

**Universidade do Minho**  
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**Mobile Interface Design:  
Instant Places Mobile Application Case**

Tese de Mestrado  
Mestrado em Media Interativos

Trabalho efectuado sob a orientação do  
**Professor Doutor Nelson Troca Zagalo**

# Declaração

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DE ACORDO COM A LEGISLAÇÃO EM VIGOR, É AUTORIZADA A REPRODUÇÃO PARCIAL DESTE TRABALHO APENAS PARA EFEITOS DE INVESTIGAÇÃO, MEDIANTE DECLARAÇÃO ESCRITA DO INTERESSADO, QUE A TAL SE COMPROMETE

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# **Mobile Interface Design: Instant Places Mobile Application Case**

## **Abstract**

Interactive public displays have the potential to innovate in the way we communicate, and express, ourselves publicly. Instant Places project, developed by Ubicomp group at Department of Information Systems, University of Minho, wants us to have the opportunity, through these displays, to become not only spectators but also influence the content generated in them, as well as marking (and managing) a public presence or interacting with other users, for example. This interaction is possible through the platform that is becoming increasingly more ubiquitous and used these days, the Smartphone.

This dissertation aims to find a solution for instant Places mobile application, which will be the main vehicle for interacting with public displays. Moreover, it is intended that the results found on this document can not only contribute to the project that is intended, but can also be applied in the development of interfaces for mobile devices in general terms.

It is expected that this dissertation show the key aspects to consider for that kind of project, such as how do we use the device, the differences from the traditional computer, technical aspects, limitations and opportunities, as well as other issues that will allow a combination between the aesthetic and functional factors.

**Keywords:** User Interface; Mobile Interface Design; Public Displays Interaction;



# **Mobile Interface Design: Instant Places Mobile Application Case**

## **Resumo**

Os ecrãs públicos interativos têm o potencial de inovar na forma como comunicamos e nos expressamos publicamente. O projeto Instant Places, desenvolvido pelo grupo Ubicomp, do Departamento de Sistemas de Informação da Universidade do Minho, pretende que, através desses ecrãs, tenhamos a oportunidade de nos tornar não só meros espectadores, mas também influenciar o conteúdo gerado nos mesmos, bem como marcar (e gerir) uma presença pública ou interagir com outros utilizadores, por exemplo. Essa interação é possível através da plataforma que se tem tornado cada vez mais ubíqua e utilizada nos dias que correm, o Smartphone.

Esta dissertação, pretende encontrar uma solução para a Interface do Utilizador da aplicação, para Smartphone, do Instant Places, a qual será o principal veículo de interação com os ecrãs públicos. Por outro lado, pretende-se que as conclusões deste documento possam contribuir não só para o projeto que se destina, mas que possam ser igualmente aplicadas no desenvolvimento de interfaces para dispositivos móveis em geral.

É expectável que se encontrem aspectos fundamentais a ter em conta para tal desenvolvimento, como a forma de utilização do aparelho, as diferenças para o computador tradicional, aspectos técnicos, limitações e oportunidades, bem como outras questões, que permitirão uma conjugação entre o factor estético e o funcional.

**Palavras-chave:** Interface do Utilizador; Desenho de Interface Mobile; Interação com ecrãs públicos





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# Abbreviations

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API — Application Programming Interface

App — Application

CPU — Central Processing Unit

CRT — Cathode Ray Tube

CSS — Cascade Style Sheet

GUI — Graphical User Interface

HCI — Human-Computer Interaction

HTML — HyperText Markup Language

iOS — Apple's mobile devices Operating System

SDK — Software Development Kit

UI — User Interface





# Introduction

This study has been made under the Instant Places project, developed at University of Minho. The main feature of this project is to provide people a way to express themselves, publish and share content publically and get information of their interest, all made through public displays. We are assisting an incredible growing of smartphones usage, and it's making this devices an ubiquitous tool in our everyday lives for uncountable tasks — according to Strategy Analytics<sup>1</sup>, the number of smartphone users around the world has reached one Billion in the third quarter of 2012. This ubiquity makes it the most appropriate medium to make the bridge between the user and the public displays. The mobile application for interacting with the public displays is the main reason of this research and will be presented as the final result. It is also pretended to reach conclusions able to improve the Mobile User Interface Design in general.

## 1.1 — What is Instant Places

Instant Places is a research project on situated displays, based at Universidade do Minho, looking for ways to put people interacting with digital public displays, an increasingly important element of our technological landscape, with the ability to change our communication habits in public and semi-public spaces. According to José et al (2013), *“this trend could enable us to move from a world of closed display networks that function as isolated islands to scenarios in which large-scale networks of pervasive public displays and associated sensors are open to applications and content from many sources”*. The goal is to take people to generate content on the screen based on what they find valuable, instead of standing passive. Researchers also refer that display systems haven't reached their potential as an open communication medium. People usually ignore its content, but this project intends to attract people's attention

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<sup>1</sup> Source: <http://blogs.strategyanalytics.com/WDS/post/2012/10/17/Worldwide-Smartphone-Population-Tops-1-Billion-in-Q3-2012.aspx>

making themselves part of it. The challenge of meaningful communication using public displays requires specific paradigms to enable people to control content and publishing.

This is where user Interface Design role comes in. It should help user to make decisions and have an accessible control over his interactions between each public display. Being a project based in situated displays, the application is location-based, that puts users creating a “relationship” with each display<sup>2</sup>.

By now, instant places main features are:

— **Places**

Might have one or more displays as a symbolic environment that provides a meaningful context for situated social interactions.

— **Personal Identities**

Let people explicitly and systematically manage publication and self-exposure in public displays. For now, that means people can create different identities for each display and use them to publish content, either by attaching pins or creating posters.

— **Display applications**

Place owners would be able to select multiple display applications for use on respective displays. Each display’s applications should be able to adapt their behaviour according to place’s available resources and current circumstances. Applications can also access data shared in each place by users — like pins and

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<sup>2</sup> Not every system feature is defined yet. Although, it may be possible to publish on several screens at once, based on other displays’ activity. For now, it isn’t already a reality. Thus, this study is based on concrete established functions.

posters, e.g. — so that they can create visualization of this data information. Main applications available now are:

### — Pins

A pin refers to an institution, cause, campaign, sports team, or band that people might identify with. Users can associate pins with their identities by associating it from a pre-defined list (constantly growing). A pin comprises a visual icon, a name, a set of tags, and a set of sources from which people should be able to generate screen content. Pins aren't exactly a mechanism for user-generated content. Pins work more on a crowdsourcing model in which users express support for or interest in particular content sources. Each time a user connects to a display, this information might be considered as part of their identity and used to increase the popularity of the content associated with those pins.

To know more about Instant Places and, for a better interpretation of this dissertation, please access [www.instantplaces.org](http://www.instantplaces.org)

Note: Henceforth, Instant Places public displays will be referred to as *Display* or *Displays*.

## 1.2 — Motivation

As one of the most important subjects in user experience design, the interface became an inevitable research case for Instant Places mobile application. It's important to clarify that visual interface design isn't just about text, and forms (although it's essential too), but it's mostly about usability, navigation, and information architecture. Nielsen (2000, 11) puts usability in front of artistic approach to web design. Nevertheless, the author points that there is a need for art, fun, and general good time on the web, but the main goal of a well-designed web interface is to conduct the user right through what he wants in minimum steps and without needing

to think too much. Krug (2006, 11), who considers “don’t make me think” the first law of usability, says that “as far as is humanly possible, when one look at a web page it should be self-evident, obvious and self-explanatory”. Colours, symbols and typography are indispensable elements to help that (as it is on road signs, e.g.) and, consequently, to provide a good experience. In just a few years, the number of mobile applications available at digital stores of the two most relevant systems in the market — Apple App Store and Google Play — has reached more than one million applications each<sup>3</sup>. And this number will certainly grow in the next few years.

Having said that, it’s plausible to research, not just the improvement of technology, but the Human-Computer relationship. After searching on documented studies about Smartphone and TV interaction, it was possible to find some studies exploring the possibilities to improve the experience of watching television at home, focusing essentially on entertainment. However, we missed exploration and research on interface design and interaction with public displays, focused on social activity. It’s important to understand, in this case, what people intends to do, what the application itself can be and how to provide users the best way to make it all happen correctly and intuitively. Again, the results of this study shouldn’t only be seen as a solution for Instant Places, but take some methods to apply on any other mobile website or application.

## **1.3 — Methods**

Usability tests and metrics are an important data source to help designers make a better work when designing interfaces, but some previous studies and knowledge from interface design scholars and professionals may, and should, be applied too. There isn’t much academic research based on the most recent mobile devices interface and respective applications, although this technology is becoming the principal digital device people use for all kinds of tasks. So it’s opportune to do

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<sup>3</sup> Source: <http://www.theverge.com/2013/10/22/4866302/apple-announces-1-million-apps-in-the-app-store> and <http://mashable.com/2013/07/24/google-play-1-million/>

research about this subject. A lot of scientific knowledge acquired over the years largely refers to websites and software design optimized for desktop/laptop computers. The challenges are about collecting what have been concluded before and join it with this study's collected data in order to reach new conclusions. Likewise, online publications are becoming an important source of information and a shared platform of ideas between professionals, nowadays. There are really important articles on online magazines, company's webpages, and even great professional's personal blogs. For researchers, it's undoubtedly advantageous as it's a faster way to access content. Nevertheless, there's the issue of being able to filter which content really matters. However, it is certainly becoming indispensable and considered, by many, as the new main source of information.

## **1.4 — Objectives**

The goal of this study is to find a proposal that solves the mobile interface problem for Instant Places. User's mobile device will be the vehicle utilized to interact with the public displays. A good, user-friendly, intuitive and also pleasant interface is the expected final result. Still, it's important to clarify that there are often other ways to solve an interface problem, although this study intends to find limitations, possibilities and solutions that contribute to a greater experience for the users.

This study shouldn't be seen as a hypothetical case, but as a concrete result to be applied essentially on Instant Place's mobile application. However, it doesn't mean this is the only possible solution but, according to the carried research, the one found more plausible. As an academic research, the final result should be as conclusive as possible, but in several cases interfaces take years to perfect and simplify. Interface design is the visible (and touchable) side of a complex range of programming languages, microprocessors and a wide range of components that make technology work. But we have to keep in mind that the end-user almost never cares about it. Mostly users just want to pick up the devices they bought and simply (and easily) use them. Almquist (2000) points that what reaches the user is what's visible on the

screen. He doesn't care about backend, but cares about function, and function is helped by good designs and smart, but invisible, technical solutions. This means the designer should transform a complex system to an easy-to-use forefront.

## ***“Good design makes a product understandable”***

— Dieter Rams, 1978

One of Nielsen's (1995) usability heuristics<sup>4</sup> — “Match between system and the real world” — refers that the system should speak the user's language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. This means a designer should think the interface focused on who will use it and that was the ultimate objective case of our work. The main goal of this research is to understand how interface design can improve the user experience in Instant Places mobile application while interacting with a public screen, but also elicit some conclusions to be applied on different kind of situations. Above all, it intends to be a contribution to an improvement of the mobile interface design.

Is important to note that this is not a global user experience project. This work is focused on User Interface Design, as part of the experience. There are many factors that contribute to the overall experience. Interface is an important one, but not the only one.

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<sup>4</sup> Jakob Nielsen's Usability Heuristics for User Interface Design — Visibility of system status; Match between system and the real world; User control and freedom; Consistency and standards; Error prevention; Recognition rather than recall; Flexibility and efficiency of use; Aesthetic and minimalist design; Help users recognize, diagnose, and recover from errors; Help and documentation.

## **1.5 — Structure**

This dissertation is essentially divided into two stages: an introduction to the mobile scene and a collection of principal issues to take into account before starting to design a User Interface project and then, the conceiving of the project itself.

The first stage — Context — aims to understand the environment this project will be conceived. It was found essential to collect information in order to know the requirements of designing a User Interface, what have been done before, what main authors and experts have concluded, what are the possibilities and limitations as well as recognizing the technical issues to care before starting to develop an idea or design concept.

On a second stage — Instant Places Mobile Application Design — a proposal is presented, based on earlier conclusions. As it was intended, the collected information allowed us to create an interface that respects the issues found before. It aims to join aesthetics with functionality, contributing to a better User Experience.





PART 1

# **CONTEXT**



## **2 – Mobile Scenario**

### **2.1 – What does “Mobile” mean?**

Prior to deepen on a mobile project is to know what “mobile” means. Although the term is being adopted as referring to smartphones and tablets, it may be confusing, since a laptop, for example, is a portable and mobile device too. Some authors, like Weiss (2002) use the term “handheld”, which captures the essence of the device size, although allows the inclusion of television remote control into the definition. According to Ballard (2007: 3), “mobile” refers to the user, and not the device. The term “mobile” refers to devices that can be used “on-the-go” (while walking for example) and don’t have to be static while using them. Weiss further notes that to be considered a handheld device, it must pass those three requirements:

- It must operate without cables, except temporarily (recharging, synchronizing with a desktop)
- It must be easily used while in one’s hands, not resting on a table
- It must allow the addition of applications or support Internet connectivity

Hooper and Berkman (2011, xvi) classify the evolution of mobile telephony in four eras:

1. Voice
2. Paging and text
3. Pervasive network connectivity
4. General computing devices.

Considering the current mobile phone as being a “fourth era” device, it must have the following characteristics:

- Small: It's small enough to a person carry all the time, preferably on their pocket
- Portable: It is battery-powered and independent from electrical current
- Connected: It's wirelessly connected, not attached to the wall or connected only when user makes special effort. Whenever possible, it is connected in multiple ways, to both voice and data networks
- Interactive: It's inherently interactive. Allows much more interactions than a MP3 or a PDA
- Contextually aware: Uses the ability to understand the network to which it's attached, to help the user get things done

For Firtman (2010:4) a mobile device is portable, personal, carried by people almost all the time, easy and fast to use and somehow network connected. The author adds that when we think about mobile devices, we need to exclude de “phone” concept. Voice calls are just a simple feature. The term “mobile” can refer to a wide range of devices, so he classifies them as:

- Mobile Phones
- Low-end mobile devices
- Mid-end mobile devices
- High-end mobile devices
- **Smartphones**
- Non-phone devices
- Small Personal Object Technology (SPTs)
- Tablets, netbooks, and netbooks

Nevertheless, this study is focused on smartphones. But Firtman considers it the most difficult category to define. He also questions why some mid-end and high-end

devices are not considered “smart” enough to fit this category. Smart is a concept that evolves every year. What today is considered a simple mobile phone would have been considered very smart ten years ago. As defined today, a smartphone has a multitasking operating system, a full desktop browser, wireless LAN (WLAN, also known as WiFi) and 3G connections (now 4G), a music player and several of the following features:

- GPS (Global Positioning System) or A-GPS (Assisted Global Positioning System)
- Digital Compass
- Video-capable camera
- TV out
- Bluetooth
- Touch support
- 3D video acceleration
- Accelerometer

David (2011: 1) points the iPhone as the highest representative of what a smartphone is. He goes further saying that it’s fair to compare this device to a computer, due to be equipped with almost the same features. When the iPhone was launched in 2007, Steve Jobs hailed the phone as three devices in one: a phone, an MP3 Player and the best way to experience the web.

We can assume that the term “mobile” refers to devices that don’t have to be stationary, are small enough to carry with one hand and may be easily transported everywhere. According to the described categories, this study is based on a Smartphone, as it has a multitasking operating system, a full desktop browser, Wireless LAN (WLAN, also known as Wi-Fi), 3G connections, GPS, as many other features, although those are essential for the concerned application in case.

