Only then can apps really add value, when work processes are being made faster and more effective. A business case needs to be in place. So, how do you interface front-end with backend? Our Indian developers were working on 12View for the first time in their lives. Our 12View Website partner didn't have any mobile experience. It took some hard work and long hours to finally make the interface stable and trustworthy."
- **Budget:** "I would say that the greatest challenge was to stay within budget, which was not that large. So, we constantly had to decide on whether a certain effort was within the scope of the project. I would advise readers that once a customer has been won, a good, sufficient and clear budget should be approved. That makes life much more enjoyable for an app builder."



## Users

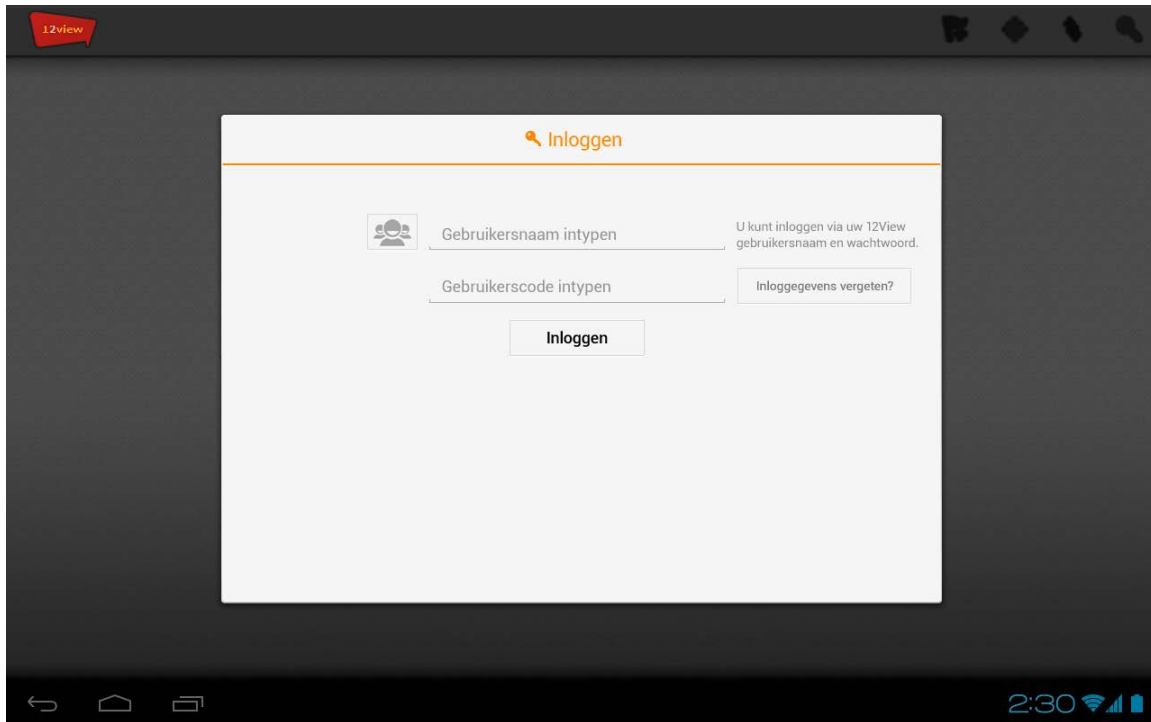
The 12View app serves approximately 150 users, primarily doing two types of work:

- **Sewer inspection teams** use 12View for onsite maintenance planning, checking sewer statuses and defects onsite, and reporting and taking notes for later use.
- **VDV employees** use 12View for sales purposes and reporting on detected defects.

## THE MOBILE EXPERIENCE

A typical use case scenario for 12View goes something like this:

- An inspector is responsible for the sewers in his municipality so he needs to know when maintenance has been scheduled (what dates), both in the past and the future.
- He sets out on his daily routine, often working outside and remote from the main office, conferring with several types of contractors. In the past, his work was done manually, logged for later use in the office.
- With the 12View app he now has the power to “to look beneath the ground, standing above it.” 12View allows him to take notes and photos, with information being synchronized in the background with the 12View backend.

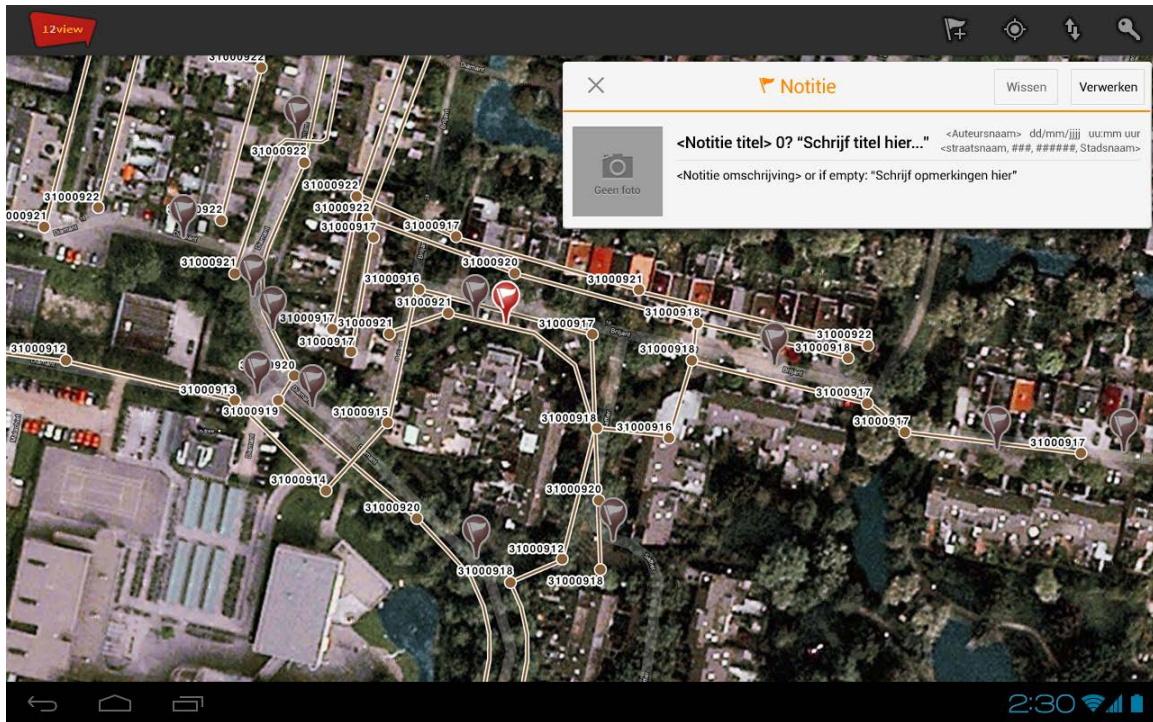


This is the 12View login screen, with access to frequently used buttons (left button with home icon), plus a “Forgot your login details?” button (in the box to the right). The Web version of 12View works with user profiles, so on the app, the user is also required to log in. Once logged on, the user stays logged on until a certain time frame has passed, but the user can always log out manually. The app is secured in only one way, with username/password authentication.

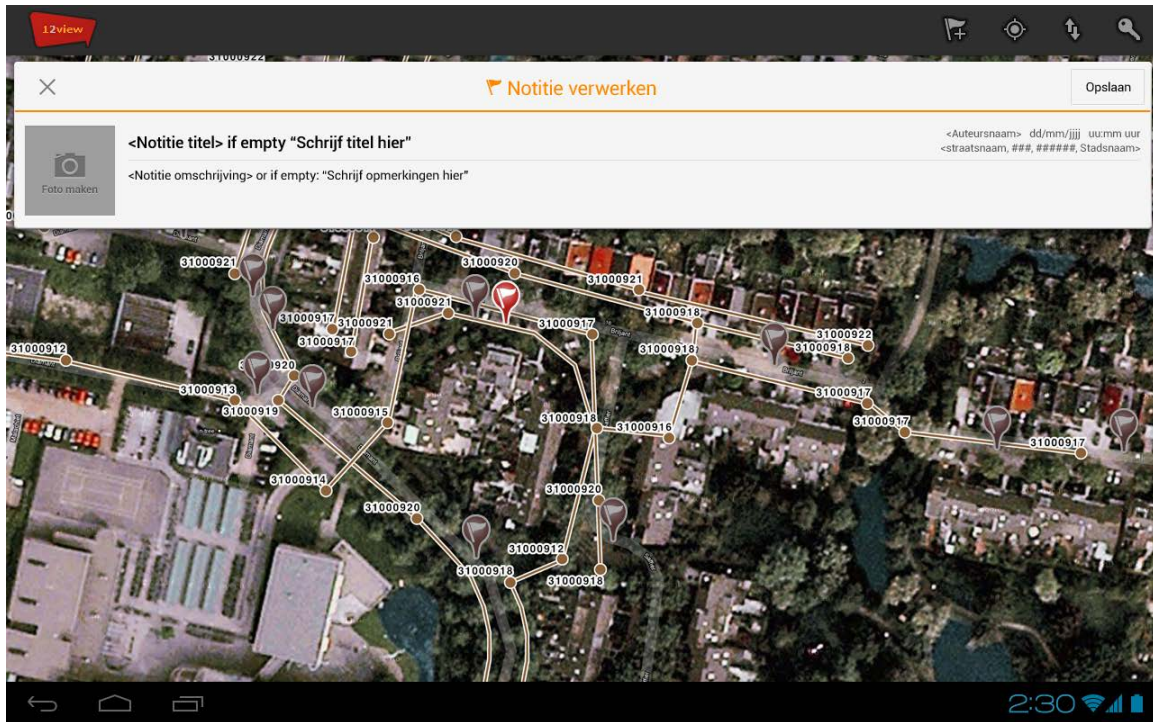


This screen shows how 12View looks on the desktop.

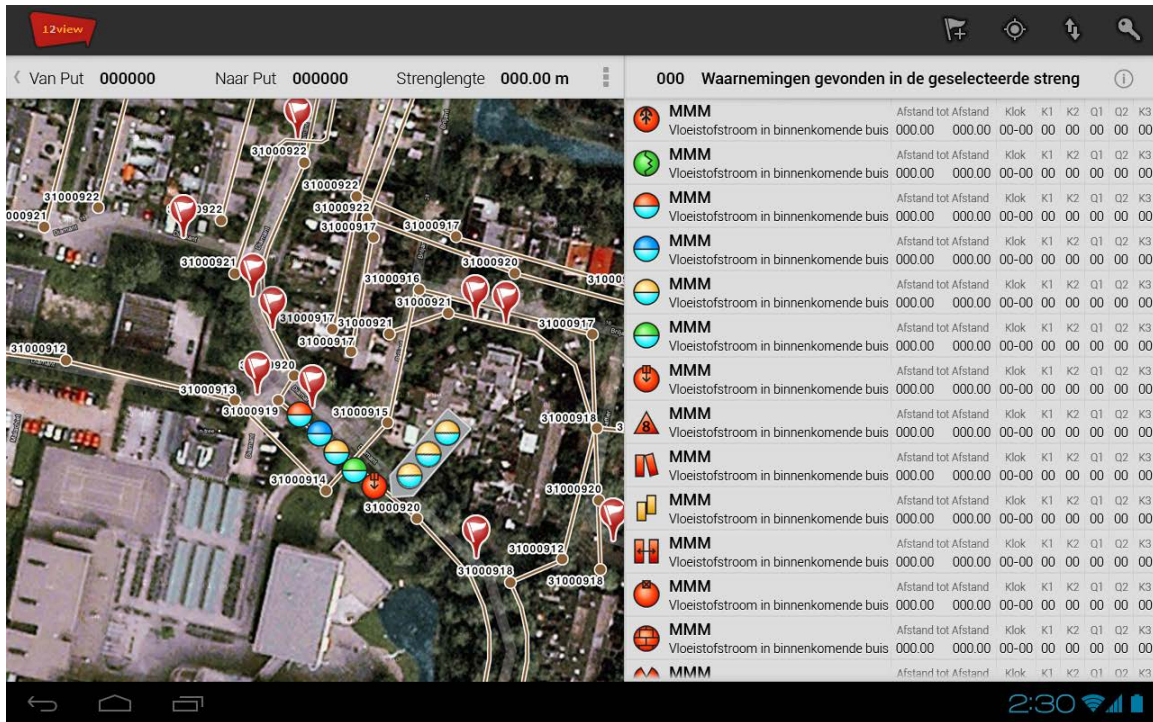




A single tap to the map's note icon (first icon – upper right) triggers the note-checking screen. A note can be erased (*Wissen*) and edited (*Verwerken*). Each note consists of a title, a description, author's name, creation timestamp, location of creation, and photo.



This is the screen used to edit a note. The note block expands to full screen width, allowing users to add a picture or edit the title or description. *Opslaan* can be tapped to save changes. Adding a new note works in a very similar manner.



Once a sewer track is selected, the issues associated with it are displayed, in the exact location where they are found. Each issue type has a unique icon for quick identification. Each issue has basic issue information displayed in the list on the right. The *Van Put* bar (across the top, above the map) shows information about the sewer track itself. Tapping the menu button (three stacked squares on the bottom left) gives the user extra information about the sewer track. The *000 Waarneming gevonden...* bar (upper right, just above the issues list) indicates the number of issues in that sewer track. The *(i)* icon in the far right discloses helpful information for new users, to help them interpret the symbols.