## 2.2 — Why Mobile?

With an increasing role of computers and digital devices in our everyday lives, the HCI discipline grew both in academia and industry (Canny, 2006). Software usability, especially on smartphones and tablets, is now an important subject to study, once digital applications are becoming more and more ubiquitous for all kinds of tasks. According to mobiThinking<sup>5</sup>, based on a Portio Research<sup>6</sup> from March 2013, 1.2 billion people worldwide were using mobile applications at the end of 2012. Also, there's a forecast for this number to grow 29.8 per cent each year, reaching 4.4 billion users by the end of 2017. Coursaris and Kim (2006) refer that the turn of this century marked an increased focus on mobile usability studies for research in the field of Human Computer Interaction. Although there's a considerable number of usability studies in general, the use of mobile devices is exponentially increasing, and we're missing more research mobile oriented.

Studies on this area may contribute to improve mobile products and services, once smartphone is becoming the preferred vehicle to access information by the majority of users. Since 1970's, the main focus of HCI studies has been on desktop software and websites, controlled by a keyboard and a mouse, but nowadays, designers, developers and also scholars are starting to turn to smaller and tangible screens to display information. Markoff (2009) refers that cell phone is "*the world's most ubiquitous computer*". The New York Times journalist adds that software designers who early revolutionized the use of Personal Computer making it truly personal with a visual system called WIMP — windows, icons, menus and pointer, as we know it for Macintosh and Windows computers — say they see the same happening now with mobile phones. That was written only two years after the release of the first Apple iPhone presented by the company's CEO (Steve Jobs) in January 2007 and placed on sale in June of same year. A device that is considered by many not

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<sup>5</sup> mobiThinking, (2013). Global mobile statistics 2013 Section E: Mobile apps, app stores, pricing and failure rates, <http://mobithinking.com/mobile-marketing-tools/latest-mobile-stats/e>, 13 August 2013.

<sup>6</sup> Source: <http://www.portioresearch.com/en/blog/2013/fast-growth-of-apps-user-base-in-booming-asia-pacific-market.aspx>

the first cell phone with a “full-screen” tangible surface neither the first smartphone, but the one that defines what a smartphone really is. Plus, it came with a new technology, which, at the time, was not accessible by the masses, a multi-touch screen controlled by our own fingers. At a TED talk in 2006<sup>7</sup>, Jeff Han refers Bill Bruxton (and his crew at University of Toronto’s Dynamic Graphics Project) as a pioneer on multi-touch screen technology by the 80’s but was the Han’s project that jumped into the spotlight as a truly interactive multi-touch sensible surface. It gave rise to what is called NUI (Natural User Interfaces) which is characterized by the end of graphic elements and “pointing and clicking” and the introduction of swipe, pull, drag, hold, etc. The word “click” is being replaced by the word “tap”. Apple just spread this technology through its devices — first iPhone and lately the iPad — popularizing this new study field of “mobile interface design”. The term may be related to the first mobile phone, since it has an interface too, although it was manufactures responsibility to design it. Nowadays, any individual is able to design not only websites that fit and look better, but also applications that run on these devices operating systems. It can explain why this is a growing topic of interest. Joos (2013), on a Smashing Magazine article wrote: *“The iPhone ushered in a revolution in interactive communication. Only five years later, touchscreen devices are all around us, and interaction designers are redefining ways people use digital content”*. Also, it’s important to note that this technology is now common to us, but it’s not the latest kind of interaction. Google revealed its Google Glass<sup>8</sup> project in the middle of 2012. It reflects how technology is becoming wearable and starting to be part of us too — interesting to see an example of it as Neil Harbisson<sup>9</sup>. Despite touch screens became a mass product in recent years, new forms of human-computer interaction were born very quickly.

Fox (2010), points that the mobile device is the Internet for many people. The researcher argues that more people will use mobile devices instead of traditional computers to obtain information. McGrane (2012) states that: *“If people want to do something on the Internet, they will want to do it using their mobile devices. Period.”*

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<sup>7</sup> Source: [http://www.ted.com/talks/jeff\\_han\\_demos\\_his\\_breakthrough\\_touchscreen.html](http://www.ted.com/talks/jeff_han_demos_his_breakthrough_touchscreen.html)

<sup>8</sup> Google Glass website — <http://www.google.com/glass/start/>

<sup>9</sup> Harbisson, N. (2012) I listen to color. [http://www.ted.com/talks/neil\\_harbisson\\_i\\_listen\\_to\\_color.html](http://www.ted.com/talks/neil_harbisson_i_listen_to_color.html), 10 October 2013

Through his point of view, there's a trend for "mobile-only" users who access information exclusively on mobile devices like smartphones and don't even own a desktop or laptop. To argue that, the author points some facts:

— In India, seventy per cent of the population — approaching to a billion people — has a mobile phone

— China now has more mobile Internet users than there are people in the United States

— In Egypt, of the ten million people who access the web, seventy per cent of them are "mobile-only" users

— For billions of people in the developing world, mobile phones are the only way they will ever connect to the Internet

In developed countries, a large and growing number of users who access the Internet do it only through a mobile device. Marcotte (2010) tells that mobile browsing is expected to exceed desktop-based access within three to five years. McGrane also points that in June 2012, thirty-one per cent of Americans who accessed the web from those kind of equipment, rarely or never use any other device for the same task. The author indicates that this number tends to increase, referring the Pew Research Centre that reported, in an early study from July 2011 that 28% of smartphone users go online mostly using their phone, although having access to a computer at home or at work, and one-third of those users have no access to a broadband connection at home. As an example, Jeff Weiner, CEO of LinkedIn, a well-known professional network, announced the company's strategy will pay a big focus on mobile. It's expected that 50% of LinkedIn's unique visitors will come via mobile devices in 2014<sup>10</sup>. This data predicts an upcoming future where people no longer need, neither want, a computer and to be at certain location to access the Internet. Those facts also indicate that globally, the number of people who access information from a mobile

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<sup>10</sup> Source: <http://mashable.com/2013/10/23/linkedin-plans-mobile/>



device will be bigger than who use a desktop or laptop computer.

Twitter CEO, Dick Costolo, at D11 conference (All Things Digital) on May 29, 2013 has pointed the company's strategy not to compete with traditional media, but to complement it. Its intention is a Television partnership (as they're already working with ESPN and Turner Broadcasting<sup>11</sup>), which can be used, e.g., as advertising campaigns, making audience interact through their mobile phones via Twitter, providing a "much more engaging experience for users", in Costolo words. He also approached the "mobile first" trend of web services revealing Twitter's intention: "We're not just mobile first, we're all-in on mobile"<sup>12</sup>.

## 2.3 – Patterns

The Architect Christopher Alexander, as components of a language to build towns, planning urbanism as in the construction of buildings, introduced the pattern concept. In *A Pattern Language*, Alexander et al (1977, x) refer an extremely practical language that *"You can use it to work with your neighbours, to improve your town and neighbourhood. You can use it to design house for yourself, with your family; or to work with other people to design an office or a workshop or a public building like a school. And you can use it to guide you in the actual process of construction."* Through these words, we are able to have a perception of what a pattern is. They should be seen as proven solutions for certain problems, and documented as such. As in architecture and engineering, the same concepts might be applied to interaction design and development. Although, it doesn't mean it should be followed as the only solution to a problem, but one which has been proven to work.

Reusing and reapplying known best cases in graphic design is a common concept. Hooper and Berkman (2011, 18) refer that *"There has always been a culture*

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<sup>11</sup> Tweney, D. (2013) Twitter CEO: We're not competing with TV and News media, we're 'complementary'  
<http://venturebeat.com/2013/05/29/twitter-ceo-were-not-competing-with-tv-and-news-media-were-complementary/#WYqDjtpkw4gBIJp.99> 12 November 2013

<sup>12</sup> Full interview: Isaac, M. Twitter CEO Dick Costolo: The Full D11 Interview. <http://allthingsd.com/20130529/twitter-ceo-dick-costolo-the-full-d11-interview-video/>. 12 November 2013

*of sharing, borrowing, and building over the work of others*”. It’s the nature of things. Nothing is completely invented from scratch. Although, patterns may lead to a conflict between design managers who are apologists of repeatability and the use of templates, stencils or any pre-made work, and those who want freedom to explore new solutions. However, Hooper and Berkman warn for a misunderstanding of how patterns should be used. As referenced before, they don’t consist in rules, but in well-defined and well-researched best practices. Yet, the basic principles of design must always be kept in mind, centring efforts on user and always considering the purpose of the design. The authors also cite Alexander when referring to design patterns, and point object-oriented software development as applier of the Architect’s concept.

### **2.3.1 — What have been done?**

Often we see native applications following guidelines provided by the respective operating system companies, in order to fulfil their requirements. Almost every well-known mobile application is conceived under these guidelines. There is always a Navigation Bar at the top edge of the screen and, when necessary, a Toolbar at the bottom. As we see on Facebook mobile application for Android OS (Figure 1) and iOS (Figure 2) and Google+ Android application (Figure 3) and iOS (Figure 4) respectively, these guidelines have been followed.

There has been a tendency to use off-canvas side menus (Figure 5) like YouTube Android (Figure 6) and iOS (Figure 7) applications does, as well as RBMA Radio for both operating systems (Figures 8 and 9).



Figure 1. Facebook Android App (2013)



Figure 2. Facebook iPhone App (2013)

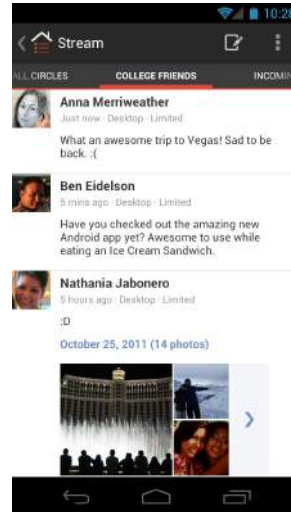


Figure 3. Google+ Android App (2013)

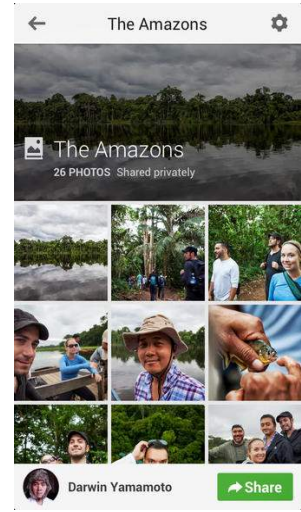


Figure 4. Google+ iPhone App (2013)

These are just a few examples, but a quick search on the web or application distributors will show it as a very common practice. This approach has been very frequent on mobile versions of websites too, with several advantages, like: Add more content without needing to change the layout; doesn't occupy space on the front page; just one tap away and, of course, being a very common solution, users get used to it.

Wroblewski (2012) warns to the fact that responsive design tends to put everything listed vertically on small screens, resulting in long pages full of diverse components. In author's words, "(...) *you might say there's always more space off-screen (...) than there is on-screen*". These examples show how a pattern is applied, and something that has proven to work might be used several times, to "play safe". As referenced before, there is also the question of repetition, and habits. Users are driven to understand a symbol or functionality because, since they've learned to use a device, it always has been like that. Everyone knows the two traces symbol on a Music Player is to pause the music, not because they know the origin of it<sup>13</sup>, but because it has been like that since ever.

<sup>13</sup> Source: <http://en.wikipedia.org/wiki/Caesura>

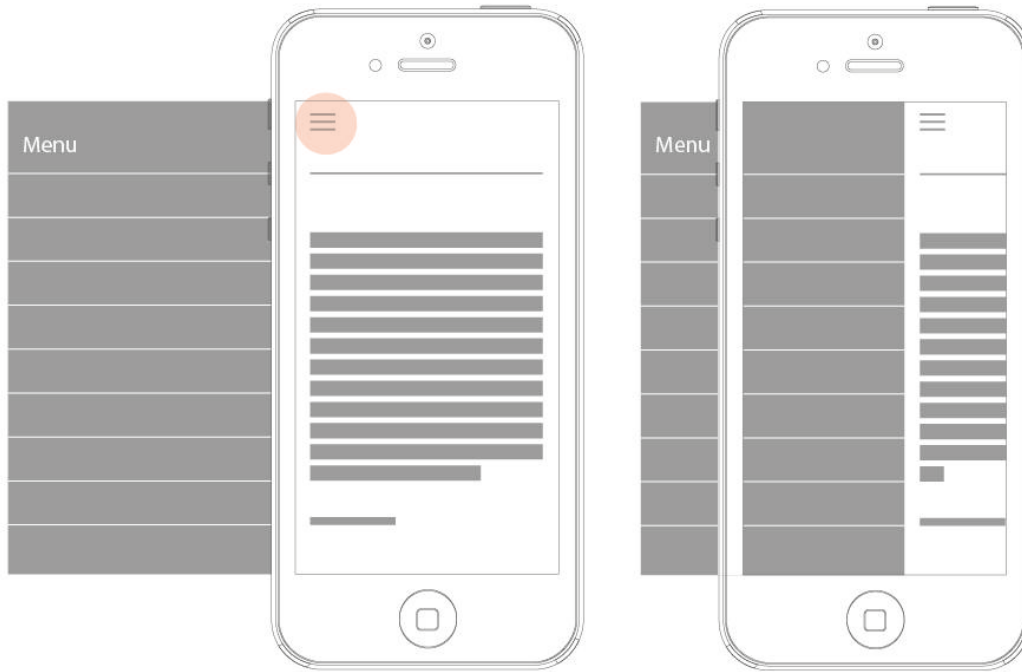


Figure 5. Example of a hidden menu that is revealed when the user touches the menu icon

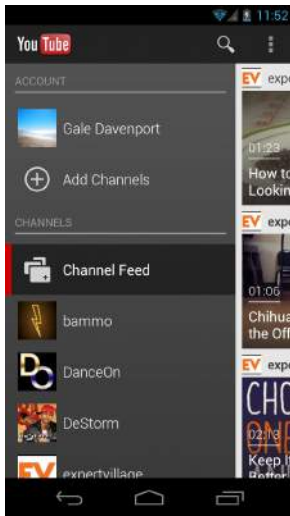


Figure 6. Youtube Android App menu (2013)

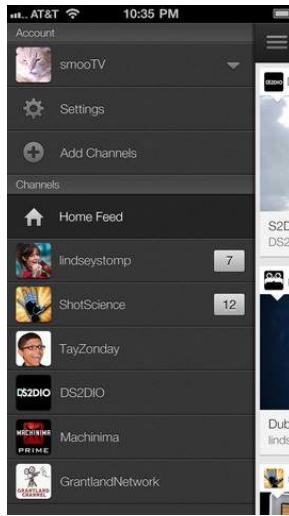


Figure 7. Youtube iPhone App menu (2013)

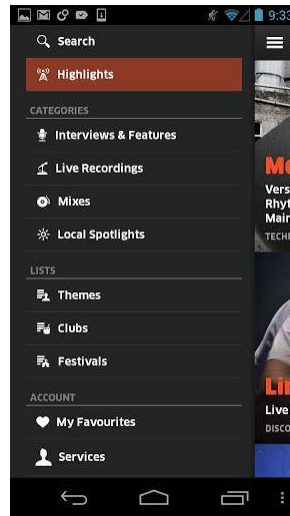


Figure 8. RBMA Radio Android App menu (2013)

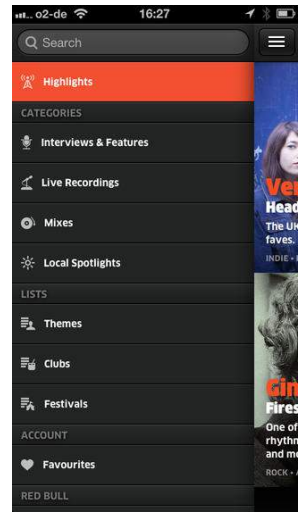


Figure 9. RBMA Radio iPhone App menu (2013)

It's interesting to see how mobile patterns are influencing web in general. Nowadays, it is common to see a "back button" on several websites or applications for desktop — Soundcloud (Figure 10) is an example — while it became an intrinsic

navigation solution on mobile, even there's a history back button in every browser. Also, the off-canvas menu is a trending practice these days. Even though, sometimes, without any advantage on a desktop screen size, but it visually cleans the front page. Google Nexus 7 website (Figure 11) is an example of a "mobile first" approach, hiding functions that could be immediately accessible. There is a lot of unused space in the white bar at the top edge, but they decided to hide the menu. It is important to note that it's probably an influence of flexible design, which will be discussed later.