12view

Van Put 000000 Naar Put 000000 Strenglengte 000.00 m

000 Waarnemingen gevonden in de geselecteerde streng

Straatnaam <Straatnaam ...>

Inspectie dd-mm-yyyy ID 000000000000M Lengte 000.00 m

Materiaal <Materiaal naam>

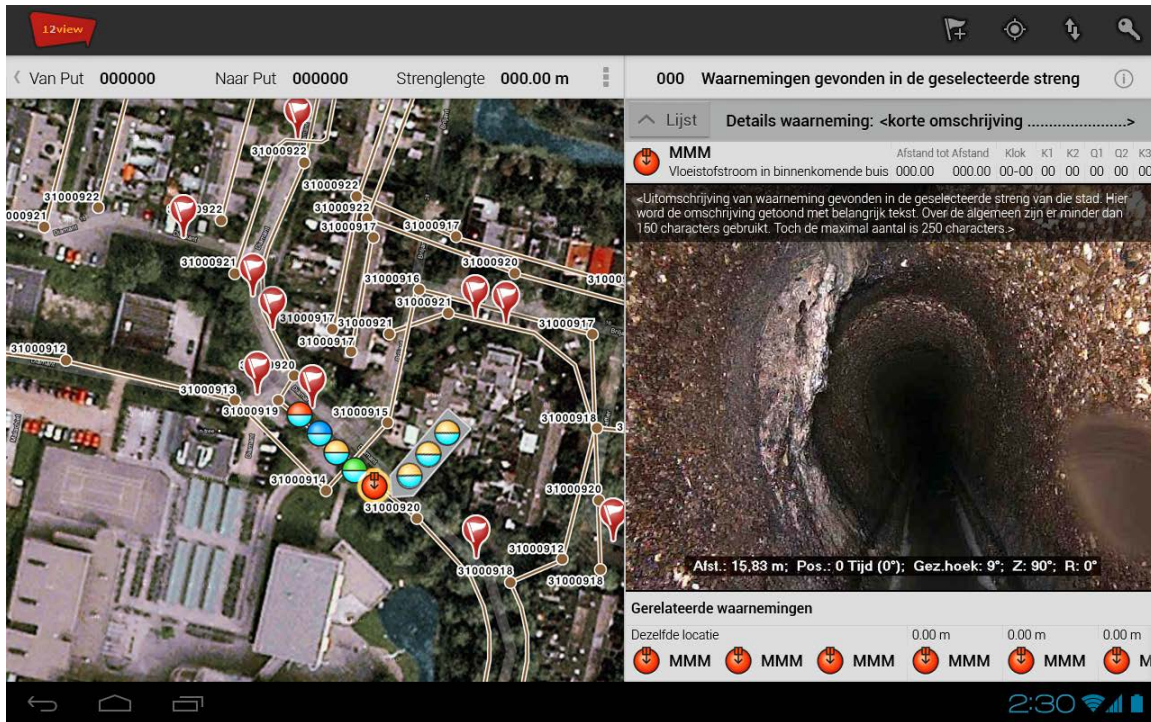
Diameter 0000/0000 Verb. type <Verbindingstype>

Algemene opmerking <Opmerkingen over het riool, de streng, etcetera...>

Icon	Waarneming	Afstand tot	Afstand	Klok	K1	K2	Q1	Q2	K3
🚫	MMM Vloeistofstroom in binnenkomende buis	000.00	000.00	00-00	00	00	00	00	00
🟢	MMM Vloeistofstroom in binnenkomende buis	000.00	000.00	00-00	00	00	00	00	00
🟡	MMM Vloeistofstroom in binnenkomende buis	000.00	000.00	00-00	00	00	00	00	00
🟠	MMM Vloeistofstroom in binnenkomende buis	000.00	000.00	00-00	00	00	00	00	00
🟤	MMM Vloeistofstroom in binnenkomende buis	000.00	000.00	00-00	00	00	00	00	00
🟢	MMM Vloeistofstroom in binnenkomende buis	000.00	000.00	00-00	00	00	00	00	00
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🟡	MMM Vloeistofstroom in binnenkomende buis	000.00	000.00	00-00	00	00	00	00	00
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🟡	MMM Vloeistofstroom in binnenkomende buis	000.00	000.00	00-00	00	00	00	00	00
🟠	MMM Vloeistofstroom in binnenkomende buis	000.00	000.00	00-00	00	00	00	00	00
🟤	MMM Vloeistofstroom in binnenkomende buis	000.00	000.00	00-00	00	00	00	00	00
🟡	MMM Vloeistofstroom in binnenkomende buis	000.00	000.00	00-00	00	00	00	00	00

2:30

Extra information about the sewer track is shown as an overlay on the map. The overlay is triggered by tapping on the second menu button (bottom left).



The detail view is displayed when a user taps on a specific issue (on either the map or the list). The extra information consists of a picture of the issue, a description of it, and related issues nearby (also stating the distance to the original issue). Applied's approach is to design for mobile first, meaning that navigation and content are optimized from a user experience perspective. So, for example, in 12View there are three levels to progressive disclosure of information: the street overview, the observation overview, and the observation details (existing inspection pictures, notes and pictures of above-ground observations). These levels are clearly recognizable in the design of the app.

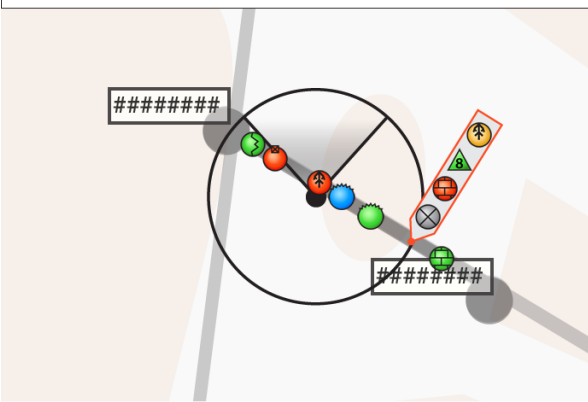
## DESIGN PROCESS

Applied conducted a series of interviews with the customer management and 12View Web builder team during the pre-sales and pre-design phase. The team determined the feature list from those interviews. Then, they created wireframes:

**Waarnemingen: streng details and waarnemingen**

LOGO-12VIEW
🚩 🏠 🔍

Van Put	<b>&lt;#####&gt;</b>	Naar Put	<b>&lt;#####&gt;</b>	Lengte	<b>&lt;####&gt; m.</b>
Straatnaam	<b>&lt;Straatsnaam, straatsnaam&gt;</b>				
Inspectie	<b>&lt;Maa. ijij&gt;</b>	<b>&lt;Omschrijving&gt;</b>		Lengte	<b>&lt;####&gt; m.</b>
Buismateriaal	<b>&lt;Materiaalsnaam&gt;</b>			Diameter	<b>&lt;####&gt; cm</b>
Verbinding	<b>&lt;Verbindingstipe&gt;</b>				

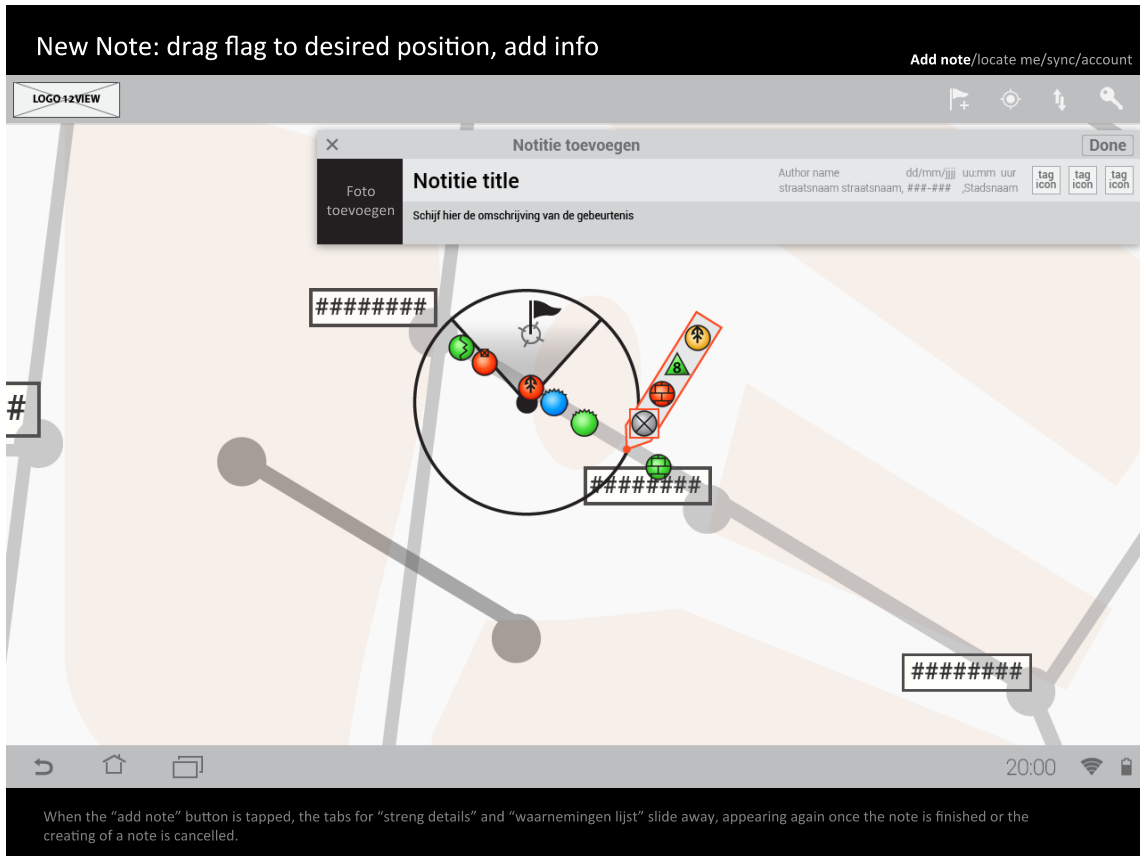


Riol i.d.	Klokstand	Vebr.	Put ref.	Bestand naam	Bestand teller	Band teller	Teller type
0000.00	12-00	A	1	MMMMMM	000	0000	0000
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0000.00	12-00	A	1	MMMMMM	000	0000	0000
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🏠 📄 📄
20:00 📶 🔒

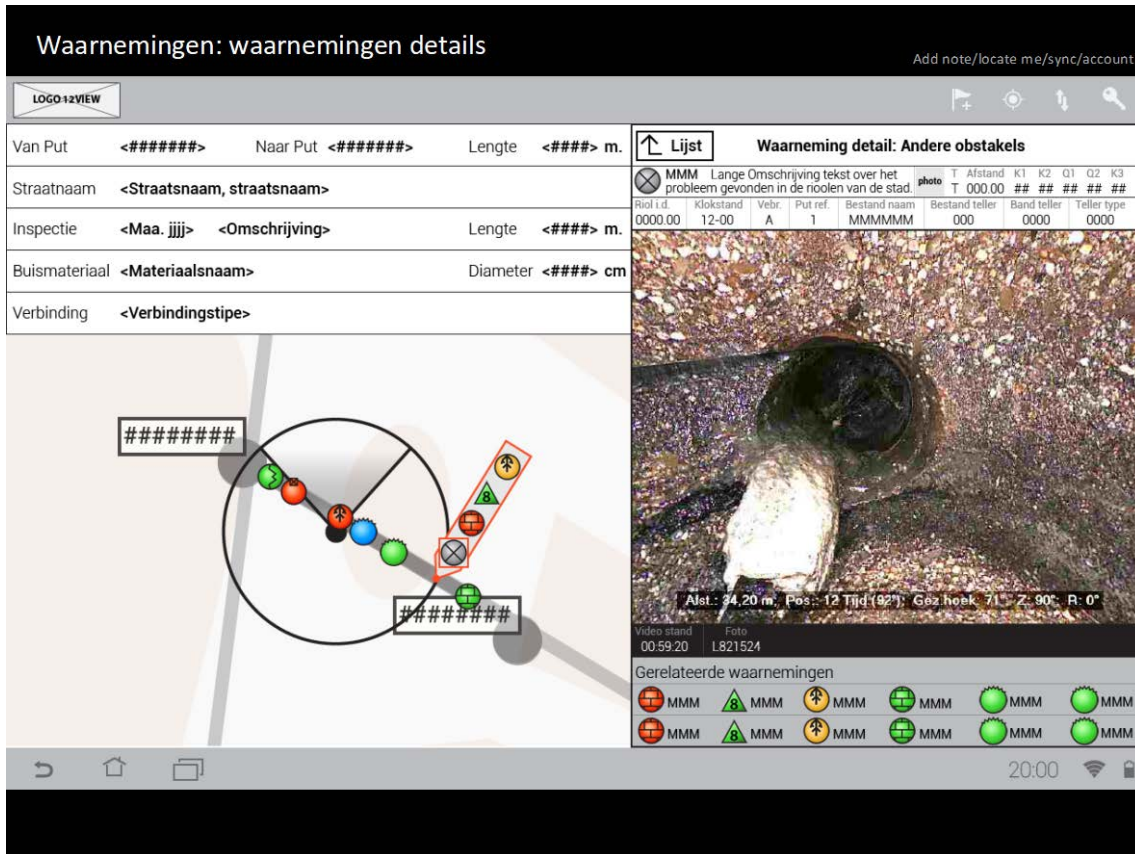
The information showed in the right list will slightly change depending on the input from Antoine. Please let me know your dedicated and rational feedback about this.

One of the design prototypes the team created during the design phase.



One of the design prototypes the team created during the design phase.





One of the design prototypes the team created during the design phase.