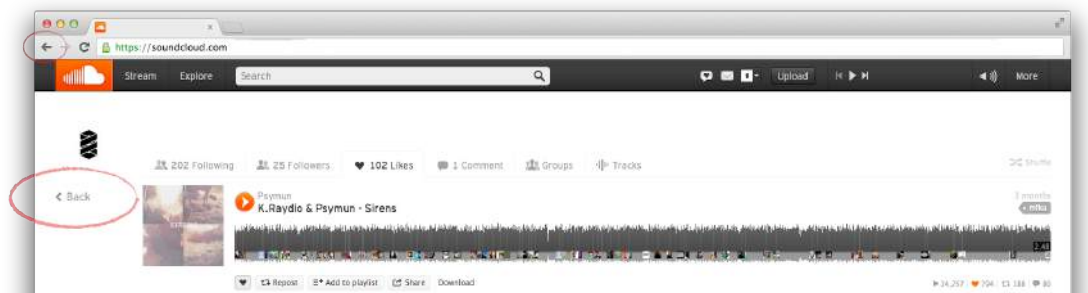


Figure 10. "Back button" on Soundcloud Web App and browser's history back button. (September, 2013)

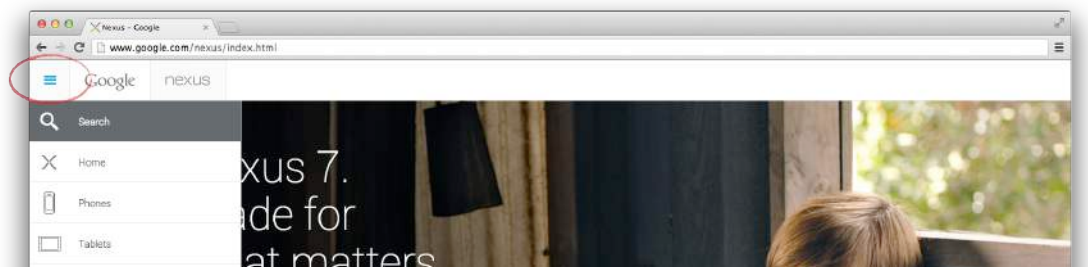


Figure 11. Google Nexus 7 website — button similar to many mobile applications (September, 2013)

It's far from a proper resume of what have been done. But probably another thesis might be needed just to study that. As it's not plausible to show all patterns on this paragraph, and it's not the main subject of this study, these are just few examples of very common solutions applied on mobile design. Nevertheless, Neil (2012: 2) points essentially seven primary navigation patterns:

— **Springboard**

Similar to iOS home screen, e.g.

— **List Menu**

Such as the examples shown before.

— **Tabs**

Normally horizontal bars with several options

— **Gallery**

Usually for photo albums or collections, disposed as a grid.

— **Dashboard**

Probably the most completed, showing to user great part of information needed, without menus.

— **Metaphor**

Use real world similarity conducting user to easily understand a function.

— **Mega Menu**

Similar to springboard menu, but usually more focused on important categories user may want to use first. Icons are big enough to catch user's attention and make it easier to remind.

And, as secondary navigations, Neil points three main solutions:

— **Page Carousel**

User swipes left or right to navigate through different pages. It is common to use as much dots as the number of pages to tell user where he is.

— **Image carousel**

Similar to Page Carousel but usually, when a user opens an image on a gallery, swiping to left must led him to the next one.

### — Expanding list

Opens subcategories on a list menu.

There are several other patterns<sup>14</sup>, namely for: Forms; Tables and lists; Search, sort and filter; Tools; Charts; Invitations; Feedback and affordance; Help. But the ones found most relevant for Instant Places case will be highlighted during this study.

## 2.4 — Mobile vs. Desktop

Smartphones are approaching to laptop / desktop computers, when we analyse some technical specifications: processors, screen resolution, network connections, storage, etc. Although, according to David (2011), it's already fair to put both devices at the same level. Smartphones are now little computers we carry on our pocket and fit our hand's palm. However, the utility is different from a computer. It can be compared to a Swiss Knife, since we are using it for all kinds of tasks on our everyday lives. Thus when it comes to design an interface for it, there is a set of factors that makes it different from a laptop / desktop to take into account.

Wroblewski (2011) warns that designing for mobile means designing for its reality. When conceiving a mobile-based application, everything should be done to improve performance. The main focus on this project is how to design graphical user interfaces for tangible small screens. Although, it is important to analyse what factors may cause a decrease on the experience, and avoid them. Interface design is also about animations, effects, and little “tricks” not just to make the product look better, but also to guide the user and improve the pleasure of using it. But implementing it may cause lower performance and it should not harm the experience. There are some differences that may influence the design of interfaces for mobile platforms instead of desktop ones.

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<sup>14</sup> More used patterns can be found on: NEIL, T. (2012). Mobile Design Pattern Gallery. O'Reilly, New York

## Mobile

Smaller screen

Our fingers make the input

No “right-click”

Virtual keyboard crosses content

Less space to display information

Target elements need to be large enough for finger size to point

Nothing happens until the user really touch the device

Great variety of models and screen sizes. In each device, there’s an unalterable window size

Vertical

Inferior network connection

Weaker CPU

## Desktop

Bigger screen

Keyboard and mouse as input devices

Right-click

Keyboard is apart, all screen area free

Space liberty to display content

Elements and links can be smaller, accessible by cursor precision

Change a visual element when the mouse cursor is over it

A standard resolution of 1024x768<sup>15</sup> was established as standard for websites. Although, window may change size

Horizontal

Better network connection

Better CPU

Haitani (apud Moggridge, 2007: 221) refers he has developed “Zen Riddles” to articulate points in a way people would remember. The most core point was the riddle of “*How do you fit a mountain into a tea cup?*” which people argued, “*Well, you have to shrink the mountain*”. This is thinking like “More is better” — the desktop thought. The point is to start by thinking what really is necessary and not trying to fit all features in such less space.

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<sup>15</sup> Source: <http://gs.statcounter.com/#resolution-ww-monthly-200903-201203>



Budiu and Nielsen (2011: 7) point that small screens mean fewer visible options at any given time, requiring users to rely on their short-term memory to build an understanding of an online information space. This makes interactions harder. They give the example of comparative product research as a trouble, being difficult to find room for multiple windows or other interface solutions. However, it is not necessarily a bad thing. As we live in information era, which means we are required to process tons of visual “trash” everyday, designing for smaller screens might be a way to go straight to the point and synthesize that information. While websites often contain a wide range of content, mobile sites usually include only the most relevant functions and features. Ma (2011) warns that mobile site designs should give priority to the features and content users are most likely to need when viewing a site using a mobile device. Wroblewski (2011: 18) refers the natural constraints of mobile devices as a help to focus and simplify mobile experiences. He also points that solid information architecture principles, like clear labelling, balanced breadth and depth and appropriate mental models are fundamental to organize content on mobile. Although, it also needs to:

- Align with how people use their mobile devices and why
- Emphasize content over navigation
- Provide relevant options for exploration and pivoting
- Maintain clarity and focus

The Instant Places mobile application has some aspects that are not possible to be backed by previous research work. Although it's an application for smartphones, it works as an input to interact with a third party device. Some research on interaction between a smartphone and a Smart TV, and even Social TV offer important information, but interacting with public displays is not yet a common , therefore scientific studies are scarce. A lot of results of this research are based on usability tests and field studies.

## 2.4.1 — Touch influence

Designing complex interfaces for such small viewports<sup>16</sup> can mean a very hard task. However, one of the main features Steve Jobs presented when introduced the iPhone, was the use of natural gestures to manipulate a digital, touch-based, interface. Like zooming an image just by pinching or stretching with two fingers, e.g.. He also referred that it would be distributed without the typical User's Guide, claiming however it wouldn't be necessary. What Steve Jobs meant was the interface would be so intuitive that the user would know how to use it, even if he never experienced a touch screen before. It's true that his viral presentation video from 2007 spread over every media, and was seen by millions of people all over the world, and that helped to know how to use the iPhone and, consequently, upcoming touch-based smartphones. As Hooper and Berkman (2011: 18) observed, most of user interface paradigms from the desktop have been applied to mobile, not making use of gesture interactions, and based just on simply replace mouse pointer to a finger tap. Usually, it's the operating system itself that makes use of most touch opportunities. But in fact, we are witnessing a steady growth in the use of tangible smartphones capabilities. Likewise, there has been an emerging development focused on user and experience improvement. Almost everyone was fascinated by iPhone's presentation in 2007 because the interface had a kind of "magic factor" implicit.

One of the main differences to desktop, designers must care when designing a user interface for mobile, is the extinction of mouse "hover" technique, like referred by Scott and Neil (2009: 85). On touch screens, is impossible to make an element change visually just pointing the cursor to it — when a button is touched, it's expected to immediately do something, but on a desktop computer, it is possible to make an element react when a user points the mouse cursor over it, without clicking. However, there are other ways to make use of this technique on touch-based devices, but it involves more actions from the user. Here are two examples:

— The hidden element that supposedly shows when we point the cursor on a computer, on a tangible device is shown when the user taps the element for the first

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<sup>16</sup> Available screen area for the digital interface

time, but needs to tap it again to make an action, what may annoy the user. The advantage of this is that an element automatically reacts without any influence and gives user a hint to understand what the specific button does.

— Other technique makes the use of natural gestures, a common approach since the introduction of tangible devices. It's a very useful solution when there is so much less space to display information on a screen. Some applications like Mailbox (Figure 12) are using gesture-based interactions instead of buttons to replace visual elements (in this case, buttons) and give space to relevant content. The new iOS7 Mail (Figure 13) App or Facebook Messenger (Figure 14), for example, use the swipe gesture to show more options. This technique might be used to reveal a hidden element and then close it automatically when dropped. It may require more action, but when it's necessary to have many features on a small screen, it is seen as a good solution. Although, Operating Systems themselves make use of gesture-based interactions for, e.g., go to previous screen (like iOS7 does if you swipe from the left edge instead of touching the "back" button). Designers must keep in mind what areas of the interface will be (or won't be) affected by native OS interactions.

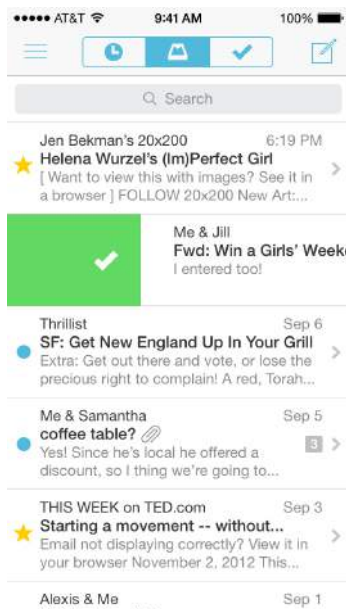


Figure 12. Mailbox app (swipe to mark as read)

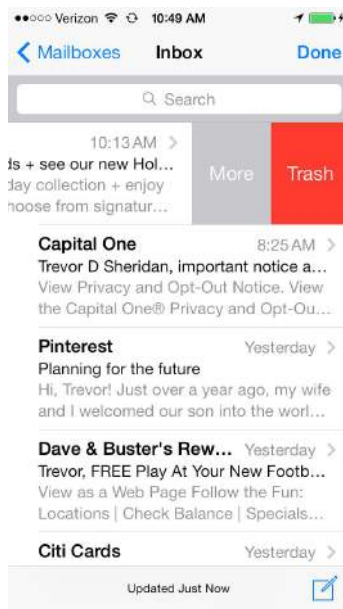


Figure 13. iOS7 Mail App (Swipe to reveal options)

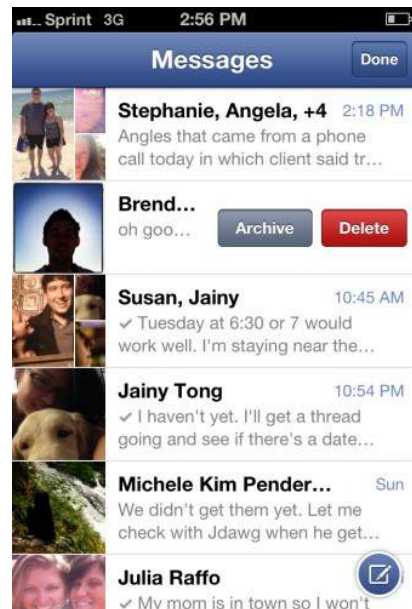


Figure 14. Facebook Messenger app (Swipe to reveal options)

The iBooks app for iOS has no button to turn the page. Instead, it uses the metaphor approach to indicate that feature. It is expected that users turn the page by swiping left or right with no visual indication for that (it eliminates visual elements from the screen freeing more space for content). Basically, it makes use of instinct and user learnt experience.

We also can take advantage of device orientation. Almost every video App, like *Youtube* or *Vimeo*, automatically changes to full screen mode when we turn a phone to horizontal perspective. It allows user to focus just on video content, when he wants, turn the device again or tap the screen and the interface shows navigation options again.

Ma (2011) refers that there are many people who believe the basic principles and guidelines applicable in website design should still be applied for mobile platforms. In fact, today's web standards are a lot more different than the basic text-based HTML known from 1990's. The Usability Analyst also wrote that design of mobile websites is still in its infancy. New principles and best practices will arise as this field on design continues to evolve.

## **2.5 – Limitations**

### **2.5.1 – Designer vs. Developer vs. Technology**

Designers are sometimes conditioned, whether it's because of technical issues, financial resources or even by the client's (or whoever asked for the design) impositions. In the case of Instant Places, it was decided that, rather than conceiving a native mobile application for each operating system, it would be built a hybrid one, under web technologies, namely HTML5.

This title doesn't mean a conflict between designers and developers but that both should work as a team in order to conceive a pleasant looking interface yet easy to use and stress-free for the final user. In short, there are many factors that make a piece of software a good or bad experience, however the two expertize areas complete each other (see "Form or function?" point). On the other side, both designer and developer might have an opponent in common: Technology. It's certain that, nowadays, it evolves at a stunning velocity. Yet, it still imposes some limitations, moreover when we're committed to create an application transversal to the majority of available devices.

## **2.5.2 – Performance**

There are technical considerations we must take into account when designing for mobile. Though mobile devices are similar in specifications to the desktops of yesterday, they are still not as powerful as today's desktops (Rischpater and Zucker, 2010: 13). These authors advise to keep an eye toward the limited resources available for mobile — memory, both dynamic and non-volatile are limited; the CPU is also typically less powerful than that available on a desktop. Although speed is an important issue, it's not just on mobile. Wroblewski (2011: 24) refers the tests done by Amazon, Yahoo!, Microsoft and others which suggest that even very small delays on desktop can turn users away. He also points that long-term studies by Google show that slow performance has lasting effects, reducing people's activity for five weeks.

## **2.5.3 – Native, Web, Hybrid**

It was decided by Instant Places team to develop the mobile application under HTML5 technology, compiling it into a Hybrid application to run across devices. For

clarification about Native, Web and Hybrid applications, Seven (2012) marks the following points:

— **Native Apps**

Are built for a specific platform, with its SDK, tools and languages, typically provided by the platform vendor (e.g. xCode under Objective-C language for iOS, Eclipse uses Java for Android, Visual Studio requires C# for Windows Phone)

— **Mobile Web Apps**

Are built with any server-side technology (like PHP, Node.js, ASP.NET) that render HTML

— **Hybrid Apps**

Like native Apps, run on the device, and are written with web technologies (HTML, CSS and JavaScript). Native apps run inside a native container, and leverage the device's browser engine to render the HTML and process the JavaScript locally. A web-to-native abstraction layer enables access to device capabilities that are not accessible in Mobile Web applications, such as accelerometer, camera and local storage.

One of the main problems in developing HTML5 is the susceptibility to system lag due to heavyweight JavaScript libraries. Cederholm (2010) points CSS3 as a solution to replace, in punctual situations, JavaScript, making use of its new properties to make animations and transitions, e.g., in order to conceive a lighter document, and economize the data and time needed to load. The main issue of using CSS3 is because it's part of HTML5 technology, which is not supported by older mobile devices in the market. Although, the latest devices, as well as the following ones are supporting this emerging technology and performance is tending to become better and better. Nevertheless, designers and developers must work side by side to conceive the most lightweight application possible. Hardware performance matters to a designer when he is projecting an interface because design choices can influence its functionality. It also has to do with hardware itself and its performance (which is referenced on

“Performance” point), so all these issues must be kept in mind to provide a better user experience.

## **2.6 – Conclusions**

A mobile device, namely the Smartphone is the new personal computer. Consequently, it means an all-new area for designers and developers to focus on. Most paradigms of web design and usability are known from the past, when the major Interfaces were for desktop computers. Those paradigms are changing, as the technology evolves and mobile devices are gaining ground over PCs. Most experts from the area began to advise a “Mobile First” approach, when designing a web product.

It is important for a designer to understand in what technology he’s working under. Like an architect needs to know in what materials a building will be conceived. He doesn’t do the engineer job, but it will dictate a successful and functional work. In mobile application development, designer must have some knowledge on hardware support and technology for the kind of software he is projecting. The discussion “Native vs. Hybrid” applications for mobile, e.g., can lead to new research. However, the most important issue is to understand constrains and opportunities to create efficient and functional products and avoid user frustration and stress.





### 3 — Principles of User Interface

The user interface of a system concerns itself with the system, the user of that system and the way in which they interact. It is composed by those parts of a system that are designed to be apparent and manipulated by the user and those models and impressions that are built up in the mind of the user in response to interacting with these features. Also, the user interface incorporates elements that are part of the user and methods of communicating information from one to the other (Barfield, 1993; 2).

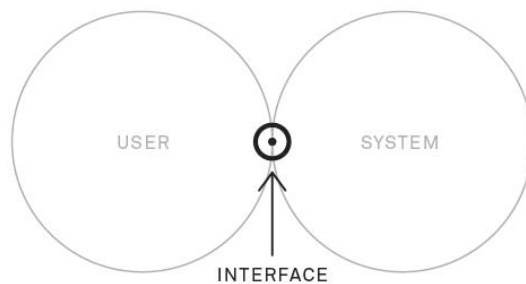


Figure 15 — Interface

According to Stone et al (2005: 3) computer science, psychology, ergonomics, engineering and graphic design are disciplines which all contribute to Human-Computer Interaction. Although, when users interact with a computer system, they do so via a User Interface. Good user interface design encourages easy, natural, and engaging interactions between a user and a system, and it allows users do execute their required tasks. It also make user forget he's using a computer system and get on with what he wants to do. The authors refer that what makes an interface good or bad is based on usability.

Designers always have to keep in mind the final user needs and wellbeing. Designing an interface isn't just about organizing information, but the context and how users carry their devices and really interact with the product is fundamental to a

good user experience (Hooper, 2013). As this study focuses on mobile devices, it's important to know how people utilize it.

It was hard to find a title for this dissertation because it is related to the experience of using Instant Places, but the definition couldn't be "User Experience". The goal of this work is to provide users the best tool to interact with the public displays — easily, intuitively and accessible — not being cause of stress or unpleasant experience. Although, User Experience is much more than a User Interface, so it's not viable to describe this work that way while there's so much left to fit that definition. Nevertheless, User Interface stills a hard topic to discuss every aspects of it. The main concern is to solve Instant Places mobile interface issue, identifying stakeholder priorities and give the best possible response.

At first, also as a landmark, the main goal was to make users start using Instant Places. Once again, it depended on several facts (as communication, marketing, etc.), yet usability is a common sense quality for any product to succeed.

Porter (2008: viii) refers the principles for successful social interface are the basics of human psychology. To web designers, tasked with increasingly sophisticated applications, it can seem daunting to get into these psychological issues. How do we make not only services personally valuable with easy-to-use interfaces, but also support people's social desire for interactivity, authority, reputation, identity and control?

According to Porter, the five stages of the usage lifecycle are:

- Unaware  
Includes who never used our application
  
- Interested  
Need an explanation of benefits before taking the plunge
  
- First-time use  
Where people decide whether or not to have a relationship with the product

— Regular use

People feel they're getting value from a product

— Passionate use

People really enjoy your product and share their knowledge about it.

In the 1950s and 60s, Abraham Maslow (apud Walter, 2011: 5), an American psychologist, discovered something we all knew but had yet to put into words: no matter our age, race, or station in life, we all have basic needs that must be met. Figure 16 shows Walter's interpretation of Maslow's Hierarchy of Needs<sup>17</sup>, which, according to Walter (2011: 6) can help designers to understand their goals when designing interfaces. The bottom three strata of the needs pyramid might be sufficient to "build" a product, but it's in that top layer that we can live a truly fulfilled life. "*Interface design is design for humans*" Walter adds.

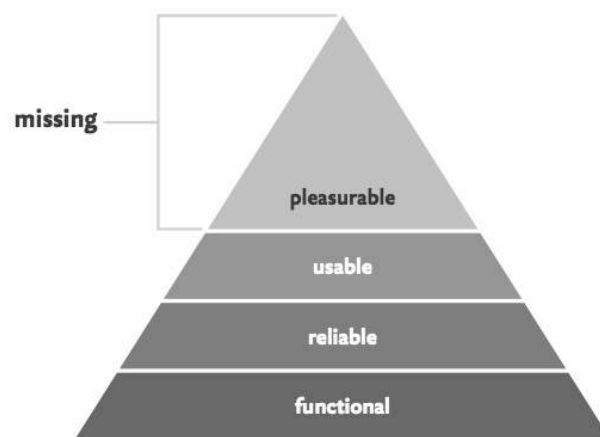


Figure 16 — Interpretation of Abraham Maslow's Hierarchy of Needs by Walter

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<sup>17</sup> Abraham Maslow's Hierarchy of Needs, from bottom to top: Physiological; Safety; Love/Belonging; Esteem; Self-Actualization.

***“Design is so simple, that’s why it is so complicated”***

— Paul Rand

This mobile application is distinguished from “single-device” apps we are used to. However, the *Display* part stills a limited prototype lacking design work, which is not contemplated here. We started by conceiving the mobile device application even with no concrete “*Display*” version, because the display works as a “diffuser” of content created by users through their devices, or generates information based on user’s preferences and interests. Thus, *Display* application design was influenced by the mobile version. It is also important to realize that future third party applications (which run inside Instant Places system) are responsibility of respective developers.

Hereupon, the following topics are related to what revealed to be relevant for creating a mobile application digital interface.

### **3.1 — Graphical User Interface**

A Graphical User Interface (GUI) of a computer system is composed by metaphors, images and interaction concepts that are used to express the functionality and meaning of the system on its screen (Horton and Lynch, 2004: 17). Graphic design and visual “signatures” should be used not only to give life to webpages, but graphic elements are part of User Experience. GUIs were projected for people to control their personal computers. Today, users expect a sophisticated design level on every graphical interface, including webpages and mobile applications. The goal is to satisfy user needs, adapting technology to them and not the other way around. Users may not be forced to understand (and overcome) unnecessary obstacles. Horton and Lynch also point, as one of the main problems for users, knowing where he is on a

webpage. Clean and coherent icons, graphic identity systems and a summary or general overview screen may transmit confidence to users in a way they find all they need with no wasting time. Users may always be able to go back to the main screen or other navigation point through enlightening and accessible links.

There has always been a place for the visual element in computing, from the linking of the CRT (Cathode Ray Tube) to the computer in mid-1950s, thus providing an image as a means of extracting information, to the recognition of computer graphics as a discipline in its own right (Baker, 1993: 10). More recently, the Graphical User Interface, with its insistence on the visual icon, has democratized Human-Computer Interaction for all users. The supremacy of visuals over text as a mean of interaction has been recognized not only in the realm of the personal computer, but also in workstations and all interactive digital environments. Also, visual recognition can be cross language, becoming a mean of communication with no borders (except when there are different cultural interpretations of a symbol).

The computer was originally designed to be a mathematical tool for manipulating abstract symbols — it was designed to be used by experts only accessible by the academic community and those with a considerable programming knowledge —, it was not until the television monitor was added that the result of computation could be seen. This visual, rather than written, result gave birth to the electronic image. The development was a radical one since the CRT had never before been associated with computing. As with many developments in computing, it was scientists working at MIT (Massachusetts Institute of Technology) who first made the breakthrough in showing how the television monitor could be hooked up with the computer, while data, displayed as a graph, could be photographed to 35mm film. Ever since this development, the computer became always associated to a visual display.

Ivan Sutherland, an MIT student, with his doctoral thesis ‘Sketchpad — A Man-Machine Graphical Communication Science’ is probably responsible for how we know (and interact with) computers nowadays, developing and prototyping an interactive computer system that laid the foundations of modern computer graphics.

Sutherlands's work showed how man and machine could begin to communicate graphically, and demonstrated that the interface between the user and the machine can be friendlier to non-computer scientists.

Baker also refer that PARC (Palo Alto Research Centre) had an important role in this topic. In 1979, "Alto" was introduced and began the revolutionary upward spiral that resulted in the personal computer. As already been referred, today's most personal computer is the small device we carry in our pocket (the Smartphone) with a small screen area and operated by finger touch.

Evidently, there's much longer history left than one transcribed here, but it's important to recognize the role of Graphical User Interfaces in HCI history, being that so ubiquitous in our lives. Hopefully, this thesis may help to improve how applications are designed for the kind of devices we now use more frequently.

## **3.2 — Usability**

According to Stone et all (2005: 6), Usability is defined in Part 11 of ISO 9241 standard as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use".

When vendors started to view users as more than an inconvenience, the term of choice was "user-friendly" systems (Nielsen, 1993: 23). However, Nielsen finds this term inappropriate, because he considers users don't need machines to be friendly to them, they just need machines that will not stand in their way when they try to get things done. Usability is one of the most important factors that software designers must take into account when designing a new user interface (Troutt and Sheiner, 2007; Nielsen, 2000). There are several facts that make a product usable, but certainly,

one of the principles is simplicity.

Usability is a qualitative attribute relating to how easy something is to use, more specifically, it refers to how quickly people can learn to use something, how efficient they are while using it, how memorable it is, and how much users like using it. If people can't or won't use a feature, it might as well not exist (Nielsen and Loranger, 2006: xvi).

Interaction Design Foundation ([interaction-design.org](http://interaction-design.org)) puts usability at the heart of user experience. All efforts should be focused on how easy the product is for the end user as this may dictate if he keeps interested or not. Still, this concept means different things for different people, many definitions and lists of rules set out to codify what constitutes a usable web site design, but they all have the same principle at their core: Users need usable products (Garrett, 2011: 48).

Lowdermilk (2013: 5) refers the most common and misguided presumption he finds, especially within the developer community, is that practice of usability is subjective. These developers believe usability decisions are arbitrary and can be decided by applying their own personal preference. In fact, the success of a product might be related to a user-centred approach, developing an application/software focused on what users really want. While taking into account the business/ marketing goals, it must respect the final user to succeed.

Nielsen (2012) states that usability is defined by five quality components:

— **Learnability**

How easy is it for users to accomplish basic tasks the first time they encounter the design?

— **Efficiency**

Once users have learned the design, how quickly can they perform tasks?

— **Memorability**

When users return to the design after a period of not using it, how easily

they re-establish proficiency?

— **Errors**

How many errors do users make, how severe are these errors, and how easily can they recover from the errors?

— **Satisfaction**

How pleasant is it to use the design?

The usability specialist also points that usability and utility are equally important and together determinate whether something is useful. It is worthless if it's easy to work, but has no utility. However it's no good if actually makes what a user wants but is difficult to operate. Usability plus utility is what makes a product useful.

### **3.3 — User Centred Design**

User-Centred Design (UCD) emerged from Human-Computer Interaction (HCI) and is a software design methodology for developers and designers. Essentially, it helps to make applications that meet the needs of a user (Lowdermilk, 2013: 6). UCD is not only about aesthetics or making things look pretty. It ensures that we examine how effective an application is in achieving its design purpose. According to the referred author, it is possible to have *“a stunningly beautiful application that’s a usability nightmare”*.

The data shown at “Why Mobile” chapter is just a sample of facts that demonstrates the necessity of studying and improve usability on digital interfaces for mobile devices. Mathis (2011: 19) mention that designers often point “human-centred” or “user-centred” as the main principal for their design process. It means they are constantly thinking about who will use their products and try to create the



best solution for these people, but in a vague sense. The “formula” to do this is hard to achieve, but it generally starts with user research or a focus group.

### **3.4 — User Research / Focus Group**

According to a famous Steve Jobs thought (1998), “(...) people don’t know what they want until you show it to them”<sup>18</sup>. Close to this idea Mathis (2011: 19) gives when references an interesting quote by Henry Ford: *“If I’d asked people what they wanted, they would have said faster horses”*. Designers should pay a lot of attention to market trends and forecast people needs. That’s where the term “designer” came from and this is what they are competent to do. Mostly people are concerned with other subjects, like using what someone has designed to them, instead of thinking what they might need. Said this, user research and focus groups are sometimes a vague idea because asking people directly what they want, can be frustrating and inconclusive. Also, there’s the routine, the habit and what people are used to. It may be deterrent to detect where the gap is and see what’s next.