## LOGISTICS

**Working with partners:** Applied is a sales and design consultancy firm, so programming is not among the company's core services. After evaluating 25 potential mobile development partners, the Applied team partnered with a development team in India. "We choose the best of breed, and keep bringing our development work to them," says Beijer.

**Budget:** The 12View budget was € 25.000,00 (€ 20.000,00 UX and development and € 5.000,00 Web services)

**Timeline:** The application took approximately three months to design and build, from project sign-off to first release.

## MEASURING SUCCESS

Measuring the success of the 12View app is pretty straightforward: sell more licenses (through VDV). By offering the mobile app for 12View, the company increased the user experience of 12View on the desktop. Mobile capabilities mean that VDV can sell another service to its customers, and in turn, the municipalities benefit because work on sewer systems admin can now be done outside, on the spot, where the physical systems actually are. "Customer satisfaction is being determined by license revenues," says Beijer, "which have gone up significantly (we've heard). No actual figures are in our possession [yet]."



12view



### Android Tablet App for empowering municipality inspectors during sewer system and street inspections.

- Ubiquitous access to updated condition of the sewers.
- Integrated with extensive DB and desktop software.
- Maps integration and geo-Location functionalities.
- Note making on the spot.



A marketing mock-up used to promote the 12View app to VDV customers.

## LESSONS LEARNED

The biggest lesson the team learned while designing the 12View app is about focus, says Beijer:

- **Focus.** "Focus, focus and focus on UX and interaction design. Our developers finished the project within a one-month timeframe because they started working as soon as the complete visual side of the app was agreed upon and features were known."
- **Make it useful and people will buy it.** "Go vertical ASAP. Right now, Applied is negotiating and pitching for deals with all large Dutch engineering offices. A good and clear-cut pixel-perfect Google map integration makes one hell of a difference."

## “mTec” (ZON Multimédia)

**Company Overview:** ZON is the pay-TV leader in Portugal. With 1.6 million customers, it is the leader in next-generation broadband services, film distribution and exhibition, and its landline business is growing.

**Headquarters:** Lisbon, Portugal

**Annual Sales:** €858.6 million (2012)

**Number of Employees:** 1,600

### **Mobile Project Overview:**

mTec is a mobile application (with both a Web app version and a native Android app) that supports ZON field technicians as they work on customer support house calls. mTec provides detailed information about ZON work orders and customers, in real time, giving users greater context in which to perform their work. This work includes installing and repairing network equipment, diagnosing signal problems, and terminating service and is done on site in customers' homes.

### **Design Team:**

The core project team consisted of approximately nine people, including external developers and designers working as “insourced” resources. Innowave Technologies was responsible for the application design.

### **Members:**

**In-house:** Ana Margarida Almeida, Agile Project Manager; Simmi Chandra, Business Account/Requirements Manager; Rui Bento, Business Analyst Team Leader; and Susana Rodrigues, Business Analyst.

**Insourced team members:** Paulo Renato Santos, Developer; Bruno Félix, Developer; Tiago Gomes, Developer; Ricardo Pereira, Developer; and Paulo Victorino, User Interface Designer.

## OVERVIEW

Taking the (formerly) manual, paper-based tasks performed by the company's field organization and optimizing them for use on mobile devices creates a multitude of efficiencies across ZON and gives the company a measurable competitive advantage.

mTec gives ZON field service technicians the ability to access a direct channel of communication with the ZON home office as they perform service calls at the homes of ZON customers. It provides users with the following features and content:

- **News and alerts:** give field technicians a heads-up when new products or services are available and notify them of new functionality available through the app.
- **Work orders:** The app provides detailed online information about work orders, which are the core of their work process.
- **Customer information:** Because technicians work inside customers' homes, the mobile app puts customer information at their fingertips.

- **Access address and customer historical information:** In addition to customer information, service reps can access historical address and customer information.
- **Work tools:** The app provides tools to help the field reps do their work, for example, the ability to activate and disconnect equipment and receive remote signal readings on customer equipment.
- **KPIs:** mTec gives workers up-to-the-minute access to information about how they are doing in their job. This is important because, in the process of billing for work performed by technicians, there are a number of rules that, if not met, trigger a penalty for the workers.



**Homepage.** The mTec homepage delivers news and alerts to users. Content managers curate these headlines, dynamically changing which alerts and news items are featured. The user also has access to all application menus and options on this main screen. The icons across the top provide links to (from left to right) home (the ZON logo), daily Work Orders (Information), Operations and Results, and persistent access to search.

**Type of project:** ZON mTec is a Web-based application and also an Android native app. The ZON mTec application core is a Web app, which can be executed by the majority of Web browsers. This enables any type of mobile phone to connect to the application and provides a user interface suited to mobile UI standards. An Android native application wraps around the ZON mTec core in order to mask the browser's appearance and hiding the navigation bar. This enables ZON mTec to be launched as an application installed on the device, rather than via the browser.

ZON provides mobile devices for its service provider partners, but they are also allowed to use their own devices. So, the Android (native app) version of mTec was optimized for Android phones, and specifically the Samsung Galaxy Ace (running Android v.2.3-Gingerbread, an 800 MHz ARM 11 processor and 278 MB RAM). This is the standard handset ZON currently provides. mTec's Web app is optimized for use with any smartphone.

**Why this approach:** Putting mobile tools in the hands of its workforce gives ZON a competitive advantage. This helps the company meet the needs of its customers and, at the same time, allows it to simplify internal processes, making them more efficient and effective. The company's service technicians can use their own devices when working with customers in the field, so the application's core functions were developed as a Web app to give users access to the full feature set from any mobile device. And, as a Web app, it provides several advantages for the tech team in managing the application centrally and avoiding the challenges of maintaining version control.

The Android native app wraps around the ZON mTec core, giving Android users the advantage of having the app installed directly on their device. By providing both a native app and a Web app, the team was able to offer a full experience for everyone and an optimized experience for its most prevalent audience: Android users. Building the native app was mostly to help users authenticate. It provides a login system so users don't have to enter their username and password every time they want to use the app. Another advantage of the native app is that the users do not have to memorize the address of the Web app. The native app saves (in session) the username and password of the users, allowing them to automatically go to the Web app without having to enter their credentials.

## Goals

The goals of the project were to:

- Reduce the number of phone calls back and forth between technicians and the ZON home office
- Reduce the use of SMS and typing errors when technicians are reporting on job status, while in the field
- Allow technicians to have real-time information
- Help technicians be more efficient when delivering ZON services
- Reduce the number of work orders, thus reducing the company's paper consumption and carbon footprint by decreasing the use of paper

- Reduce the lag time between when work orders are issued and when they are accepted. Before mTec, after a technician completed a job, a person with access to the back-office application had to amend the work order and mark it closed. Now, the technician can close the work order directly in mTec, increasing the speed with which this information is available across ZON's systems.
- Enable faster payment to service providers for work orders. (Note: Field technicians are third-party service providers who do not work directly for ZON.)

## Challenges

During this project, the team faced some important challenges, including:

- **Prioritizing content:** Translating the complex functionality of a back office system into a streamlined mobile application was a difficult process.
- **Creating a workflow:** The team had to create a mobile experience that would guide the users (field technicians) through the necessary features in a logical workflow to facilitate a technical intervention while visiting customers in their homes.
- **Managing a flexible development process.** The major challenges in this type of project are the scope of the product and ensuring its usability. The team accomplished both through the use of Agile (SCRUM) techniques with staggered feature deliveries, allowing them to gather as much feedback as possible from the end users. This methodology provided greater engagement between implementation teams and end users, enabling an outcome as close to their expectations as possible.
- **Understanding the technical limitations:** Team members made sure they fully understood the parameters of the technical environment, right from the start. They wanted to ensure that they were creating an application that provided maximum performance while using minimal processing capacity. It was essential to understand the technical landscape up front and know the specifics of their end users' standard equipment, as well as the limitations inherent in those handsets.

## Users

The following user groups use ZON mTec:

- **ZON service technicians:** These users install new equipment, solve technical problems, and terminate service, while working in customers' homes. mTec allows these technicians to view work orders assigned to them for that day's work in real time.
- **Field coordinators:** Field coordinators don't usually make house calls, but they are allowed to. They use the application to review the work orders assigned to field technicians, but they can't edit them.
- **Service provider managers:** Managers can view all existing work orders but are not allowed to edit them.

## THE MOBILE EXPERIENCE

Simply put, ZON mTec helps field technicians do their jobs. The application puts the right information into the hands of technicians at the right time, in a just-in-time manner, using expand/collapse menus, reducing the information presented on each screen to just what's necessary, and giving them the ability to delve deeper when and where it's needed. This process of progressive disclosure helps guide users through a series of steps toward task completion. These steps change dynamically, depending on the requirements of a particular work order, so the technician doesn't even have to think about the next action to take.

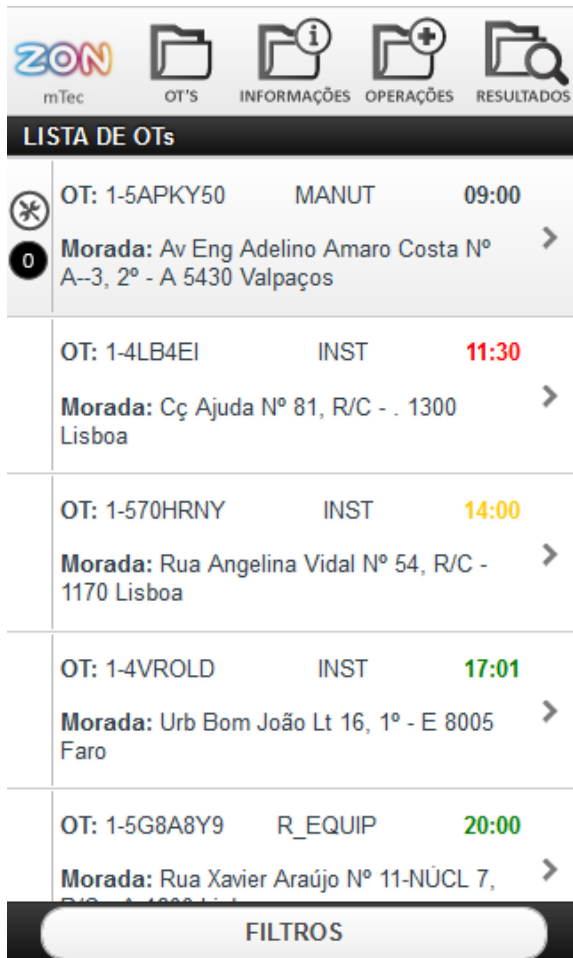
The design purposely limits the number of free text (data entry) fields by providing alternative options for entering information such as select boxes, and pre-populates fields whenever possible. ZON mTec also has intermediate validations to confirm that the information entered is correct, and whether required fields have been filled.

### The Work Order Workflow

Work orders (*OT's*—the first folder icon in the main navigation bar) are the bread and butter of a field rep's workday. Each rep is assigned a number of work orders, which direct and inform the rep's activities in an average workday.

The app also provides users with simple navigation and a guided workflow to help field technicians through the work-order process for each customer. The screens below illustrate some of the steps in that process and how the user is guided onward.

The work order (*OT*) screen features a single table (shown below) but uses "fat rows" (for easier manual manipulation) and puts additional data in a second in-line row (as shown with the customer address), rather than a separate column. In some columns they replaced what might have been text with icons (as shown in the first item in the list of work orders) to save crucial screen space.



The *OT's* list page shows all the *OTs* (*Ordem de Trabalho*=work orders) assigned to the user. Work orders show only essential information by default (ID, work-order type, customer address and scheduled hour). The user can tap through to get a more detailed view of the work order. Tapping on *Filtros* (at the bottom of the page) allows the technician to customize the fields that will be shown on this screen. This page shows all the individual operations that were specified in the work order. The work orders are organized chronologically. The page employs design elements intended to add visual distinction to the page, for example, color-coding and graphical symbols. The color code (for the time code) indicates whether the user is delayed (red) or on schedule (green) for his next appointment. This adds a level of urgency to the tasks. Another aspect of this screen worth noting is how the team made good use of the space available.





This is the main menu for the work orders section of the application. It is the launching point from which most of the field rep's work is done. To get to this screen the user has selected on one of the work orders shown on the previous screen: *OT 1-4LB4E!*. This is the first screen for that particular work order. This page links to the main options available to a rep assigned to the work order: *Informações* (Information) is where the user finds customer data, client portfolio information and equipment information. *Operações* (Operations) gives the user information on open jobs, the work that has to be done; and allows the technician to report possible delays, request signals, activate equipment and report incomplete work. *Resultados* (Results) allows the technicians to consult the results of the work order. *Voltar* (Return) takes the user back to the list of *OTs*.



Abertura trabalho >

Alerta >

Não Realizada >

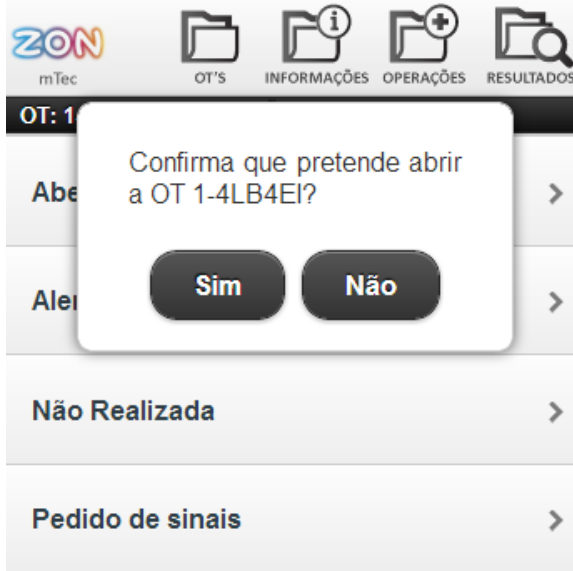
Pedido de sinais >

VOLTAR

This screen shows the menu that is presented to users when they have to go forward in the workflow. With this simple layout the user has an objective view of all possible options.



This screen shows the progression from the main menu shown above. When users tap *Operações* on the main menu, this submenu appears. Different types of work orders give users different menu options on this page. *Voltar* again returns the user to the previous level (main menu).



Here the user has opted to open a specific work order by tapping on *Abertura de trabalho* (Open Work Order), and the app asks him to confirm that he wants to open that particular work order.

OT: 1-4LB4EI / OPERAÇÕES / SINAIS NO TAP

BF (90 MHz)	AF (751 MHz)
<input type="text" value="12"/>	<input type="text" value="18"/>

VOLTAR    ALERTA    SEGUIR

This screen allows the field technician to report the service's signal quality at the point of distribution (an existing cable in the street). The quality of this signal is critical to providing service to the customer. The signal level can derail the work, so the signal test is the first step performed by the technician.



OT: 1-4LB4EI / OPERAÇÕES / SINAIS

PEDIR SINAIS

ATUALIZAR

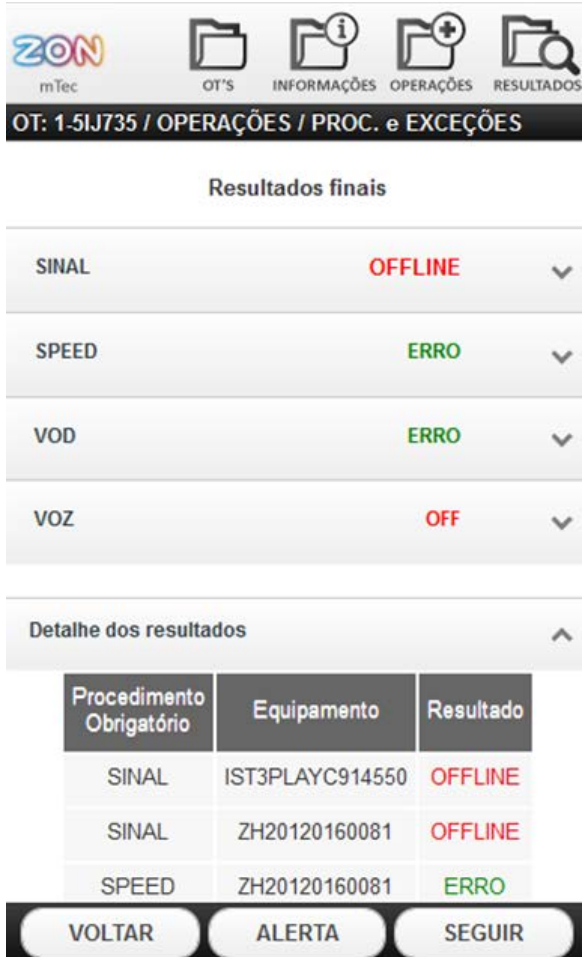
Não existem Níveis de Sinal

VOLTAR

ALERTA

SEGUIR

The work order signals page allows the user to check the last signal available for each piece of equipment during the signal reading, as well as to request a new reading. To verify the result of the requested reading, the user can tap the *Atualizar* (Update) button or navigate to this page later on.



When the user taps *Atualizar*, the app displays a message that tells the tech whether or not a signal is present and when the last signal was detected.

**ZON**  
mTec

OT'S    INFORMAÇÕES    OPERAÇÕES    RESULTADOS

**OT: 1-4LB4EI / OPERAÇÕES / EQUIPAMENTOS**

**ADICIONAR**    **ATUALIZAR**

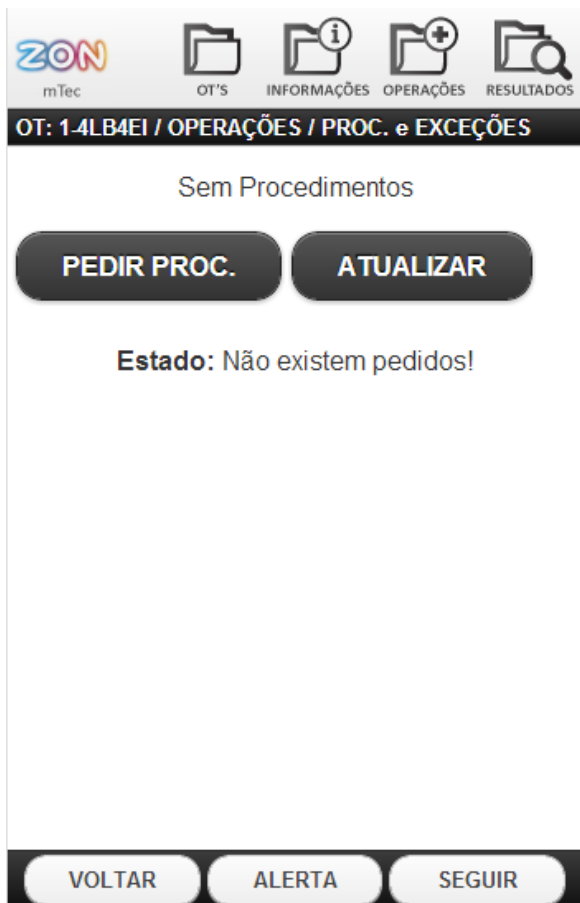
**Ação:** Ativar  
**Equipamento:** Equip. Extra HGATEWAY  
**Nº Série Novo:** DEVNET101089  
**Feedback:** Em tratamento - selecione atualizar

**Ação:** Ativar  
**Equipamento:** Equip. Extra HGATEWAY  
**Nº Série Novo:** DEVNET100586  
**Feedback:** Em tratamento - selecione atualizar

**Ação:** Ativar  
**Equipamento:** Equip. Extra HGATEWAY  
**Nº Série Novo:** DEVNET101005  
**Feedback:** Em tratamento - selecione atualizar

**VOLTAR**    **ALERTA**    **SEGUIR**

With this screen mTEC guides the field technician through the process of a particular service call. This page presents all the equipment that was specified in the work order. It also gives the user the opportunity to add (*Adicionar*) equipment not initially requested or update the work order (*Atualizar*). The buttons along the bottom allow the user to return to the previous screen (*Voltar*), send notification to the home office (*Alerta*) and proceed (*Seguir*) to the next screen in the workflow.



Here, the user can verify if he has completed all mandatory steps for a particular service listed in the work order.



OT: 1-4LB4EI / OPERAÇÕES / RECOLHA EQUIP.

ADICIONAR

ATUALIZAR

Equipamento:

HGATEWAY

SN:

DEVNET100539

Recolha



Upgrade/downgrade



Equipamento:

HGATEWAY

SN:

VOLTAR

ALERTA

SEGUIR

In this step of the work-order process, the technician is asked to change the actions for the client's equipment (installed, collected, or not collected), if applicable. The actions for collecting and not collecting are followed by a reason. Depending on the reason, technicians may have to add information concerning anomalies and missing accessories.

OT: 1.4VROLD / OPERAÇÕES / DESC. TRAB.

TRABALHO EFETUADO ^

TV v

NET ^

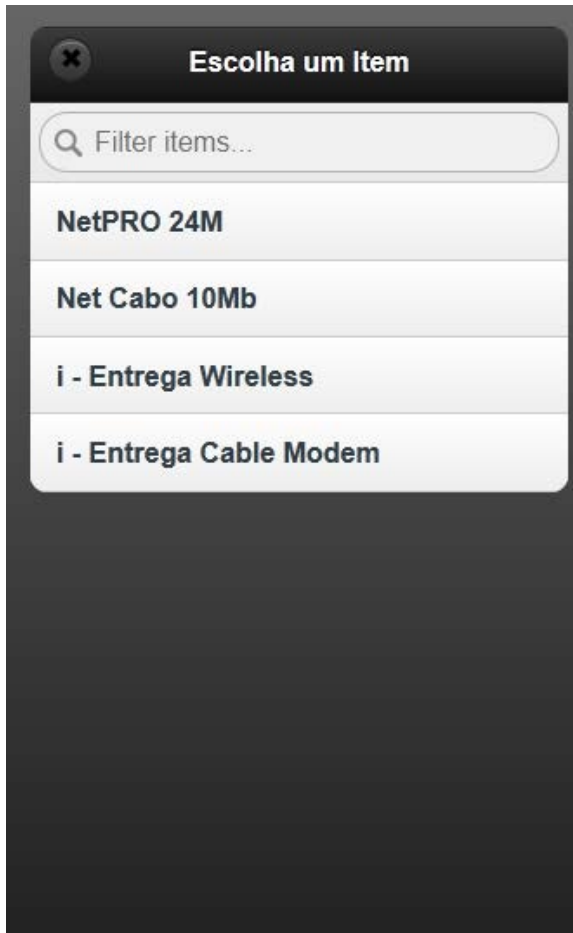
Serviços adicionais ^

Desc Instalação	REQUISITADO		EFETUADO	
	Qtd	Ação	Estado	Qtd
NetPRO 24	1	L	Sim	1

ADICIONAR GRAVAR

VOLTAR ALERTA SEGUIR

**Work description.** The limited display size of mobile devices was a challenge in designing mTec, because it was originally a back-office application. This page is a good example of how the design team makes strategic use of all available screen real-estate to fit all the information needed, while still accommodating the interaction constraints of entering data on a small, touch-screen device. This form is pre-populated with all the items that will be used to fulfill a particular work order. The first set of menu items—*Trabalho Efetuado* (work accomplished), TV, NET *Serviços adicionais* (additional services)—has expand/collapse menus that give the service rep the ability to drill down and define specific parameters for the services he will be providing during this house call. (The screen below shows an example of the TV section expanded.) The section below the first four expand/collapse items is where the rep logs which specific equipment will be provided (*Efetuada*) during the visit vs. that which was requested (*Requisitado*). With just a tap in the description area, the user obtains the list of items to choose from (for example, the area that says “NetPRO24”). This list also includes a search option with auto-complete functionality. After selecting the equipment, users need only to choose one of two options L (turned on) or D (turned off). The two buttons at the bottom allow the user to add additional services (*Adicionar*) or to save (*Gravar*).



If the user wants to enter an equipment item different from the one provided, the system must offer him all the available choices. This is challenging because available product lists can be very long and unwieldy to scroll through on a small screen. The ZON design team opted to provide the user with the list via a search filter rather than a combo box. In this example, if the tech wants to change the equipment from *NetPRO 24M* (shown on the previous screen) to something else, he would tap on the X next to the item (to clear it) and then start typing. The field then turns into a search box with type-ahead functionality, to provide best matches as the user types.

**ZON**  
mTec

OT'S    INFORMAÇÕES    OPERAÇÕES    RESULTADOS

**OT: 1.4VROLD / OPERAÇÕES / DESC. TRAB.**

**TRABALHO EFETUADO** ^

**TV** ^

Serviços adicionais ^

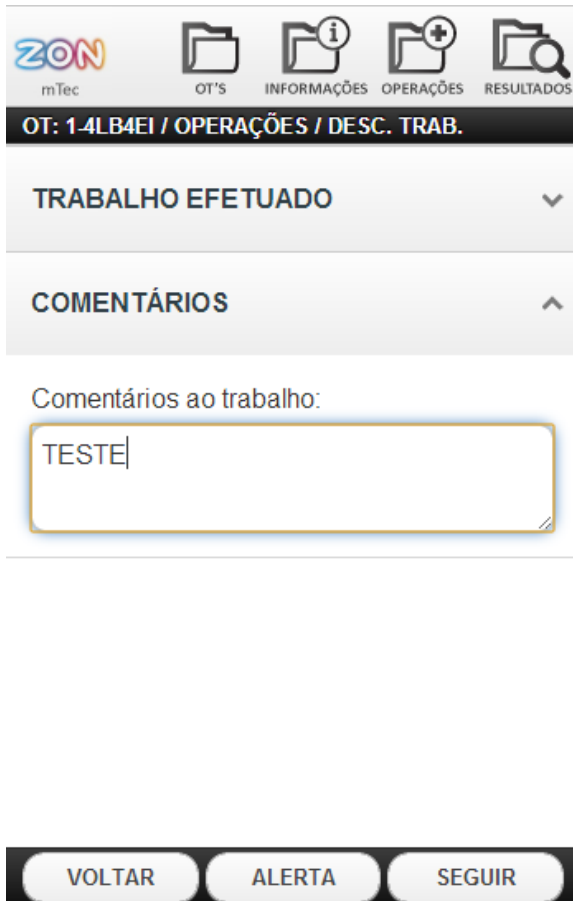
Desc Instalação	REQUISITADO		EFETUADO	
	Qtd	Ação	Estado	Qtd
Seleção Sport TV	1	Ligar	Sim▼	1

ADICIONAR    GRAVAR

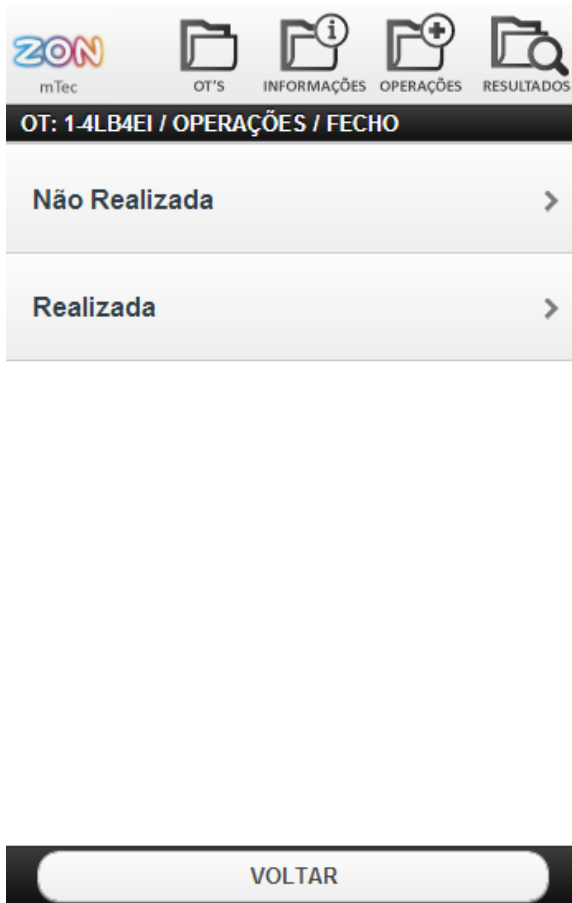
Equipamentos ▼

VOLTAR    ALERTA    SEGUIR

Another example of a work description screen.