Mathis (2011: 20) gives an example on how a focus group might fail. In de 1990s, Atari tried to compete with Nintendo’s Gameboy (that led the handheld gaming market) with Lynx. After talking to focus groups, the company decided to go forward with a device more powerful, with a colour screen and a faster processor. Also, they went with a huge case for the device, because people in the focus groups said they prefer a larger model. The device was a flop and nobody wanted one. The author contacted the co-designer behind it and asked him about this situation. He told him “One of the most valuable lessons I learned from the Lynx: never trust focus groups.” People said they wanted it big, but then it was too big to be what it supposed

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<sup>18</sup> in Business Week Online. Steve Jobs on Apple’s Resurgence: “Not a One-Man Show” May 12, 1988 — <http://www.businessweek.com/bwdaily/dnflash/may1998/nf80512d.htm>

to be: a portable device. This is why it can be treacherous. Usually, people are not able to tell how to solve their problems, or even be able to tell what their problems are. Plus, a web product like Instant Places has the potential to collect data and metrics from users to improve it. Instant Places is still testing the waters. And for now, we intend to give people a tool to express themselves and mark their presence at a certain local from their mobile devices to a public display. It involves several roles from different experts, but the mobile interface must encourage users to interact with the system, feeling it easy and secure.

### **3.5 — Form or Function?**

Perhaps one of the biggest issues for every Designer is to combine functionality/usability with beauty. Pearrow (2000: 3) believes the need of both qualities can be balanced, mentioning that truly great web sites are the ones that combine it. Although, he says, when usability principles are taken to the extreme, it can result in unsightly and anaesthetically unpleasant web sites, with no need for such extremes. When conceiving an interface, things should be balanced. Any of both areas, when applied in excess over the other often gives bad results.

Nielsen (2000: 11) considers that there are two basic approaches to design: the artistic ideal of expressing and the engineering ideal of solving a problem for a costumer. However, even the author feels the need of funny, beautiful and visually enjoyable experiences, usability must be the centre of any web project. “Usability rules the Web”, Nielsen starts to state. Otherwise, there’s still a need for inspiration and creativity. It isn’t just about having a search box, or an arrow to go back, or a dropdown menu, but the need to organize things correctly and quickly accessible by any user. According to the author, you get appropriate design ideas (and not just ideas for cool designs that nobody can use) when you watch users and see what they like,

what they find easy, and where they stumble. Good design ideas are gotten by following usability engineering methodology and steep in user reactions and data.

Nevertheless, Norman (2004: 17) has the opinion that “attractive things work better”. He reports that in the early 1990s, two Japanese researchers (Masaaki Kurosu and Kaori Kashimura) studied different layouts of controls for ATMs — Automated Teller Machines — identical in function, number of buttons and how they operated. But some had the buttons and screens arranged attractively and the others unattractively. The result was clear: attractive ones were the easiest. However, Norman also reports the study of Noam Tractinsky, an Israeli scientist who was suspicious about these results. He argued referring the Japanese aesthetic tradition is different from action-oriented Israelis thought. He made the same tests (with rigorous methodological control) in Israel and the results were stronger in Israel than in Japan demonstrating how attractive interfaces seems easier to use.

When it comes to the question of “form or function”, the answer must be “both”. In the end, both qualities should be connected and complement each other.

### **3.6 — Ergonomics / Human Factors**

According to Clark (2010), designing for touchscreens demands thoughtful awareness of where fingers are positioned while using a mobile device. Mobile devices mean handheld devices, which we carry with our hands while handling them.

Why it’s an important issue? We want users to feel comfortable using our application, so we should not force them to an extra effort for our sake. Smartphones are conceived to be handheld devices, to use with a hand (Wroblewski, 2011 and Clark, 2010), fitting our hand palm and operated with our thumb. Clark also writes: “(...) *your project is not only a challenge of visual and graphic design but of industrial*

*design too. (...) There are honest-to-god ergonomic issues to account for*". Further on, we'll see which areas are considered the best ones to place main actions of an interface on a smartphone screen.

### **3.6.1 — Using One-Handed Mobile Touchscreen Devices**

A study made by Hooper (2013), observing 1333 people using mobile devices on the street, in airports, bus stops, cafes, etc. shows that 780 of these people were touching the screen to scroll, tap, type, or any other gestures to enter data, in three basic ways:

- Using just one hand — 49%
- Holding with one hand and interacting with the other — 36%
- Two handed — 15%

While most people use just one hand, many others use other methods. *"Even the least-used case, two-handed, is large enough that you should consider it during design"* says Hooper.

The difference between a desktop screen size and handheld computing has inspired many to explore novel software designs for data presentation, navigation and interaction on small screens (Karlson et al, 2006). Scholars at Human-Computer Interaction Lab — Computer Science Department, from University of Maryland considered the importance of usability issues on handheld devices and made a survey to understand it. They were looking for answers to the following questions:

- When do users of handheld devices use and prefer one hand vs. two hands?

- Which surface regions on a handheld device are more easily accessed with the thumb?
- What types of gestures are the easiest to make with a thumb on a handheld device?

Based on use patterns, there was no obvious winner between one hand and two hands usage, but we can read at their working paper: “(...) *user perceptions of why this is the case indicates that the interface is the culprit, rather than preference; they use one hand if at all possible and only two hands when the interface makes a task impossible to do single handedly*”.

Answers to these questions depend on user scenarios, which make very difficult to design well, but the scholars affirm that their study will lead designers to enjoyable and ergonomic devices from the outset. They concluded that users often interact mobile devices with only one hand and would do so if information management tasks better support single handed use. Also, the results suggest favourable regions and directions for movement and offer evidence that device size impacts performance. According to them, optimized target placement has the potential benefit of increasing the speed of device interaction, at the same time protecting against repetitive stress injury.

According to Wroblewski (2011), since the majority of people are right-handed (70—90%) and use their thumbs while operating a mobile with one hand, optimizing the application for right-thumb actions is a better solution. That means primary actions should be placed from the middle to the bottom of the screen and arranged from left to right. On the other side destructive actions like cancel or delete could be placed outside people’s comfort zone, making the user think twice if they really want to cancel or delete something.

As Pearrow (2000, 2) argues: any action that requires the doer to “stretch” unnaturally to accommodate an action or a thing is ‘*Procrustean*’. A label based on the Greek myth of Procrustes, “The Stretcher” who forced travellers to be fitted to bed. Since the product interface is difficult and uncomfortable, nobody would like to use it.

Clark (2010) observes that designing for touch-screen phones means designing for thumb, and points that they have limited range and flexibility. Only a third of the screen is in truly effortless territory — at the bottom of the screen on the side opposite the thumb. The author advises to place primary tap targets in the comfortable zone (Figure 17 and 18).



Figure 17 — Comfortable zone referred by Clark (2010)



Figure 18 — Comfortable zone referred by To (2013)

When holding a phone with just the right hand, the thumb naturally falls in an arc at the bottom left corner of the screen and it's hard to reach the top of the screen. Clark also points that it's an important reason why toolbars and navigation typically land at the bottom edge of mobile phone interfaces. We can't predict who will use the device if right-handed or lefty, placing actions at the bottom of the screen is more important than left to right. In Clark's words: *"frequently used buttons should occupy the bottom of the screen for easy tapping, while other controls should be nudged out of harm's way"*.

Where buttons should be placed on devices people operate with their hands is not just a matter of comfort, but it's important to notice that our hands will obscure

the visible working areas. Thus familiar older devices like calculators, cell phones, portable game devices, etc., had physical buttons placed where users don't cross the screen when touching them.

Wroblewski (2013) shared his notes from the *Design for Touch* talk by Josh Clark at *An Event Apart* in Seattle on April 2013 where the designer talked about how to consider ergonomics of designing for touch. As *Phone Guidelines*, Wroblewski retained:

«

- There are three ways to hold a phone: one thumb/one hand, two-hands/one finger or thumb, and two hands two hands/two thumbs. 49% of people observed using phones outside, used one thumb/one hand. But when you add in two-handed thumb use, you are looking at 75% of thumb use.
- The thumb zone: the most comfortable area for touch with one-handed use. This flips standard navigation controls from the Web on their head. The bottom is now the better area for important controls.
- Content at the top, controls at the bottom. This is a common industrial design convention that's now making its way to the software. We don't want our fingers covering the content when we are interacting with.
- Don't worry so much about left vs. right positioning, the important decisions are around top vs. bottom positioning of controls.
- Content at the top, controls on the bottom is an age-old industrial design pattern that allows you to make sure people can use controls without obscuring content.

- On Android, however, system controls are on the bottom of the device. To avoid collisions with these controls, Android recommends placing app controls at the top. This means our fingers often overlap content.
- On the Web, fixed positioning and limited height make fixed positioning controls at the bottom in mobile Web browsers harder. Some browsers also include their own toolbar at the bottom once again crowding out space. Instead a page footer navigation pattern can provide quick access to navigation controls with an anchor link at the top.
- iOS apps: controls at screen bottom. Android apps: controls at screen top. Web: controls at page bottom.

»

## **3.6.2 — Field Study**

A study was made on the field to find out how most people handle their mobile phones. There were neither questionnaires nor dialogue, just observing users in different type of contexts — where it could be an Instant Places display — and registering their behaviour when using their devices. People who are using their mobile phones for calls or just to listen to music were not included once there's no interest for this study. As our focus is on touchscreen devices, owners of this kind of equipment were the principle targets.

Two hundred smartphone owners were observed while handling their devices in different situations where it could be an Instant Places display to interact with — train station, train, metro station, metro, shopping centre and a coffee shop. It was



also noted if the person is seating or standing, trying to understand if it influences how they manipulate their phones or if their tasks require being stationary — Table 1.

● Sitting / ○ Standing

Local	1 Hand Use thumb		2 Hands Use Index		2 Hands Use two thumbs	
Train Station	○○○○●●○○●●		●●●●○○●●○○○		●●●●○○●●○○○	
41	18	9/9	15	8/7	8	6/2
Train	●●●●●○○●○○●		●●○○●●○○○○○		●●●●○○●	
27	11	8/3	10	6/4	6	5/1
Shopping Centre	○○○○○○○●○○●		○○●●●○○○○●		●●●	
28	14	3/11	11	6/5	3	3/0
Coffee Shop	●●●●●●●●●●		●●●●●○○●●●●		●●●●●	
26	12	11/1	9	8/1	5	5/0
Metro Station	○○○●○○●○○●○		●●○○○○○○●○○○		●●○○●●○○○	
41	22	7/15	13	5/8	6	4/2
Metro	●●○○○○●●○○○		●●○○○○●●○○○		●●●●●●●○○○○○	
37	16	8/8	12	6/6	9	7/2
<b>TOTAL</b>	46,5%		35%		18,5%	
200	93	46/47	70	39/31	37	30/7

Table 1 — Field study on how do people use their smartphones

Collected data shows that ninety-three out of two hundred people observed — which means 46,5% — use just one hand to hold and manipulate the device, touching the screen with their thumb. Nevertheless, 35% hold the device with one hand and use index finger to touch the screen. The remainder 18,5% use two hands to hold and interact with the device, mostly with both thumbs.

Although it wasn't asked what people were doing, once it could be considered privacy invasion, it was perceptible that most persons who were using the device with both thumbs seemed to be playing a game or sometimes typing text. And from registered data, the great majority of them were seating while doing this. Saying that people standing doesn't mean they were walking. However no user has been seen handling the device with two thumbs this while on the move.

Since the introduction of touch screens, it's usual to observe people using their index finger to point and touch the screen. However, as we noticed, people haven't lost their habit to hold a mobile phone with just one hand and use their thumb to execute actions. The reason why some users need both hands to use their smartphones may be related with the size of it alongside to how the digital interface has been conceived. As we noticed, most mobile applications have a navigation bar at the top edge of the screen.

It's clear that for normal usage, people tend to use just one hand to do all the work. It can't be forgotten that a mobile phone is designed to fit a hand palm and carried on a pocket. That's their purpose and manufactures conceive this kind of equipment to be extremely lightweight and thin to be as portable as it's possible, normally for quick usage. Physical buttons (except power/unlock one) tend to be placed at the bottom edge of the device for ergonomic reasons.

### 3.6.3 — Target Size

While there is less space to display and organize information on mobile devices due to its screen size, most visual elements need to be bigger than in desktop. Our fingerprint is much larger than mouse pointer, and tiny elements may conduct users to actions they didn't intend to. Plus, as we discussed on "Ergonomics" chapter, touch-screen interfaces targets must be optimized for thumb use on small touchscreen devices. Parhi, Karlson and Bederson (2006), concluded (and recommend) that a target size of 9.2mm<sup>2</sup> for discrete tasks and 9.6mm for serial tasks should be sufficiently large for one-handed thumb use at the same time it keeps buttons small enough without decreasing performance and user preference. Karlson (2007: 226) — who's work meets this area of interest and made a PhD thesis based on "One-Handed Mobile Computing" interactions and interfaces design — recommends a touchscreen target of 1cm<sup>2</sup> to support fast, accurate, one-handed selection. She reports the raw data analysed indicates that of the targets tested, targets 9.6mm<sup>2</sup> strike an effective balance between speed, error rate, and user preference for both single and multiple target selection. According to Karlson, data collected on the precise locations of thumb contact when users aimed for a target, together with user satisfaction feedback, indicate that targets as small as 9.1mm<sup>2</sup> may be equally efficient. However, she affirms, a safe and realistic guideline is to strive 1cm<sup>2</sup> targets.

*"If the way you hold the device dictates the place of controls, it's your finger size that dictates how big those controls should be"* (Clark, 2012). According to the designer and mobile pioneer, all platforms offer guidance to target size, but Apple is the most opinionated, pointing what Clark consider the best guideline for all mobile platforms — tap targets must have a minimum of 44 points both wide and tall. As Microsoft's Windows Phone UI Design and Interaction Guide suggest a touch target size of 48x48px, the equivalent of 9x9mm for a common 160dpi screen. Nowadays, there are several techniques to support multiple screen sizes and densities, but target sizes are suggested in a "real world" measure (like points and millimetres) to fit all necessary situations.

Still relatively to Wroblewski notes from Josh Clark talk (2013) (referenced on “Ergonomics / Human Factors” point), his notes on *Touch Target Sizes* were:

«

- The optimal touch target size is 7mm, based on the average size of human fingertips and pads. CSS2.1 defines a pixel as 1/96 of an inch. So 7mm should be 30 pixels. However, things aren't so easy because of dynamic viewports
- Pixels are variable in a dynamic viewport. To account for this we need to use 44 pixels, instead of 30. That's about 2.75ems.
- Apple mostly uses a 44 pixels rhythm to design the key apps in iOS. As long as you get 44 pixels in one dimension, you can use 29 for the other dimension. This creates a visual harmony based on a physical dimension.
- Think physically. Interfaces for the hand but of the hand as well.
- When you follow touch target sizing guidelines, you trade off density. That is, you end up with less room on the screen. That can be a good thing. On all interfaces, especially mobile, clarity trumps density.
- Simple is terrific but simplistic is not. Don't lose important complexity. Complexity gives our lives and interfaces texture. People don't want dumbed down interfaces. They want uncomplicated experiences.
- On larger screens, people assume the empty space must be filled. This leads to unnecessarily cluttered interfaces.

- On small screens, secondary information can be a swipe away. Use the principle of progressive disclosure to reveal information, as it is needed. Progressive disclosure” manages complexity by revealing it gradually.
- Extra taps and clicks are not evil when you can manage the performance issue. On mobile we might want to rethink our aversion to additional steps. As long as each tap is a quality tap that keeps the scent of information strong, it’s not a wasted tap.
- However be mindful of long scrolls that obscure what content is on a screen. Off-canvas elements can help you manage this.

»

According to Android design and development guidelines<sup>19</sup>, the smallest screen resolution of a touch-screen device is 240 pixels wide and 320 pixels tall (vertically). Since the problem is about minimum sizes, this measure (240 pixels) serves as a reference point to organize all interface elements. As explained later, on “Flexibility” chapter, UI elements — like buttons, images, text blocks, etc. — are designed in percentages to fit any device.