After completing all the required steps in a work order, technicians must describe the work done, in this mandatory comment field.



Here, the technician marks the work order as resolved (*Realizada*) or unresolved (*Não Realizada*). If was unresolved, the technician would have to select a reason from one of the list of reasons contained in the application.

## DESIGN PROCESS

Given the challenges of the data display for this project, the team was wise to take full advantage of an active workforce already using the back-office version of the software, to have them weigh in on the design at various points along the way. The company's field technicians provided great insight into how they might use this mobile application to do their jobs. This feedback allowed the team to truly optimize the app for the way these users work. The team involved users at several points throughout the design process:

- **Focus groups:** Initial user input was gathered through focus groups where real users were asked to help identify features they wanted to see implemented in a mobile solution. On the basis of their suggestions, the team refined and prioritized the feature set and defined the overall project scope.
- **Field observations:** Design team members accompanied technicians on a typical work day to help them better understand the needs of the users.
- **Prototypes:** Several prototypes were created and tested throughout the design process, and the team conducted task-based usability tests. Given the specificity of the project and the technical limitations of providing such detailed information on mobile device screens, the design team created more prototypes than it normally would have for a similar project focused on desktop display.
- **Pilot testing:** A pilot stage involving several teams helped the mTec team fine-tune the app. The experiences of those involved in the pilots also provided the foundation for success stories, which the designers ultimately used to promote the application at launch.

### Device Testing

At an early stage, the team started testing both apps on real mobile devices, the actual devices the company supplies to its service providers. Those tests helped the team improve the final solution, as developers were able to optimize the app for use in the actual environment.

## Fitting a Lot of Information Into a Small Space

Because of business restrictions, most screens have to contain a lot of information. The amount of information presented varies from work order to work order, but any information that is provided is necessary for technicians to carry out the work. The information is presented according to the sequence in which the work needs to be executed. To help with this requirement, the design team employed expand/collapse menus, so as to have the information available but place it “behind” the screen the user is on. This was a deliberate design choice, instead of offering the same information in an infinite scroll design (which could be a really long page). The team opted for this stepped approach instead, giving users what they need when they need it.

OT: 1-5APKY50 / RESULTADOS/ DESC. TRAB.

TV ^

Encomendado/Efetuated

Serviços adicionais ^

Item Requisitado	Requisição		Estado	
	Ação:	Qtd:	Ação:	Qtd:
DTH Intervenção	Ligar	0	SIM	1

Equipamentos v

Materiais v

Ligação à Rede v

VOLTAR

This screen illustrates how the design team found ways to fit large amounts of required information into a small screen size. Because of business restrictions, most screens have to contain a lot of information. Designers made liberal use of expand/collapse menus to show and hide information as needed.





**Collapsible menu—expanded.** This screen shows a typical example of information accessible through the collapsible menu for Television services.

## MEASURING SUCCESS

The company is tracking progress against its goals for the app and is showing early success. For example, in the last year ZON has reduced its carbon footprint by 34 tons, a figure attributable to the amount of paper the company has saved by putting work orders into the hands of its technicians through a mobile device.

## LESSONS LEARNED

Lessons learned from the mTec project:

- **Test on real devices.** Testing the interface on a physical device is an imperative, especially at the beginning of the project.
- **Involved users early.** Include users early in the development process.
- **Let the users educate the designers.** Immerse the design team in real work settings so that they can better understand the user requirements.

## “Show Me” (CommunicateHealth, Inc.)

**Company Overview:** CommunicateHealth, Inc. is a health communication firm that specializes in health literacy. The organization partners with public and private sector organizations to help simplify health information. The company designs healthcare services, personal health tools, public health and emergency communications and innovative interactive media. CommunicateHealth employs a talented team of plain-language writers, designers, developers, and usability specialists dedicated to creating health information products and services that are attractive and easy to use.

**Headquarters:** Northampton, MA, USA

**Annual Sales:** \$2.5 million

**Number of Employees:** 25

### **Mobile Project Overview:**

CommunicateHealth was hired by the Massachusetts Department of Public Health (MDPH) Emergency Preparedness Bureau (EPB) to design a mobile tool to facilitate communication between public health professionals and people with communication challenges—specifically, people with hearing impairments, limited English proficiency, and/or cognitive delays. The resulting solution, the Show Me app helps first responders communicate with these populations through icon-driven communication, while on or off the cellular communications grid.

**Design Team:** The core CommunicateHealth team consisted of five people, with support from six additional in-house team members. The in-house team worked closely with three members of the client team.

### **Members:**

**In-house: (core team)** Xanthi Scrimgeour, Principal; Amina Patton, UX Designer; Joshua Frank, Senior Web Developer; Ana Tellez, Director of Interactive Media; and Ariana Adams-Gregg, Health Writer. **Additional in-house team members included:** Stacy Robison, Sandy Hilfiker, Huijuan Wu, Amy Behrens, Molly McLeod and Aimee Petrosky

**Client Team:** Samantha Stone, Kerry Evans, and Katie Kemen

## OVERVIEW

A research-driven approach helped the CommunicateHealth team design an app that provides useful and reliable services for two user populations—first responders and people with communications challenges. Show Me is an example of a specialized native app developed to fill a very specific need for a very specific audience.

The primary use case for Show Me involves first responders trying to communicate with people who have communication challenges during times of crisis. The team chose to accomplish this using an icon-driven approach. The menu screen allows users to search for icons tailored to four emergency response scenarios—shelter, dispensing site, shelter in place, and evacuate—and additional icons to help communicate about medical needs, personal needs, feelings and support, and people and places within each emergency response scenario homepage.

The app can be used with or without cell phone or Internet connectivity. In-the-field situations include going door-to-door to notify residents that they must shelter in place (stay home) or evacuate because of emergency circumstances, as well as registering and responding to questions from individuals and families in shelters and dispensing sites (for example, a vaccination site).



The Menu screen (iOS version shown on the left, Android on the right).

**Type of project:** Show Me is a native app designed for iOS (iPhone and iPad) and Android phones and tablets. The app was designed for iOS first and then for the Android platform. The client, MDPH, commissioned the app for a broad population of users accessing the app with their own devices (BYOD). The iOS interface was developed first, in an effort to reach the largest number of users with the first iteration. The design team conducted research on the market share of specific mobile devices and concluded that the vast majority of devices in use were either iOS or Android, and thus concentrated its efforts on these two platforms.

The team tried to keep the Android user interface as similar as possible to the one developed for iOS but had to tweak several elements to fit the conventions of Android devices. For example, the tabs at the bottom in iOS interface became top navigation on Android (shown in later screenshots).

In its current release, the app does not take advantage of device-specific functionality.

**Why this approach:** One of the design constraints was that the application had to work while disconnected, because during a disaster there may be no reliable cellular service available. This ruled out a mobile website. The team decided on a native app because they wanted to ensure full access to all device hardware was possible if needed in the future. "We also wanted the app to have the user interface conventions appropriate to each operating system," says Xanthi Scrimgeour, Principal, CommunicateHealth, Inc. "A native app that followed the conventions of the OS platform would be familiar to the user and therefore easier to use."

In addition to the connectivity issue (which was the main reason for not choosing a Web app), the team figured that building a Web app customized for each device was just as hard as building a native app. “So, we opted for the native approach,” says Josh Frank, Senior Web Developer.

## Goals

The goal of the project was to facilitate communication during a disaster, ultimately saving time, increasing effectiveness, and preventing misunderstandings and distrust between first responders and vulnerable populations.

## Challenges

Show Me was built in an environment that presented many challenges for the design team.

- **Target users:** Creating an app for this specific population of targeted users was difficult. Scrimgeour explains: “This is a challenging group to test with. The health professionals often had limited technical knowledge, and the people with communication challenges struggled with communicating. We had interpreters for language and ASL (American Sign Language), but the cognitively disabled participants presented unique challenges. For example, in one instance we had a gentleman who couldn’t speak and used his own set of icons to communicate. In order to assess and debrief a task, he used hand motions and pen and paper. It was quite the experience. (In case you’re wondering: he could complete the task using the app and even made up his own scenario that the health professional was able to understand.)”
- **Meeting different user needs in a single interface:** “One of the challenges in designing this app was meeting the needs of two different types of users within one interface,” says Ana Tellez, Director of Interactive Media. “Since this is a communication tool, we envision first responders not just showing the app to individuals with communication challenges but also handing over the device to allow them to browse/search for items in the app and show these back to the first responder. This forced us to look very closely at the navigation structure and layout of icons to ensure extreme ease of navigation and drill-down to specific icons.”
- **Funding:** “State health departments are always at risk of getting their funding cut, and so the ability to support and maintain the app is uncertain,” says Scrimgeour. “However, the project team is optimistic that the attention surrounding this app will ensure that it spreads to other states and also help secure its future in Massachusetts.”

## Users

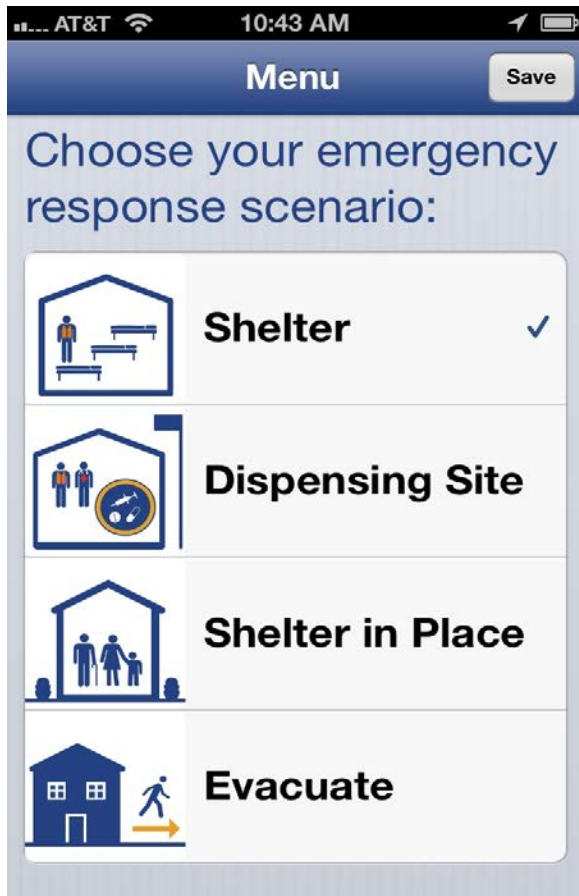
This tool meets the needs of two distinct user groups:

- **First responders:** During an emergency, first responders have certain messages that they need to communicate. For example, in a shelter situation, they need to instruct people to wait in line, sign in, get bedding and then find a cot in the sleeping area.
- **Individuals with communications challenges:** Individuals with communication challenges have their own messages to convey. For example, they may want to say, "I speak Spanish and need an interpreter," "I need to find my family," or "I'm hurt."

The clean and focused features of the app streamline this communication process while simultaneously meeting the needs of both groups of users. The app uses plain language prompts to remind emergency personnel to first identify the communication need and explain the type of emergency before jumping right into directions. This was a frequent recommendation from people with communication challenges.

## THE MOBILE EXPERIENCE

Users start with the *Menu* screen, which pops up when the users first open the app and allows the first responder to select the emergency situation. For example, if there's a snowstorm, a shelter might need to be set up. A first responder who opens the app would select *Shelter*, then they are taken to the shelter homepage. This homepage is then established as their main interaction area with the app. They don't have to go back to the *Menu* (unless they need to change scenario).

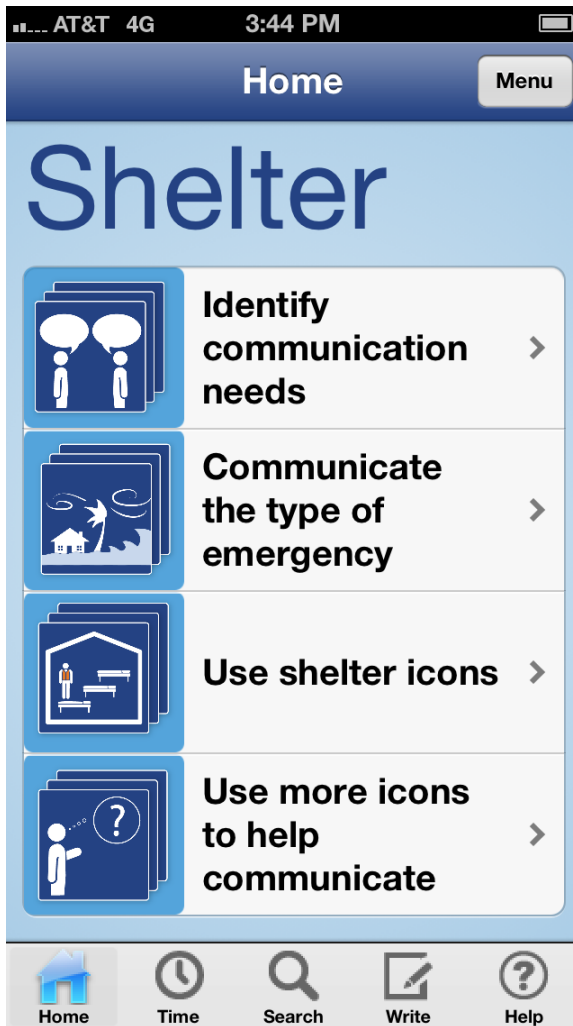


*Menu* (iOS). This is the screen where a user begins using Show Me by choosing an emergency response scenario.

Once the user has selected an emergency response scenario from the menu screen, the app saves the selected emergency response scenario on a user's phone for 24 hours; then, after 24 hours, it resets. If users open the app again, they would see the main menu page and have to pick an emergency response scenario again. Building this logic into the app was intended to account for multiple users using the same device, as well as convenience, so that the app remembers what emergency response scenario the user is operating in.

Within each emergency response scenario home screen, users are presented with four icon groups they can drill down into. These are presented in a deliberate order, to help first responders communicate effectively. By forcing users to choose an emergency response scenario at the start, from the menu screen, the app is able to filter the content so that users don't have to scroll down a long list of unrelated icons

to find the ones they need. The four task groups are automatically populated with relevant icons tailored to the specific emergency response scenario. The app provides the fourth category *More Icons* (grouped by categories) so users have quick access to additional icons, if necessary. Users can also use the tabs (across the bottom in iOS) to access specific tools related to: time, search, write, and help. This tab bar lets users jump around between these features while holding a conversation (without losing their place).



***Shelter Home.*** This screen is reached by choosing *Shelter in Place* from the *Menu* screen.



**Shelter Home** (Android): Notice that the navigation is on top (*Time, Search, Write, and Help*).





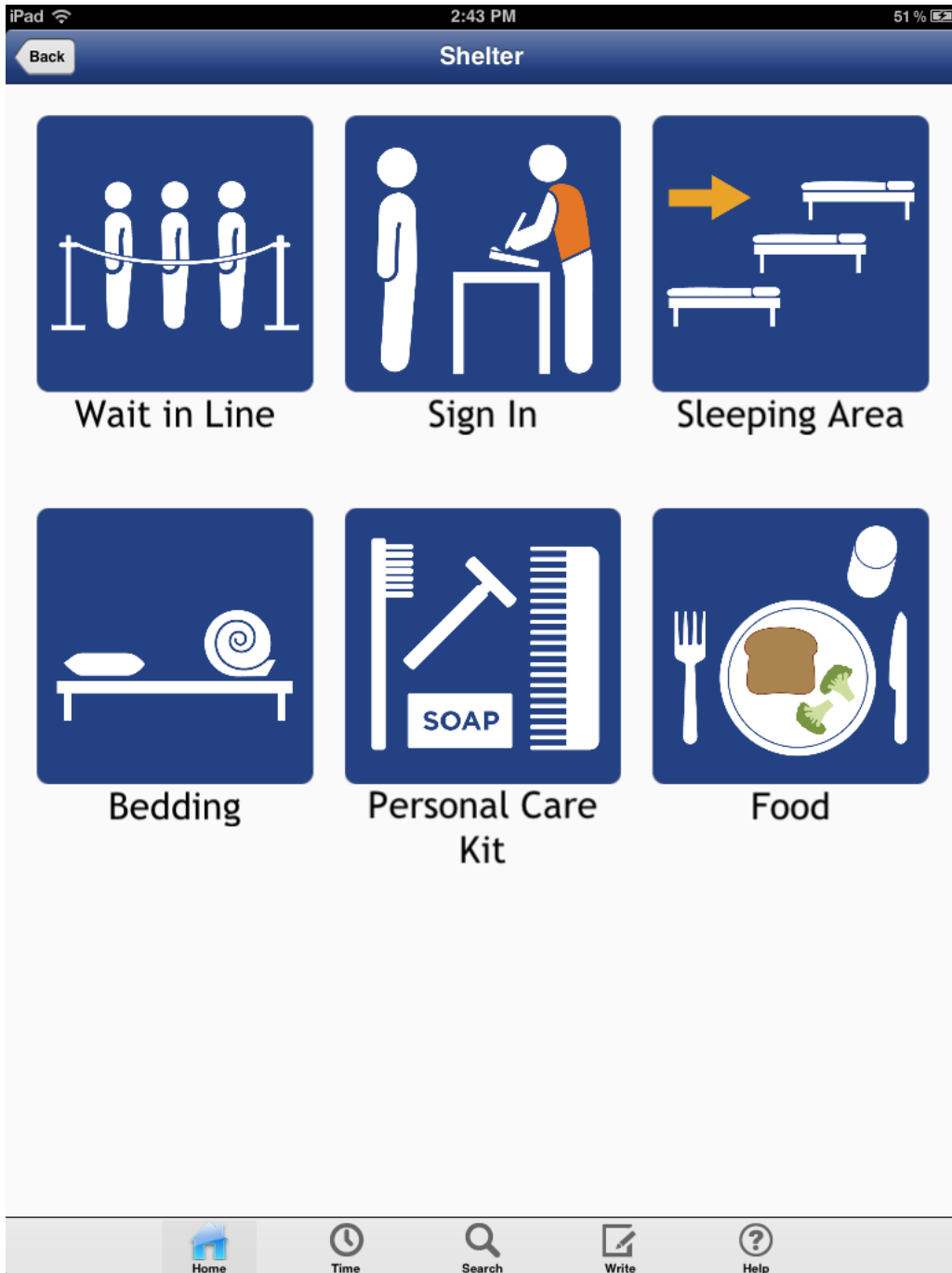
**Identify Communication Needs:** From the emergency response homepage, users can make this section appear by selecting *Identify Communication Needs*. The app provides a set of icons to help the first responder or public health professional understand the communication and functional needs of the individual.



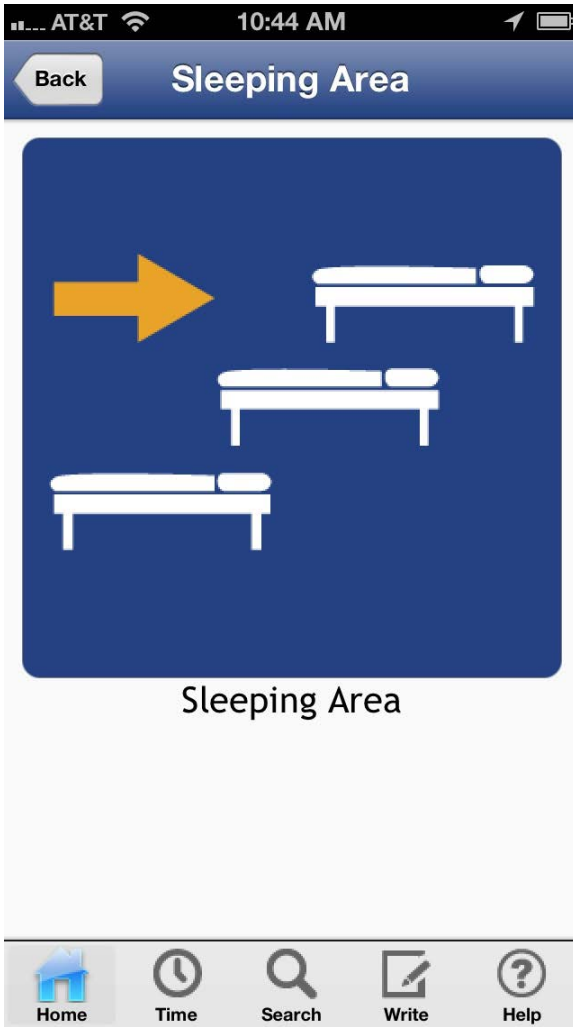
*Language Interpreter* (iPad landscape view): From the communication page, users can access a list of the top languages spoken in Massachusetts, in both English and in the language's native language/alphabet.



**Type of Emergency** (iPad portrait view): From the emergency response home screen, users can access emergency icons such as *Hurricane* and *Tornado* to better convey the context of the current emergency situation. User research showed that people were more likely to listen to instructions in an emergency situation if they understood what type of emergency was happening.



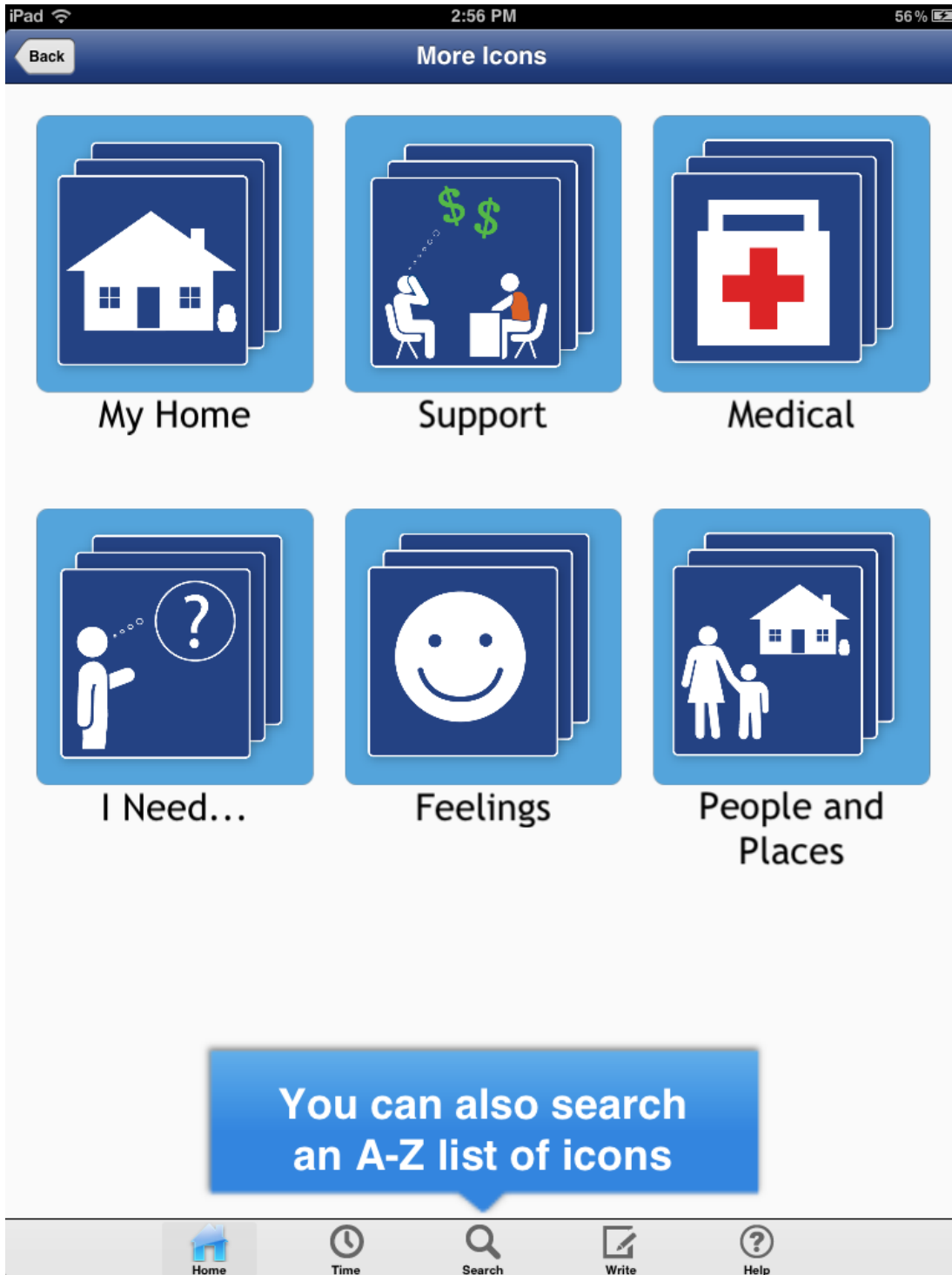
**Use shelter icons** (iPad portrait view): In addition to understanding the type of emergency, the app also has icons tailored for each emergency response scenario. The icons shown here are for an evacuation scenario. The screens shown here and below convey important information about what the user will need to do in this situation.