Since the layout of the mobile application will not change too much, there has been an effort to design all user interface elements in blocks, which adapt to the width size of the screen. Figure 19 shows an example of how does Responsive Web Design works.

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<sup>19</sup> Supporting Multiple Screens: [http://developer.android.com/guide/practices/screens\\_support.html](http://developer.android.com/guide/practices/screens_support.html)

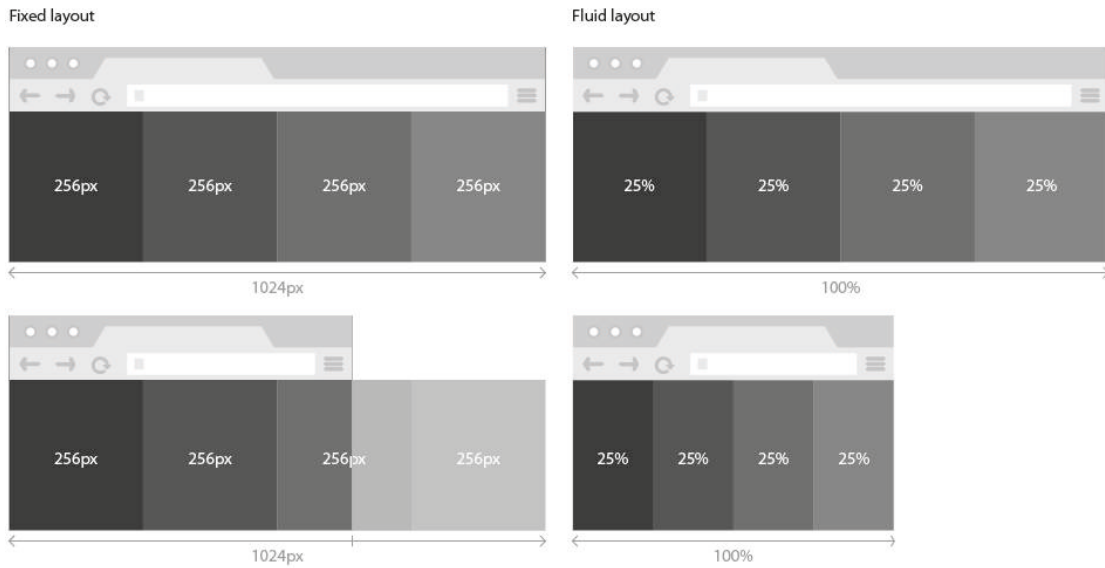


Figure 19 — Responsive Web Design example

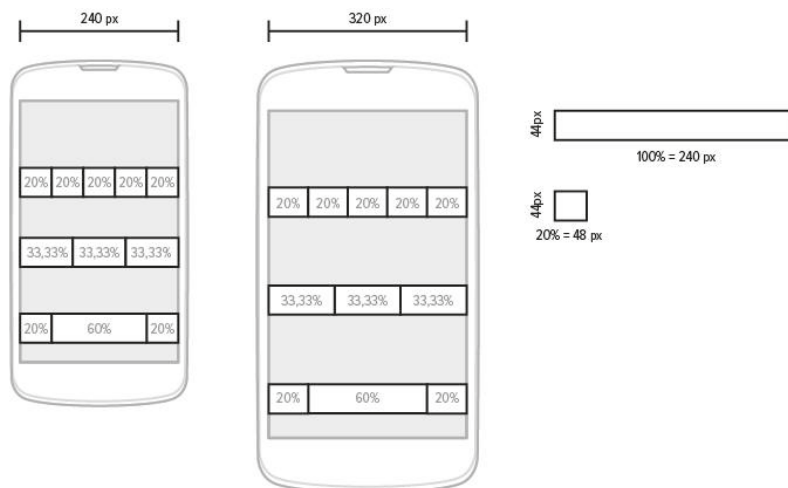


Figure 20 — Responsive UI elements / Minimum button size

Having 240 pixels as a landmark, the maximum divisions of a 100% width element must be five, which equals 20%, which in turn means 48px as minimum size. Portioning the total width in six parts, e.g., would make a 40px width target size, which is not “forbidden”, according to mentioned guidelines. However, we haven’t verified the need of more than five options for each interaction opportunity (on “Navigation” chapter is referenced why we should not have too many options), so it gives user a comfortable use for one-handed usage.

## 3.7 — Responsive design

Web design has been suffering a revolution over the last few years. With the evolution of mobile devices, and the fact that it's becoming the main personal computer for the majority of people who owns a digital internet-connected device, all the paradigms of designing a website for desktop are.

Fixed layouts are outmoded. However, this topic will not be detailed too much because this work is focused only on mobile platforms. Is important to emphasize that it could lead to a lot of discussion — many interesting work on desktop design (from Ethan Marcotte or Tim Kadlec, or many Smashing Magazine<sup>20</sup> or A List Apart<sup>21</sup> articles) is, unfortunately, left out on this document — but for our project we needed only to support multiple devices within the mobile category. Wroblewski (2012) refers that while it's true touch interfaces are increasingly present on small screen sizes, there's a lot of diversity even in this class of devices. The question of elements position within the smartphone screen gains more relevance with a tendency for bigger “small” devices. As seen on Figure 21, inside the smartphone category, device size may vary from 4 inches ( $\approx 10\text{cm}$ ) to 5.5 inches ( $\approx 14\text{cm}$ ).

The most plausible solution found for Instant Places mobile application (following some tendencies from the current mobile design scene, as the Flat Design introduced by Microsoft's *Metro Design Language*) aims to organize content as well as navigation options through divisions only fixed by height with an adjustable and flexible width.

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<sup>20</sup> <http://mobile.smashingmagazine.com/tag/responsive-design/>

<sup>21</sup> <http://alistapart.com/topic/responsive-design>





Figure 21 — Variety of smartphone dimensions

Many of Instant Places mobile application interface elements are displayed within blocks, divided according to how many options are needed. Although this may vary, almost every list of actions is displayed horizontally.

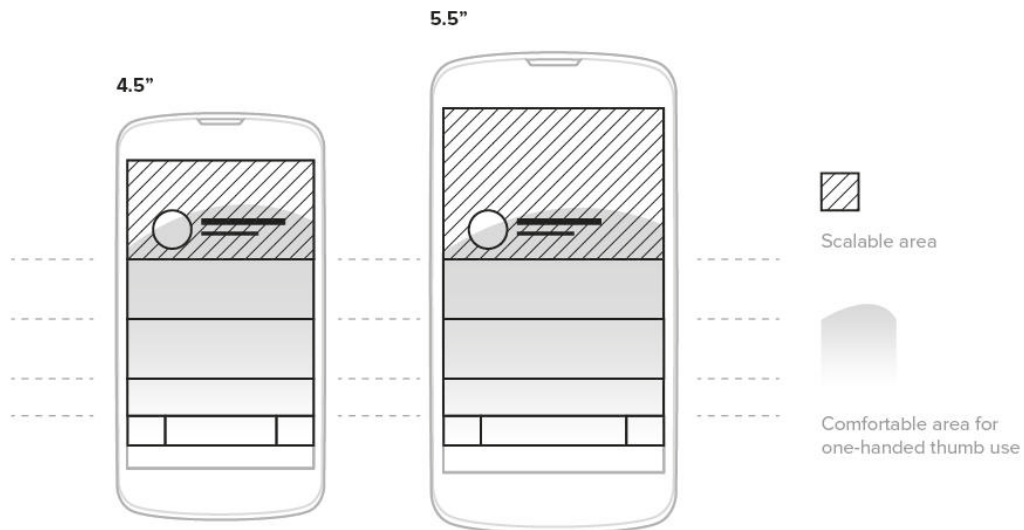


Figure 22 — Variety of Device sizes, and interface adaptation

While horizontally the elements width is proportional to screen width, height measures are, in most cases, fixed. Figure 22 shows how it should work: If a user owns a smaller or bigger device, his thumb won't grow. The solution is to scale elements at

the top, keeping bottom ones the same size, so it's still comfortable for one-handed usage whether it's a 4" phone or 5.5".

## **3.8 — Navigation**

Navigation is one of the most important issues on user experience (Krug, 2006; Kalbach, 2007 and Whittenton, 2013). Using as an analogy the subway, it could be like we wanting to go to a certain spot in town but, because the signage system misleads us, we ended up in the opposite. It can be really frustrating and time wasting. "Being lost is a fundamental human fear. We need to grasp our environment to a minimum level in order to feel secure. After going out, we should at least be able to find our way back home." (Smitshuijzen, 2007: 13) The same occurs in any digital interactive product. We might be able to get directions to our destiny, preferably quickly, but never forgetting the way back so we don't get to feel lost.

The two most important companies in the market — Apple and Google, which are responsible for the iOS and Android systems, respectively — suggest a pretty similar navigation solution. On iOS Human Interface Guidelines, Apple (2013) purpose that when you take an action, which changes the screen, you can go back to previous one by pressing de "back button". That means if you went through a way you regret, just give a step back. On the other hand, Android's navigation solution is quite similar (once you advance, you can go back), but has some differences: on previous versions of the system, the navigation through all applications relied upon the hardware Back Button that worked as iOS. It always allows user to go back, taping how many times he went forward. As the introduction of Android 3.0 in 2011, the company's Design guidelines indicate that navigation mechanism has two types of returning: the "Back" and the "Up" button. The "Up" button is used to go back step-by-step as the user goes deeper on sub-levels inside a concrete section. At the same

time, the “Back” button, which is provided by hardware can skip those “steps” and go directly to the starting point. The hardware Back Button on Android devices also serves to navigate inside the Operating System of the mobile phone itself.

Krug (2006) finds many similarities between looking for things on a web site and in the “real” world. It’s like exploring a physical space, but instead of following signs till our destiny, we click on hyperlinks. Usually, there’s a hierarchy based on groups and subgroups to organize all the information on a web site. Like, for example, a supermarket: When you enter the store, you start looking for the category of products — dairies, cleaning products, wines, etc. — then you look for subcategories, like red wine or white wine, e.g.. Web navigation works the same way. However, just like in physical world (especially a supermarket) the user/client is guided along a path created by marketing department leading him to feel the need to buy more products<sup>22</sup>. In other words, we might be able to conduct users to do what we really want them to do: use our product (however, it also depends on several extra factors). Once this object has been achieved, provide user the best experience inside the application.

Cooper *et al* (2007: 15) highlights the difference between Goal and Task/Activity — “A goal is an expectation of an end condition, whereas both activities and tasks are intermediate steps that help someone to reach a goal or a set of goals.” To stakeholders and members of the project team, a product might be a collection of features that offers users access to a set of capabilities. But to users, a product is a tool used to accomplish some higher-level goal (Anderson *et al*, 2010: 178). Tasks are steps a user goes through when using the product to accomplish his goals. Oftentimes, developers and usability professionals start the interface design process by asking: “what are the tasks?” Although this may be enough for a project to be concluded, it won’t provide a solution that distinguishes our product from the others, and might not be able to provide the best user experience. If we focus on goals, it will motivate people to perform activities. Cooper, and remaining co-authors, considers that understanding goals allow designers to understand user expectations and aspirations, which can help to decide which activities are truly relevant for the design.

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<sup>22</sup> There are several studies based on consumer’s behaviour used by marketing agencies to display products at a store with brand’s intention to guide people to acquire certain products.

Tasks and activities are useful at the detail level, but only after user goals have been analysed. Understanding user goals leads to understand the meaning of activities and thus create more appropriate and satisfactory designs.

***“Navigation is best when it’s not noticed at all. It’s like the officiating of a sports match. The referee may make dozens of good decisions throughout the game, and you may not even know he’s there. But with one bad call, the ref is suddenly the center of attention for thousands of booing spectators.”***

— James Kalbach, 2007

## 3.9 — Defining Features

Dick Costolo (Twitter CEO) at D11 conference (2013) was asked about the relationship between Twitter and Apple. He answered they see the company as a mentor when it comes to simplify designs. The goal of Twitter is not to add more features to the product but to remove what they can, making it simpler. This might be related to an “*all-in on mobile*” approach the company is adopting and the 80/20 law Firtman (2006: 61) refer — “*80% of your desktop site will not be useful to mobile users*”. Nowadays, user experience designers, who are projecting smartphone applications, must focus on which features really matter to the product. There’s only 20% of a desktop screen to focus and provide user the most direct and objective options.

“*Less is more*”. This famous quote by Mies van der Rohe serves the principles of designing smartphone interfaces. In 1995, Rob Haitani (apud Moggridge, 2007: 211) was responsible for designing the user interface of Palm’s Operating System. Haitani led his team in building a consensus for simplicity and pushing back against the pressure for feature-laden functionality. He developed a reductionist philosophy, and found that it allowed him to define the whole Palm OS. The ideas became ingrained in the attitudes of the original team of designers, who started to intuitively design to those four guidelines:

- **Less is more**
- **Avoid adding features**
- **Strive for fewer steps**
- **Simplicity is better than complexity**

Moggridge (2007: 213) refer this was the right approach in 1995, when the majority of products were trying to do too much. Products were not only too complicated, developers were also going in the wrong direction — trying to add always more functionalities and features.

Almqvist (2000) points: “*the best interface is invisible*” - as well as Oliver Reichenstein (2012), founder and director of Information Architects once said (for an

interview at The Verge<sup>23</sup>) - “*Good design is invisible*”. To sustain this idea, the digital media director argues that removing unnecessary elements allows the user to focus on performing a task and not on how it should be performed. Thus, it has a low or non-existing learning process. Simplicity is providing the right option at the right time and, according to Almqvist, it’s the hardest thing in the world to achieve. He also states “*A modern paradox is that it’s simpler to create complex interfaces because it’s so complex to simplify them. Information architecture is the challenge of our time*”. Because of that we assume in our humbleness, that when finished our design project, it’ll not mean the interface design work is finished. Many interfaces take several years to perfect and simplify (and remove features). Instant places must be kept as a work-in-progress project, constantly aware of user needs to improve its application interface and overall experience.

## **3.10 — Conclusions**

Before starting to develop any User Interface is important to recognize which problem are we trying to solve. Likewise, we need to know the limitations to solve that problem. In the case of user Interfaces for mobile devices, the problem is not just a question of information architecture. There are several issues to care before developing a design concept.

The User Experience is more complex than an Interface, but solving all these issues will certainly contribute to a more pleasant experience. The simple fact of avoiding user stress (due to bad performance, bad navigation, or any effort) is a great step to make him use our product again.

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<sup>23</sup> Full interview accessible at: <http://www.theverge.com/2012/7/24/3177332/ia-oliver-reichenstein-writer-interview-good-design-is-invisible>

PART 2

# **INSTANT PLACES**

# **MOBILE APPLICATION**

# **DESIGN**





## 4 — Wireframe

Before starting the application development, it is also crucial to define the navigation tree. To do that, we need to understand what services and information will be available for the mobile user.

Lynch and Horton (2004, 1) consider that previously planning a website and define its goals is the first step to take. This is the key to a successful result, especially if you are part of the development team. Websites — and the same is applied to mobile applications — are developed by a person or a group of people to satisfy others needs. According to the authors, unfortunately most projects are seen as a "technological problem" and are affected since the beginning by the enthusiasm of certain technics and plug-ins rather than real human or business needs. Otherwise, what will determinate the success level of an Internet project is the user. To reach that success, the project may be developed with the help of content specialists, copywriters, information architects, graphic designers, highly skilled technical and a producer. A website or application, to be successful, should be truly useful for the target audience, responding to their needs and expectations and the easiest as it's possible. They also point some fundamental basic principles when planning a website to obtain a great result.