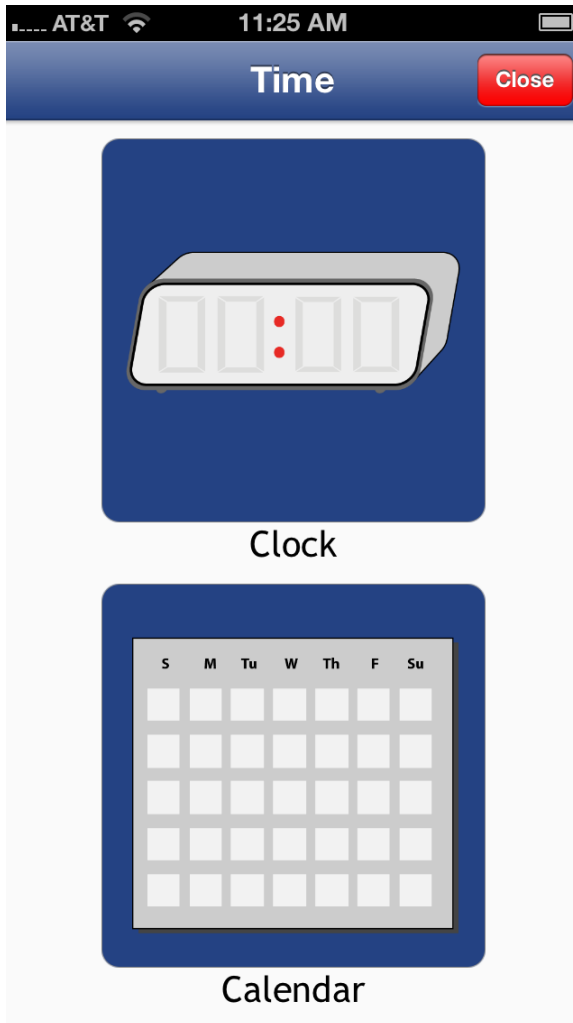
***Sleeping Area:*** A user can select an individual icon from a list of icons, for example, *Sleeping Area*, and it will enlarge to full screen as shown here.



**Use evacuate icons:** These icons are found in the same section as with the previously shown *Shelter* icons, but under the *Evacuate* home screen instead of the *Shelter* home screen. The icons with the play triangle button are animated images that show more complicated directives, such as how to turn off the gas or what to pack when leaving home.



**More Icons:** Users can access more-general icon categories from the emergency response home screen in order to communicate. The pop-up tip prompts the user to view the full icon list. The app's bottom navigation allows users to communicate about time using a clock and calendar, search a full alphabetical list of icons, write messages, and find helpful tips and links.

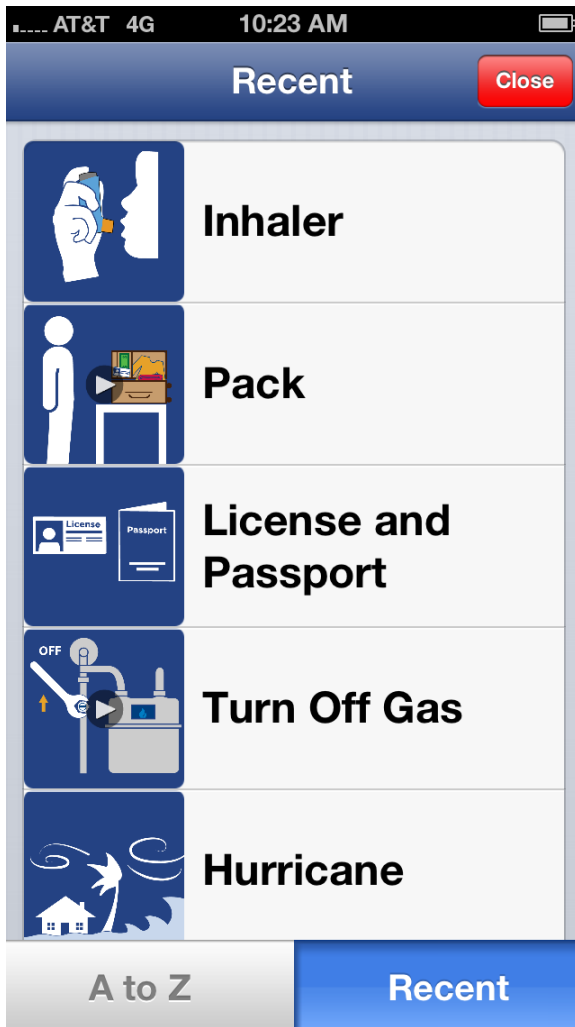


**Time:** From the bottom navigation row on iOS (top on Android), users can access a calendar and a clock using the *Time* item. The clock allows users to set a time, using a spinner, then display it on a digital clock icon. An icon showing the phase of the day (morning, afternoon, or night) pops up, according to the time selected. The calendar lets users show a span of time across days. The navigation items are all modal, meaning that they pop up, hide the navigation, and need to be closed. The benefit of having modal screens is that the app remembers a user's place afterward.

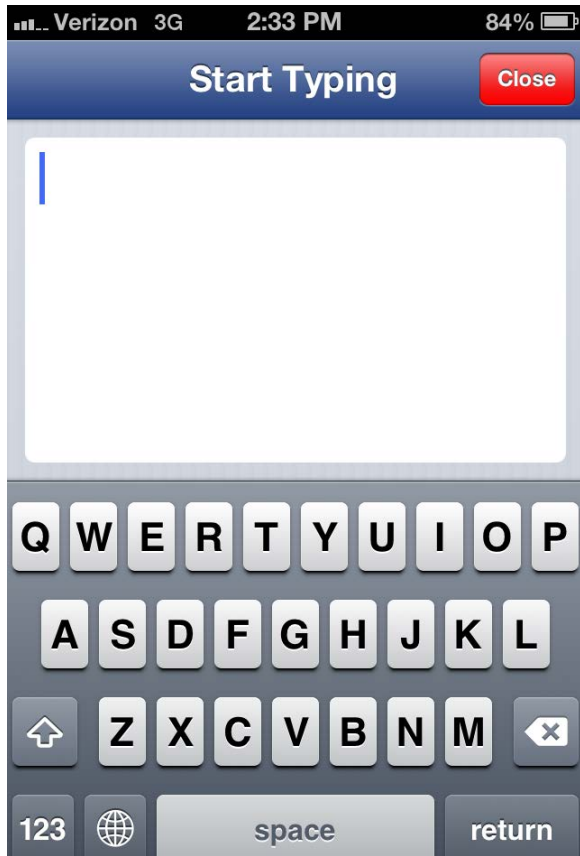




**Icon search (A to Z tab):** In the icon search section a user can view a list of all icons alphabetically or press *Recent* for the 10 most recently viewed icons, by toggling back and forth between these two options. Users can swipe down the list or type the name of an icon in the search box.



**Icon search (*Recent* tab):** Users can also view the 10 most-recent icons they've used by tapping on the *Recent* tab on the search screen.



**Write screen:** Users can type a message or hand the device to someone else to enter a message.

## Help Using This App >

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## Communication Tips >

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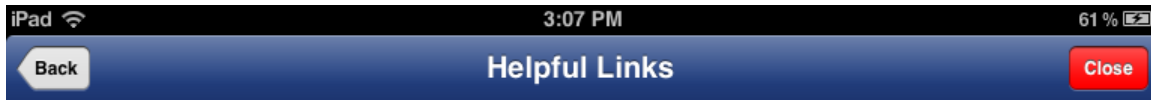
## Helpful Links >

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## About This App >

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**Help screen** (iPad portrait view): In *Help*, users can find tips on using the app and communicating effectively, access links to online resources, and learn more about the app.



For more information:

- Massachusetts Department of Public Health  
[mass.gov/dph](http://mass.gov/dph)
- Massachusetts Emergency Management Agency (MEMA)  
[mass.gov/mema](http://mass.gov/mema)
- Massachusetts 2-1-1  
[mass211.org](http://mass211.org)
- Ready.gov Preparedness  
[ready.gov](http://ready.gov)

*Helpful Links* (iPad portrait view): *Helpful Links*, in *Help*, provides relevant outside resources.

## DESIGN AND USABILITY

### Increasing Reach

The first iteration of the Show Me project was a paper tool (a pocket-sized, laminated, spiral-bound booklet) designed specifically for one type of emergency: a shelter situation. Over 1,300 copies of the paper tool were distributed to 351 local health departments, including Boston, and all emergency management employees in the Commonwealth of Massachusetts.

Based on the overwhelming response to the paper tool, the MDPH (CommunicateHealth's client) and the CommunicateHealth team decided to create a mobile app, capitalizing on the flexibility and interactivity inherent in mobile technology.

Another reason behind the move to a mobile app was to increase reach. The app will be made available to any individual assisting people during an emergency, whereas the paper tool had to be distributed. The paper tool was more expensive to create, print, and mail. The app can be distributed for free (and updated more easily).

## An Icon-Driven Approach

The design team was given a very broad directive: create a tool to assist individuals with communication challenges and special needs during an emergency. The 200+ icons contained in the app need to communicate concrete objects as well as abstract ideas to a wide range of audiences, and the user interface needed to be intuitive and usable for individuals with disabilities and the less technologically savvy.

CommunicateHealth designers worked iteratively to address these challenges and relied on testing to confirm and refine their decisions. “Working iteratively through rounds of testing with users helped us to pinpoint their needs and accommodate them with communicative icons and an easy-to-use application,” says Amina Patton, UX Designer. And the team stuck to best practices in designing the interface, including the use of:

- **Large images and icons:** The team made good use of large images and icons to make it easier for older adults or people with vision problems, cognitive delays or mobility challenges to touch the icons.
- **White space:** The app has only a limited amount of content and features simple, plain-language instructions.
- **Large text:** The type throughout the app is 16+ pixels to ensure that users would not have difficulty reading. (There is one pop-up message that is 14 pixels.) These sizes were confirmed through on-device usability testing.
- **Object spacing:** The team took care to create a design where a user could easily select the objects on the screen, regardless of their physical and/or cognitive challenges. That was accomplished by minimizing the number of objects on each screen and making them large enough to select easily with a finger tap. In the few places where the user needs to enter text (for example, searching for icons by name or entering text for display), the app calls upon the native keyboard for each device and arranges the other screen elements to accommodate it.

## A Research-Driven Approach

Both the paper-based tool and the app were based on a user-centered design (UCD) process, involving end-users as co-creators at every step in the process, including individuals with communication challenges, disability advocates, personal care assistants, public health professionals and first responders.

“Even though resources were limited, it was important to us to involve individuals with communication challenges throughout the app development process,” says Sandy Hilfiker, Principal and Director of User Centered Design. “We knew that we would need to go beyond standard best practices to meet the needs of this population.”


Additionally, the entire CommunicateHealth family weighed in on the project during company-wide “creative time.” The core team presented specific roadblocks, and the staff brainstormed ideas for moving forward.

All the icons, content, and basic structure of the app were based on the paper version of Show Me. The design of the Show Me booklet was informed by extensive formative research and usability testing with health professionals, personal care attendants, disability advocates, and individuals with communication challenges.

Research for the booklet included nine in-depth interviews, 10 focus groups, six prototype tests, and six dyadic interviews/usability tests.


## Iterative Design

All the icons were developed using an iterative design process and were tested with users. The screens below illustrate how the communication concepts evolved as the tool moved from paper to screen.



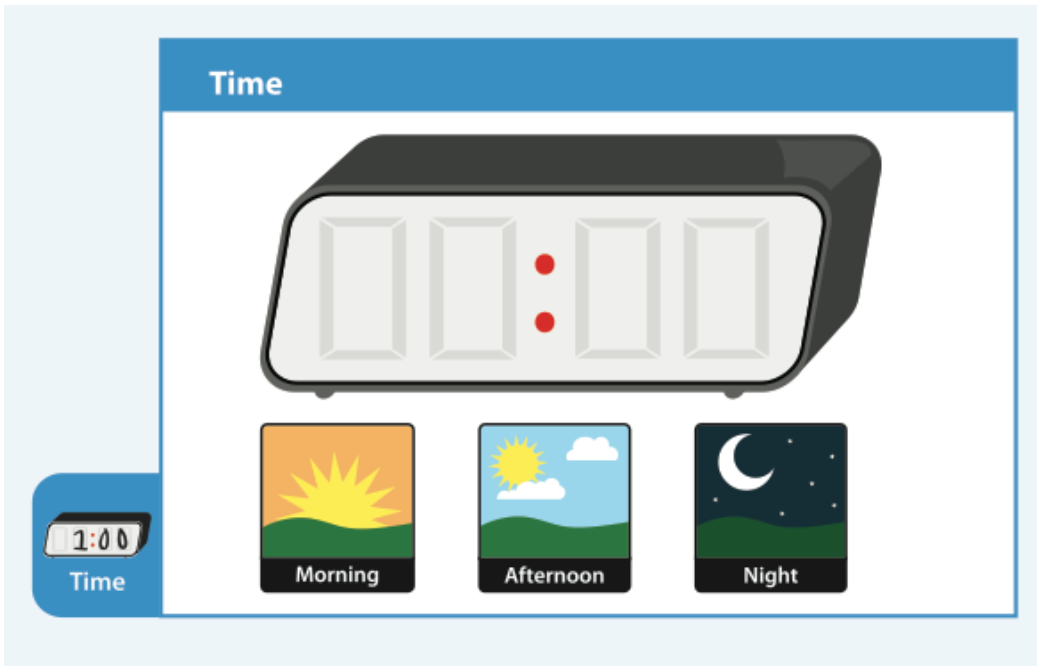
- “ Does this mean my question will be answered at this time? ”
- “ Could mean 3:00 or 12:00, need to be clearer with time. ”
- “ Shelter staff don't know when the emergency will end. I wouldn't be able to answer that question, so why give the option? ”
- “ It would be nice to give people a specific time. Like come back to get lunch at 12:00. ”

Time question in v.1 of the paper-based version of the tool.



- “ People always confuse the whole AM/PM thing. It's great that you can just point to the time of day. ”
- 📎 Overall, people with cognitive disabilities struggled with telling time on an analog clock.

v.2 of the paper-based tool.



The final paper-based version of the tool.





These screens show how the final app looks. It is easy to see how some of the concepts from the paper-based version of the tool carried over to the app.

Once the team had established the strong foundation of the paper-based version of Show Me, CommunicateHealth conducted the following formative and usability research activities to inform the organization, navigation, and features of the app:

- **Consulting published research:** Team members drew on published research about mobile app usability and educated themselves on how other mobile apps were applying standard interface conventions, such as menu placement and home buttons, common icons and labels, etc.
- **In-depth interviews:** The team conducted eight in-depth interviews with public health professionals and advocates for individuals with communication challenges (deaf or hearing impaired, limited English proficient, cognitively disabled) to ensure that the app would meet the needs of agencies, volunteers, professionals, and individuals.
- **Card sorting and icon feedback sessions:** Six card-sorting sessions were conducted with individuals with communication challenges. During these sessions, participants also provided in-depth feedback on new icons that weren't part of the original paper-based version of the tool.

- **Prototype testing:** The team conducted three prototype-testing sessions with health professionals, using a Web-based simulator.
- **Dyadic usability sessions:** The team conducted three dyadic usability sessions during which participants (one public health professional and one person with communication challenges) completed tasks, using the app together. For example, health professionals were asked to use the app to explain, “There is a hurricane coming, and you need to go to the shelter by 9 p.m.” Individuals with access and functional needs were asked to explain, “I need my medicine, and it has to be kept in a refrigerator.”

Each research exercise helped the team refine its design assumptions and enhance the overall user experience based on realistic use challenges. The following section provides more detail on some of the research activities described above, including key findings.

### **Key Findings from Card Sorting and Icon Feedback Sessions:**

- Users struggled with card sorting
- Icons were taken literally
- Users preferred fewer icons per page
- Users had limited experience with technology

An interesting finding from the card sorts was that all participants struggled with sorting the icons into groups. As part of the usability testing, the team incorporated card sorts to assist with developing a framework for grouping and labeling icons in the app. Three participants struggled with, but completed, the open card sort (with no predetermined categories). The categories they created were very large and would not be helpful in the context of an app framework. For example, one participant asked for extra cards and grouped everything under types of disasters: this is what you need for a hurricane (food, information, etc.), this is what you need for a tornado (food, information, etc.), rather than grouping icons by directives, places, disasters, information needs, etc. The other three participants struggled with the closed card sort (with predetermined categories) and were unable to complete the task.

These test results made the team question its assumptions. “We questioned the cut point for cognitive overload—how many categories and how many icons per category would be usable,” says Scrimgeour. “Ultimately, we developed four to six categories based primarily on the health professionals (with specific icon recommendations from people with communication challenges). The number of icons per category ended up increasing, primarily as a result of device testing with users with communication challenges, who preferred scrolling through long lists of icons to find the ones they wanted.”

When the team tested paper prototypes of the icons, participants said they preferred fewer icons on a page; but during usability testing on the mobile device, participants’ actions did not reflect that preference. “In fact,” says Scrimgeour, “they were scrolling through completely unrelated icon sets rather than continuing to click in and out of screens with fewer icons. We ultimately accommodated for possible cognitive overload by allowing users to enlarge icons and have the one enlarged be the only

one on the screen. This way app users could focus on one icon if needed without distraction.”

Other recommendations that evolved as a result of usability testing included:

**Recommendations:**

**Grouping and Labeling Icons**

- Create simple category labels, such as “things you need,” “warning,” or “prepare.”

PROTOTYPE TESTING RESULTS		
FEATURE/PAGE	OBSERVATIONS	RECOMMENDATIONS
<b>Navigation Structure</b>	Users expected to return to the <i>Home</i> screen after clicking <i>Done</i> while they were in <i>All Icons</i> , <i>Time</i> , and <i>Search</i> .	Test this further in dyads. Need to assess if users need or want the app to “remember” their place in <i>Scenarios</i> and <i>Type of Emergency</i> when navigating away to <i>All Icons</i> , <i>Time</i> , and <i>Search</i> .
<b>Bottom Navigation</b>	Users didn’t notice the bottom navigation during most of their encounters with the app.	Make the bottom navigation more prominent, using color. Incorporate this into training as well as on a new <i>Tips</i> page within the app.
<b>Scrolling</b>	Users had difficulty scrolling on the simulator and thought the arrow was clickable.	Remove the arrow and replace with an iOS scroll bar. Test the functionality for the dyads when the app is on a device.
<b>About</b>	Users expected to find more technical information about the app, (such as the version number), instead of tips.	Include technical information in the <i>About</i> page only. Create a new <i>Tips</i> page that helps users navigate and use the app.  Note: The team believes the new <i>Tips</i> page could solve some of the usability issues from this round of testing.
<b>Icon Groups</b>	Users stated that they didn’t understand the difference between the different colors or types of stacks.	Make changes to the color and style of all the icon groups, to create consistency throughout. Consider using color to let users know which level of the app they are in.
<b>Texting Icon</b>	Users expected to be able to use this icon to communicate with hearing-impaired people via texting or using a keyboard.	Research the feasibility of adding a texting function to this icon.
<b>Resources</b>	Users expected to find links and phone numbers in this section. They also suggested additional resources to add.	Continue as planned and consider adding a link to the HAN reports (or HAN updates). Link to one weather resource, to encourage all first responders to use the same source.

- Consider grouping icons into “Top 5” lists, to address the immediate needs of a majority of individuals. This will help reduce the need to navigate through the app multiple times.
- Repeat icons under multiple categories in the app to ensure that users can find what they need.
- Consider using plain-language instructions for health professionals, to help them guide people through the app and to assist with finding icons.
- Further develop icons related to: action—cover your windows, and direction—how to cover your windows. Consider incorporating video or interactivity.

### **Look and Feel**

- Use a default of two icons per page (Note: This was amended after additional testing).
- Consider adding a “show more/show fewer” option to, give users the choice to select the number of icons displayed per page.

### **Implementation**

- Add a training component for first responders, to teach them how to help cognitively disabled users navigate icons.

## **Prototype Testing**

The team conducted one-on-one usability tests with early prototypes of the app. Participants were public health professionals using a simulator (n=3). The chart below summarizes key findings and recommendations.

## **Dyadic interviews**

The team conducted dyadic interviews to assess the final prototype of the mobile app with public health professionals or first responders (n=3) and individuals with communication challenges (n=3). Participants were asked to complete tasks using the mobile app, such as “Tell her that she has to leave the shelter at 9:00 a.m.” The chart below summarizes key findings and recommendations.

DYAD TESTING RESULTS		
FEATURE/PAGE	OBSERVATIONS	RECOMMENDATIONS
<b>Home Screen "Menu"</b>	Public Health Professionals (PHPs) did not understand the old function of the <i>Home</i> screen. They kept returning to the <i>Home</i> screen even when their task was in a specific emergency response scenario, such as "dispensing site."	Make the <i>Home</i> screen a list view and call it "Menu." Once a user selects an emergency response scenario, that will become the new home screen. Users can always go back to <i>Menu</i> to change their emergency response scenario by clicking the button in the top right corner of the app. Also, enlarge the <i>Choose your emergency response scenario</i> text.
<b>Emergency Response Scenario Landing Pages</b>	PHPs were not clear about the hierarchy of the icon groups. They also wanted text and tips on these pages, to help guide them through the app.	Add plain-language prompts/tips on these pages. Make the groups of icons list view, to help PHPs navigate the steps.
<b>Medical, I Need, Feelings, People and Places</b>	PHPs had difficulty directing individuals with access and functional needs to additional icons, so as to help them communicate messages.	Create a section on the emergency response home pages called, "Find more icons to help communicate." Limit the number of list items on those pages. Create a clear place where an individual with access and functional needs can go to communicate important messages to a PHP.
<b>Text Size</b>	PHPs and individuals with access and functional needs struggled to read the small text.	Enlarge the text throughout the app.
<b>All New Icons</b>	Individuals with access and function needs understood all of the new icons.	No changes needed.

## Cross-Platform Testing

During the development phase, the team conducted internal testing on the following devices:

- iPhone 4 (running iOS 6.1.2 and iOS 6.1.3)
- iPhone 5 (running iOS 6.1 and 6.1.4)
- iPad 2 (running iOS 5.0 and 6.1.3)
- iPad 3 (running iOS 6.0)

They also ran the app via simulator in Xcode in:

- iOS 5.0
- iOS 5.1
- iOS 6.0

Device testing is important, as it provides feedback on how the app will look and function on an actual device, compared to a simulator, which is not as tactile as holding an actual device in your hand.

As of this writing, the team is still in the process of developing and testing on Android devices.

PROJECT TIMELINE	
MILESTONE DATE	MILESTONE DESCRIPTION
<b>Pre-July 2012</b>	Extensive research for the paper tool (much of which was applied to the app development). This included nine in-depth interviews (IDIs), 10 focus groups, six prototype testing sessions and six dyadic interviews.
<b>Summer 2012</b>	<ul style="list-style-type: none"> <li>• Reviewed existing emergency preparedness information and applications</li> <li>• Conducted eight IDIs with public health professionals and advocates for individuals with communication challenges (deaf or hearing-impaired, limited English-proficient, cognitively disabled) to ensure that the app would meet the needs of agencies, volunteers, professionals, and individuals</li> <li>• Icon design and wireframing</li> </ul>
<b>October 2012</b>	<ul style="list-style-type: none"> <li>• Conducted six icon card sorting and icon feedback sessions with individuals with communication challenges, to gather feedback on the final icon set and to inform the app's information architecture</li> <li>• Begin developing app information architecture (IA)</li> </ul>
<b>November 2012</b>	<ul style="list-style-type: none"> <li>• Design initial mockups</li> <li>• Begin content development</li> </ul>
<b>December 2012</b>	Prototype build and refinement
<b>January 2013</b>	Conducted three remote prototype testing sessions with public health professionals, using a simulator
<b>March 2013</b>	Conducted three dyadic usability testing sessions with public health professionals and individuals with special access and functional needs (using hand-held devices)
<b>May 2013</b>	<ul style="list-style-type: none"> <li>• Finalize iPhone and iPad versions and submit to iTunes App Store</li> <li>• Begin designing for Android versions 2.3 to 4.3</li> </ul>
<b>June 2013</b>	<ul style="list-style-type: none"> <li>• Finalize QC on Android devices</li> <li>• Get app into Android marketplace</li> </ul>

## Budget

The client, MDPH, had a budget of \$125,000 for the mobile app. (This does not include the initial round of formative research or the development of the paper Show Me tool.)

## MEASURING SUCCESS

The app is designed to meet a public health/societal need, making traditional measures of ROI less applicable. "The real test will come during an actual emergency, when we hope to collect anecdotal data on the success of the app," says



Scrimgeour. “We will be looking to find out: Did the app help emergency personnel do their job? Did the app help people with communication challenges feel that they had a voice?”

“Just as the creation of the Show Me app was driven by the users, ultimately so will the success of the tool,” she says. “While usability testing has helped to demonstrate the usefulness of the app in communicating health and safety information, the widespread adoption of the app remains to be seen.”

## LESSONS LEARNED

Some words of wisdom from the CommunicateHealth design team:

- **Compare costs.** “It’s important to really look at the cost of print, taking into account printing, updating and mailing, in order to see what a good long-term investment a mobile app can be!”
- **Orient users.** “We rolled out several features during testing that didn’t work. The biggest one was not using text prompts for where to start, particularly when we actually wanted users to do something first. Users would just start going through and pressing everything and quickly forget the task at hand.”
- **Don’t get hung up on the numbers.** A little bit of testing can go a long way. There’s no need to shy away from testing because you can’t run a huge usability session. Getting input from users—even just a few—can help inform your app or product in more ways than you can imagine.

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## About the Authors

**Patty Caya** ([www.pattycaya.com](http://www.pattycaya.com)) is a freelance journalist (writer and editor), and award-winning digital media producer. In her business writing, she specializes in topics relating to usability (including social media and mobile design), and the business and technology of the Web. She has co-authored the Intranet Design Annuals for NN/g from 2008–2013. She wrote both the 3rd and 4th editions of the report on Intranet Portals and the 1st and 2nd editions of *“Social Features on Intranets: A Report From the Front Lines of Enterprise Social Software Projects.”*

For over a decade, Caya has split her time between journalism projects and Web consulting. She is an experienced content strategist and interaction designer. She has consulted for many of Boston’s top interactive agencies, leading Web and intranet development projects as well as usability testing, research, and design initiatives. Her client roster spans a wide range of industries and includes leading national brands alongside mission-driven non-profits. She has a BFA from New York University’s Tisch School of the Arts and has completed coursework in the User Experience Program at Bentley University.

**Dr. Jakob Nielsen** is a principal of Nielsen Norman Group. He is the founder of the “discount usability engineering” movement, which emphasizes fast and efficient methods for improving the quality of user interfaces. Nielsen, noted as “the world’s leading expert on Web usability” by *U.S. News and World Report* and “the next best thing to a true time machine” by *USA Today*, is the author of the best-selling book *Designing Web Usability: The Practice of Simplicity* (1999), which has sold more than a quarter of a million copies in 22 languages. His other books include *Hypertext and Hypermedia* (1990), *Usability Engineering* (1993), *Usability Inspection Methods* (1994), *International User Interfaces* (1996), *Homepage Usability: 50 Websites Deconstructed* (2001), *Prioritizing Web Usability* (2006), *Eyetracking Web Usability* (2009), and *Mobile Usability* (2012). Nielsen’s Alertbox column on web usability has been published on the Internet since 1995 and currently has about 200,000 readers. From 1994 to 1998, Nielsen was a Sun Microsystems Distinguished Engineer. His previous affiliations include Bell Communications Research, the Technical University of Denmark, and the IBM User Interface Institute. He holds 79 US patents, mainly on ways of making the Internet easier to use.

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