### — Define your goals

Provide the most simple and easy-to-use interface. The fewer steps it takes to execute an action, the better it is. On his TED talk about “simplicity” in interface design, David Pogue (2006) refers that Jeff Hawkins, CEO of Palm<sup>24</sup>, have said that if a user needs to take more than three steps to complete a task (relative to Palm Pilot, the operating system of company’s devices) is too long and it needs to be redesigned.

### — Know your audience

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<sup>24</sup> Palm handhelds were Personal Digital Assistants (PDA), created in 1996, which ran the Palm OS.

Instant Places is a service that wants to achieve as many users as it can. Although we know that our main users will be young people, from 18 to 40 years old, already familiar with smartphones and its usability. Due to Instant Places characteristics, it is expected that most users are not familiar with public displays interaction.

- Content inventory

After the idea about the mission and global website structure are prepared, organize content and information. Creating an inventory or a database of existing and necessary content may force you to deeply analyse how to structure the application interface.

Each project is a different case but, according to Lynch and Horton the global process of developing a complex website generally follows six essential steps:

- **Definition and website planning**
- **Information architecture**
- **Website design**
- **Website development**
- **Marketing**
- **Tracking, maintenance and assessment**

The question that arises is: how do we define those goals and information? As referenced on “Focus-Group” point, users don’t know what they really want from this service, so product conceivers define the service own goals for users to concretize. In this case, the main idealized goals are:

- **Join Instant Places**
- **Interact with the *Displays***
- **Use it again**

Many mistakes were made till the final solution, but our concern has always been reducing steps user needs to take to interact with our system. Instant Places team decided to give users the possibility to create an account logging in with an existing

one, like Facebook, Google+, Twitter, etc. avoiding the need to create another one. Nevertheless, new users need to create an identity inside the system.

We also need to take into account in what situation a user opens the application, so it was divided in three hypothetical cases:

- New user or the device cache was cleaned (it forgets the username and password used before)
- User that logged out but the device remembers the username, so user just need to fill the password to confirm
- Already logged in (opens the application on search screen)

## 4.1 — Join Instant Places

The first screen, when the user opens the app on his device, is a “welcome” screen presenting Instant Places logotype and slogan. A new user might not be familiar with the product, thus he can swipe horizontally to navigate through a small tour/presentation about the product benefits, what Porter (2008: viii) refers as the interest stage on a usage lifecycle. The adopted solution for it was a page carousel, as referenced by Neil (2012: 30), to navigate quickly a discreet set of pages using the flick gesture with no need to jump to a different page. The *page control* (small dots below) displays an indicator dot for each currently open peer view in an app (Apple, 2012: 179). It also works as a hint to tell user there’s more content on the sideway.



Figure 23 — First screen and tour

A user who never signed up before on Instant Places, takes only two screens until is finding a *Display* to interact with:

1. Enter username and password from the account he chose
2. Add a profile photo (unrequired) and type a name (required)

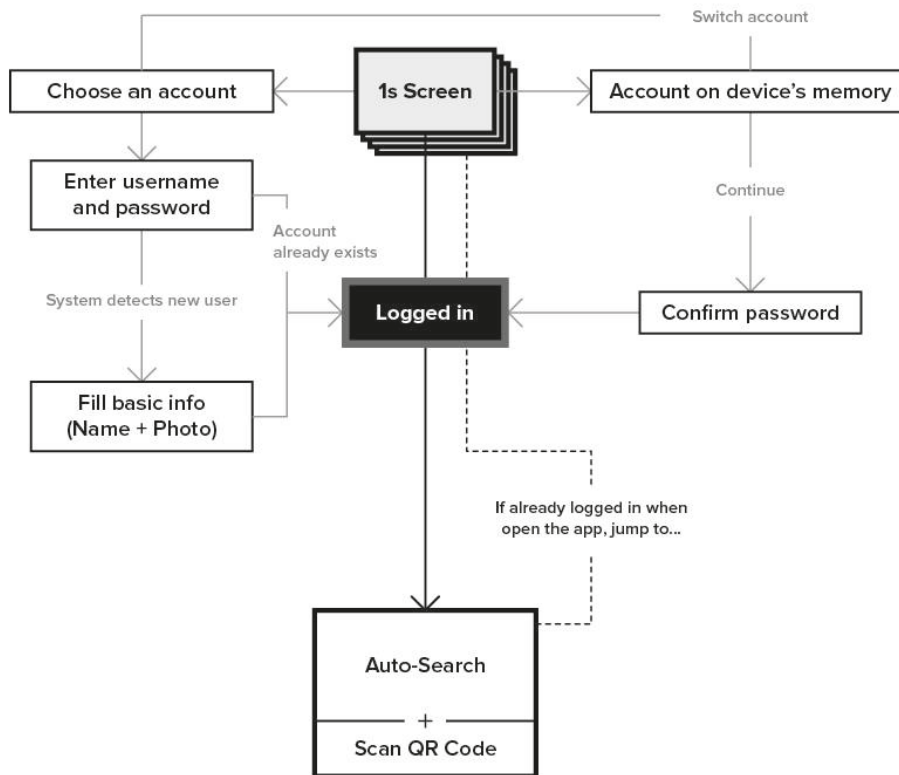


Figure 24 — First steps till searching a *Display* nearby

It's important to note that usability tests have their fundamental role during an interface development process but nevertheless the designer puts himself on end user side and tries to identify which steps or options are useless, to rearrange the work, trying to reduce as many errors and mistakes as it's possible on a usability test.

## 4.2 — Connect to a Display

During the design process, there was a big effort to understand hypothetical user's behaviour in different kind of situations, as well as which ways/options we can provide them. As we see on Figure 24 (and continues on Figure 25), after a user is logged in, it all starts at a screen searching *Displays* nearby. However, a user can scan a QR Code available close to the *Displays*. In that situation, it asks permission to

connect directly to that *Display*. Tapping yes, the user is connected and now can interact with the system. We also have to take into account if a user wants to cancel (it might happen for several reasons). To do this, he just needs to touch the centre of the screen and go in the same way as no *Displays* were found.

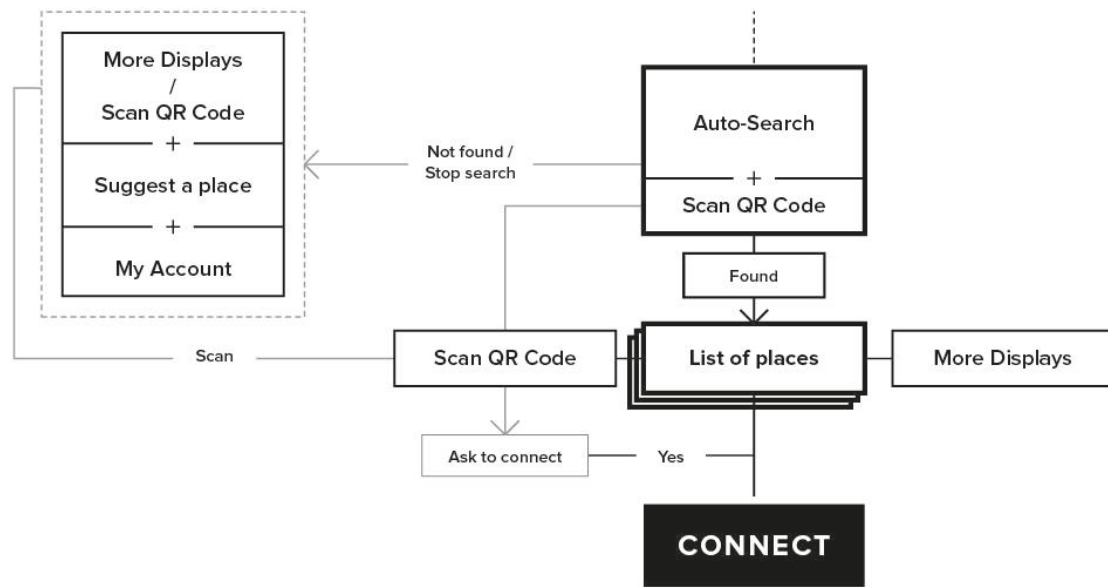


Figure 25 — Since searching for a *Display*

If the application haven't found any *Display* around — or a user cancelled the search — four options are given:

- Option to scan a QR Code;
- Search *Display* in a bigger perimeter (usually it is given a very short distance, since it's a location based application). In fact, a user can't interact with a distant *Display*, although Instant Places team decided to give users the hint that there are more places with a *Display* to interact with;
- Suggest a place.

User can write a message with his location attached to suggest a place where he would like to have Instant Places service;

— Personal account

If there are no places around, a user might want to manage his account. He can find several aspects of his activity in Instant Places system, like his posts, comments, pins, etc.

If everything happens as is supposed, a list of places nearby is shown. There is a list of how many places were found near the user location. Each one has the *Display* name highlighted and a “Connect” button (Figure 26). Yet, there’s a small arrow below the *Display* name informing user there’s more information hidden. Tapping it, information — like location and how many users are connected at the moment or how many posts were done recently, etc. — is expanded and can be closed if user taps it again. Since the “connect” button is tapped, a user is connected to the *Display* and ready to interact.

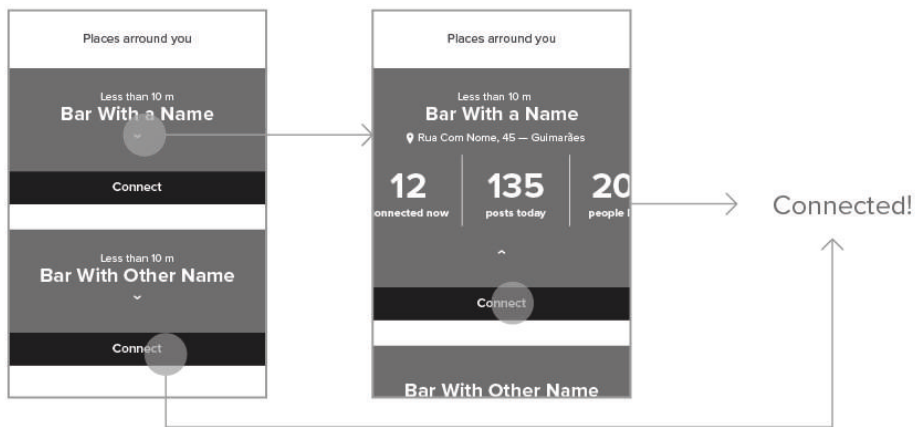


Figure 26 — *Displays* found

The reason of a “list view” choice is due to several facts. To facilitate user’s connection to the system, the first idea was to highlight the nearest *Display* with all the information visible, a flashy “connect” button and a “back” or “cancel” one. It is only viable if the application just finds a unique *Display* around. Technical issues made it not possible because geolocation may not be precise. As an example, if a user is at a

certain spot — a coffee shop, a restaurant, etc., — equipped with an Instant Places display and there’s another one in the same perimeter, like on the other side of the road, there is the risk that the first *Display* shown doesn’t match the exact user location. On an airport, e.g., it is possible to be more than one *Display* in the same place. A list view, with all *Displays* found provide user control over which *Display* he intends to connect. Hereafter, users will be allowed to publish content on various *Displays* at the same time, but it depends on extra applications<sup>25</sup> inside Instant Places.

Tapping “connect” button, a user is now able to interact with the public display. When a user is connected, the screen he faces on his personal device always was a concern — we wanted users to feel they have joined the *Display*, they can manage their “persona” and can interact in some way with the public display. The solution aimed to put all this information right accessible to users. This is just a wireframe of the app structure, but on top there’s a profile division, where the background image (created by place owners for the place’s profile) helps to “remind” a user which *Display* he is connected.

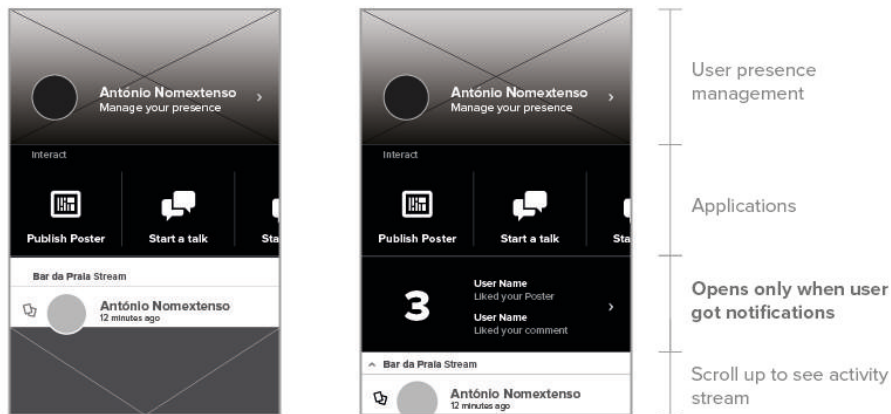


Figure 27 — Connected

On Figure 27, is visible that Activity Feed appears below the Apps panel. Thus, the user has access to it by a simple scroll up. On the right, there’s how it looks when

<sup>25</sup> Other developers might create more applications to run inside Instant Places system. Later on it will dictate more features of this service.



user has notifications — someone interacted with him in some way: the activity section falls a little more to show user notification alerts. “*Simplicity is providing the right option at the right time*” as cited before, according to Almqvist (2000). If user got no new notifications, there is no need to occupy that space.

## 4.3 — Activity Feed

Instant Places’ Activity Feed is what keeps user up to what’s going on at the *Display*. Crumlish and Malone (2009: 125) refer that the primary principle to care when designing presence interfaces is to maximize opportunities for users to declare themselves present to one another. For the authors, it depends on few actions user or system can take:

- Publish presence information
- Displaying current presence status
- Displaying a timeline of recent presence items
- Maintaining a history (partial or complete) of past presence declarations
- Providing users with a way to subscribe to presence updates
- Providing users with a way to filter presence updates

The idea behind this private-public issue we had between the personal device and the public display was to pick what’s happening on the bigger screen and transport it to our small personal device. Once again, it will depend on what app generates the content. As an example: if other user publishes an event, which is in a poster format on the public display, it might provide you, as a receptor, to keep the date, hour and location of the event. Likewise, if the post is a video, you might have the option to save it to watch it later. It all depends on which apps are to be created.

Figure 28 shows an example of something that was published on Instant Places

Display presented on mobile application and more information and interaction options are shown. Although, on personal device, user has the control to view more than what is on public display at the moment. Like earlier publications, e.g., or any other content posted on the *Display* for a given period. The idea of including filters is being studied, although the volume of publications expected during the first times doesn't justify such option.

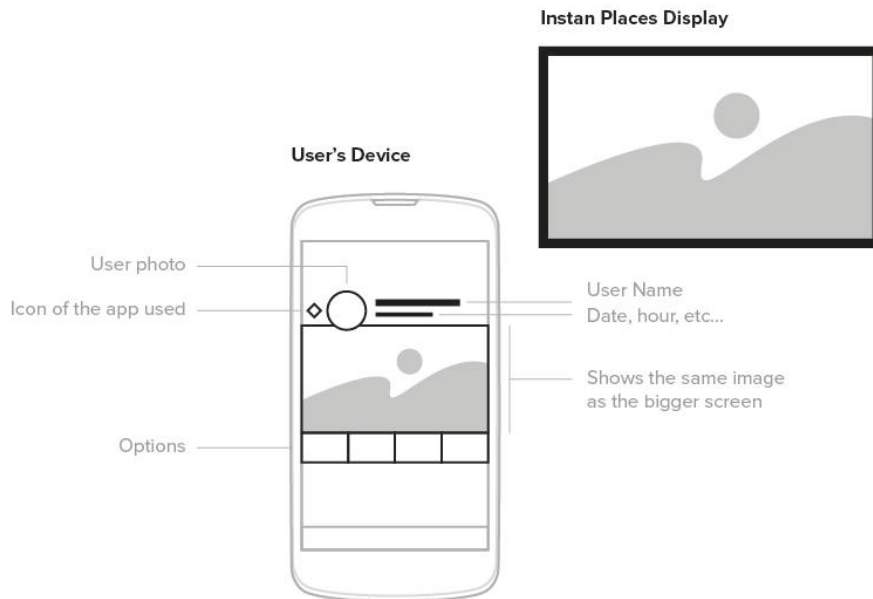


Figure 28 — From *Display* to personal device

If a user wants a better view on his device of what is presented on the display, turning the device horizontally gives a bigger view proportionally fitting screen width. Thus options appear on the right side, respecting the same target sizes, although vertically (Figure 29).

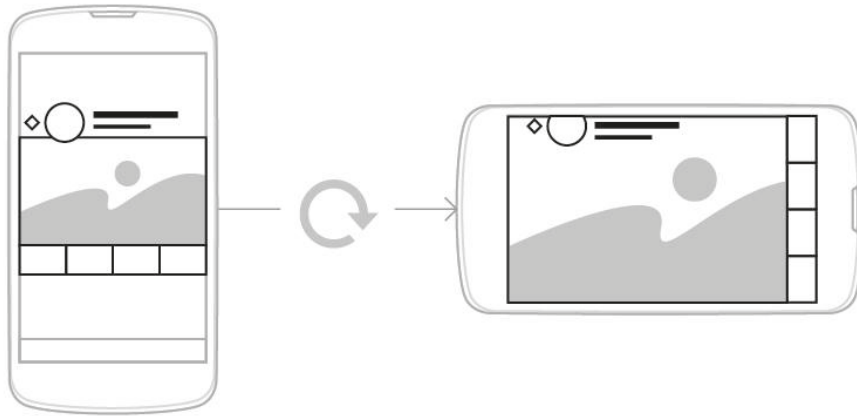


Figure 29 — Rotating the device

If a user wants a better view on his device of what is presented on the display, turning the device horizontally gives a bigger view proportionally fitting screen width. Thus options appear on the right side, respecting the same target sizes, although vertically.

## 4.4 — Presence Management

After one of our goals is achieved (user is connected to Instant Places), it's time to make the user do something on the *Display* — publish an image, a video, start a conversation, etc. — and also manage his identity at this place (mark his interest pins for example). The ability to control user's identity presentation is a core element of building a social service (Crumlish and Malone, 2009: 82). People want to control their digital portray. However it's something that is created over time, not only by pinning some subjects of interest, but during the relationship between the user and his social interaction with other users through a certain *Display*.

## 4.4.1 – Navigating Inside Sections

Building on the example of Presence Management, on Figure 30 is shown how navigation should work inside each section. Entering presence management, user has access to his activity on the particular place *Display*, as a timeline. On each post or any activity log, user is able to review the feedback he had or the generated discussion, etc. Navigation inside a particular section, works as is visible on Figure 31 — when user hits the centre block of the bottom bar (which describes where in the application user is) open a hidden menu where different subsections appear. This navigation solution meets the needs of positioning ubiquitous navigation buttons at the bottom edge of the screen putting all possibilities there.

In fact, it follows the studies and advices given before for smartphone’s digital interface design plus solving the “back button” issue, which is suggested by both Apple and Google’s Android to be positioned at the top left corner of the screen, which is proven the hardest area to reach with a normal one-handed use of the device.

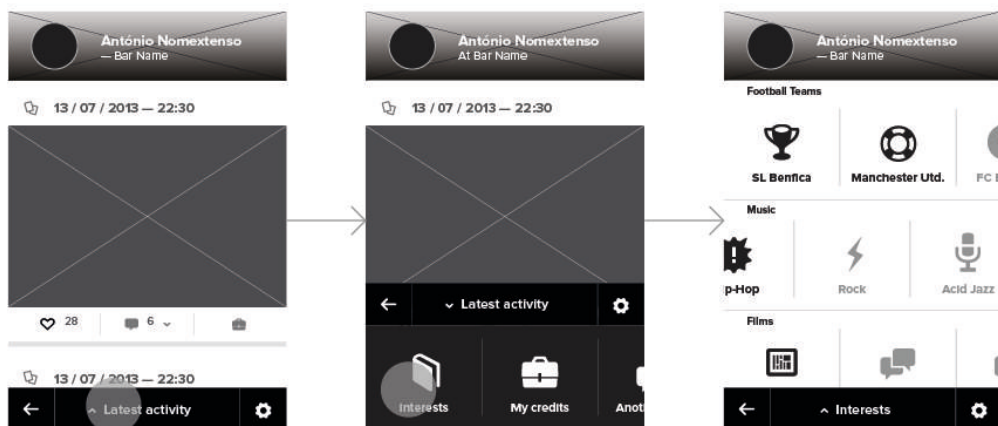


Figure 30 — Presence management

To navigating inside the division in question, a user pushes the hidden menu

at the bottom and touches which subdivision he wants to go. In some sense, it follows “step” and “paging” navigation Kalbach (2007: 55—56) refer.

During usability tests, it was noticed that “going back” might confuse some users. However, they found nothing to concern and rapidly understood how it works. Wilson (2010: 7) points *Learnability* as the most fundamental usability attribute, because the first experience a user has with a system is to explore it and learn how to use it. The cause of some misunderstanding was verified when a user selects a subdivision and then choose “go back” hoping to give a step back for the previous subdivision. What the back button does is to leave the “mother” division, to the main menu, for example — Figure 31 provides an example.

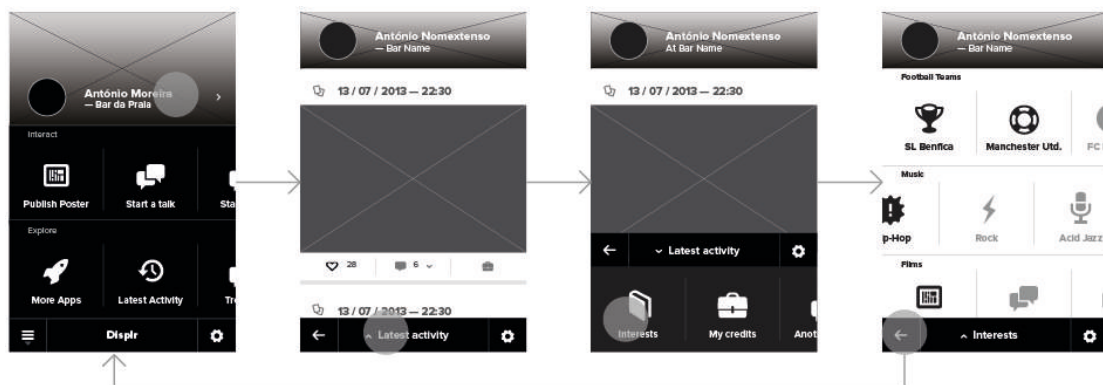


Figure 31 — Navigating inside divisions

## 4.5 — Apps Panel

Bellow user profile, there's de applications panel. To encourage a first-time user to explore interaction opportunities, two or three default applications are displayed. Last division with a "plus" sign, calls user to explore more. Then he can

manage which applications are available to use on the *Display* in cause, which one(s) he wants to add to his collection and organize them (can choose which applications appear first the next time he connects to a *Display*). On Figure 32 is perceptible how the panel works. The panel works as the shelf to put favourite apps, which can be organized by order, deleted, added.

It must be noted that most interactions between a user and the *Display* (or with other users, using the *Display* as a vehicle) will be made through third party applications, running on Instant Places system. This interface provides the user a tool to manage his personal activity.

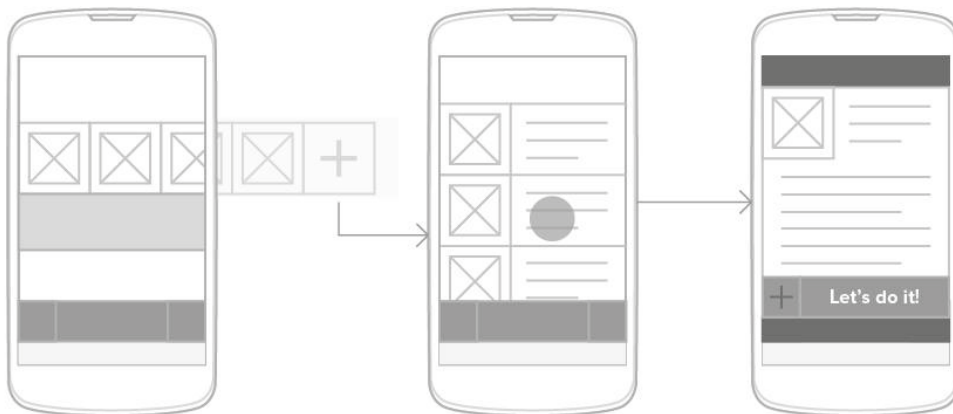


Figure 32 — Applications Panel layout

## 4.6 — Menu

When user is navigation through the Activity Feed, is essential to get access back to the main Menu, in other words, access to his Presence Management; Apps Panel; Notifications Centre; Place Options; and Settings.

How do users get access to this Menu? It is just one tap away. As we saw on

Figure 27 half the Menu is show when a user connects to the screen, and there is the Activity Feed to “pull-up”. When user scrolls up, an icon appears at the bottom left corner of the screen (Figure 33). Respecting the recommended measures for a touch-screen button, it lies at the bottom left corner freeing almost every area of the screen to display content, as Wroblewski (2011: 18) suggests — *“Emphasize content over navigation”*.

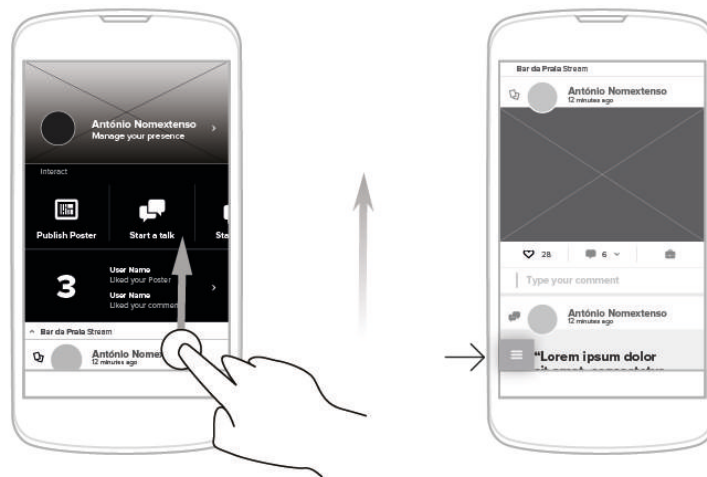


Figure 33 — Accessing Activity Feed and Menu button

As it's easy to access the Menu, getting back to Activity Feed just needs a tap on the same icon, which doesn't change its position. This navigation option is similar to those discussed on “Mobile Patterns” chapter. Menu composition and options are show on Figure 34.



Figure 34 — Main Menu

## 4.7 — Navigation overview

The next diagram (Figure 35) shows the navigation flow as the following images represent a layout of each step. Between this process and the final design, some changes were made, but never influencing what is discussed before, like button sizes and position. The same layouts were used to make the Tests presented on the next chapter (“Testing”) through an interactive prototype.



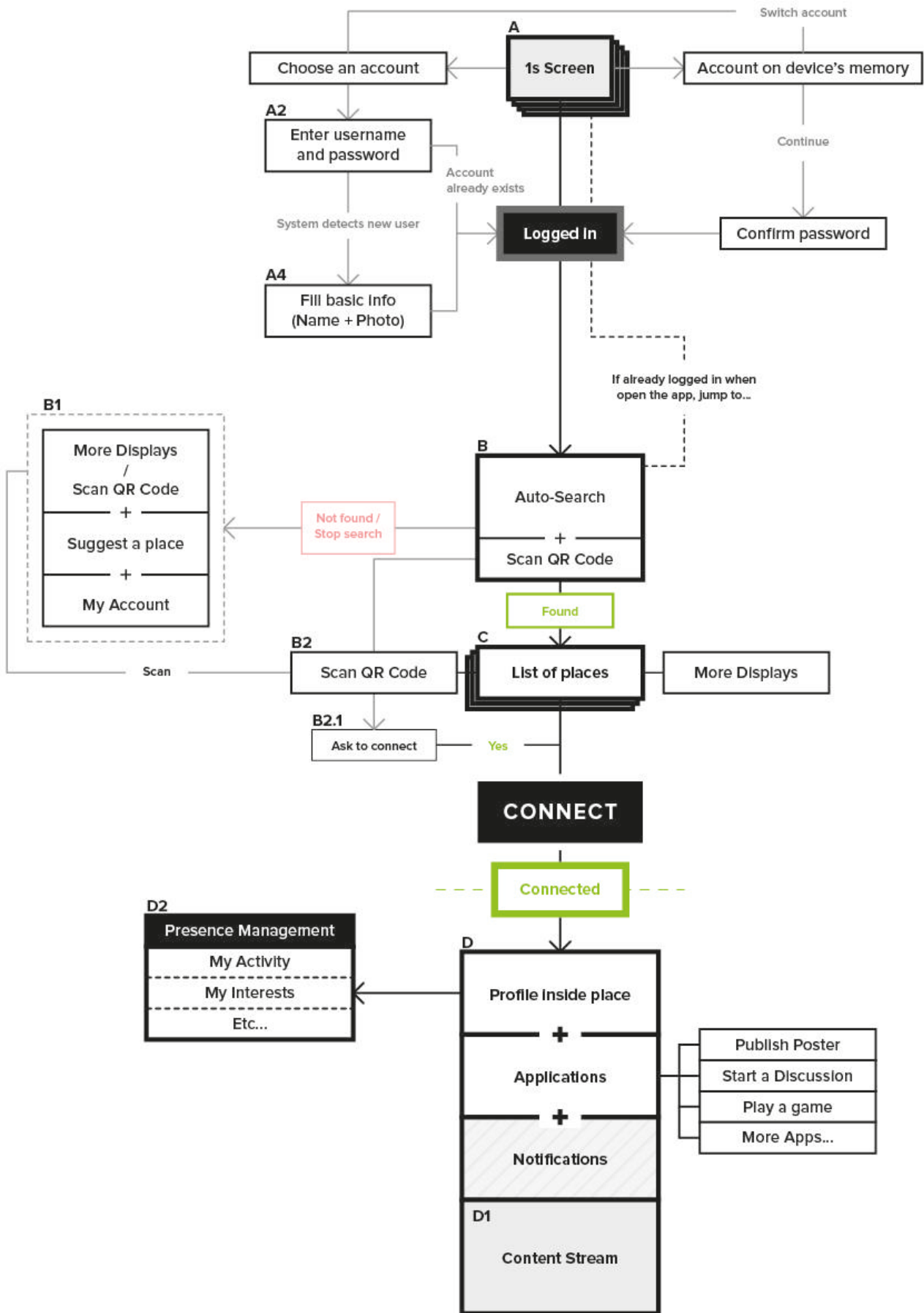


Figure 35 — Navigation Flow

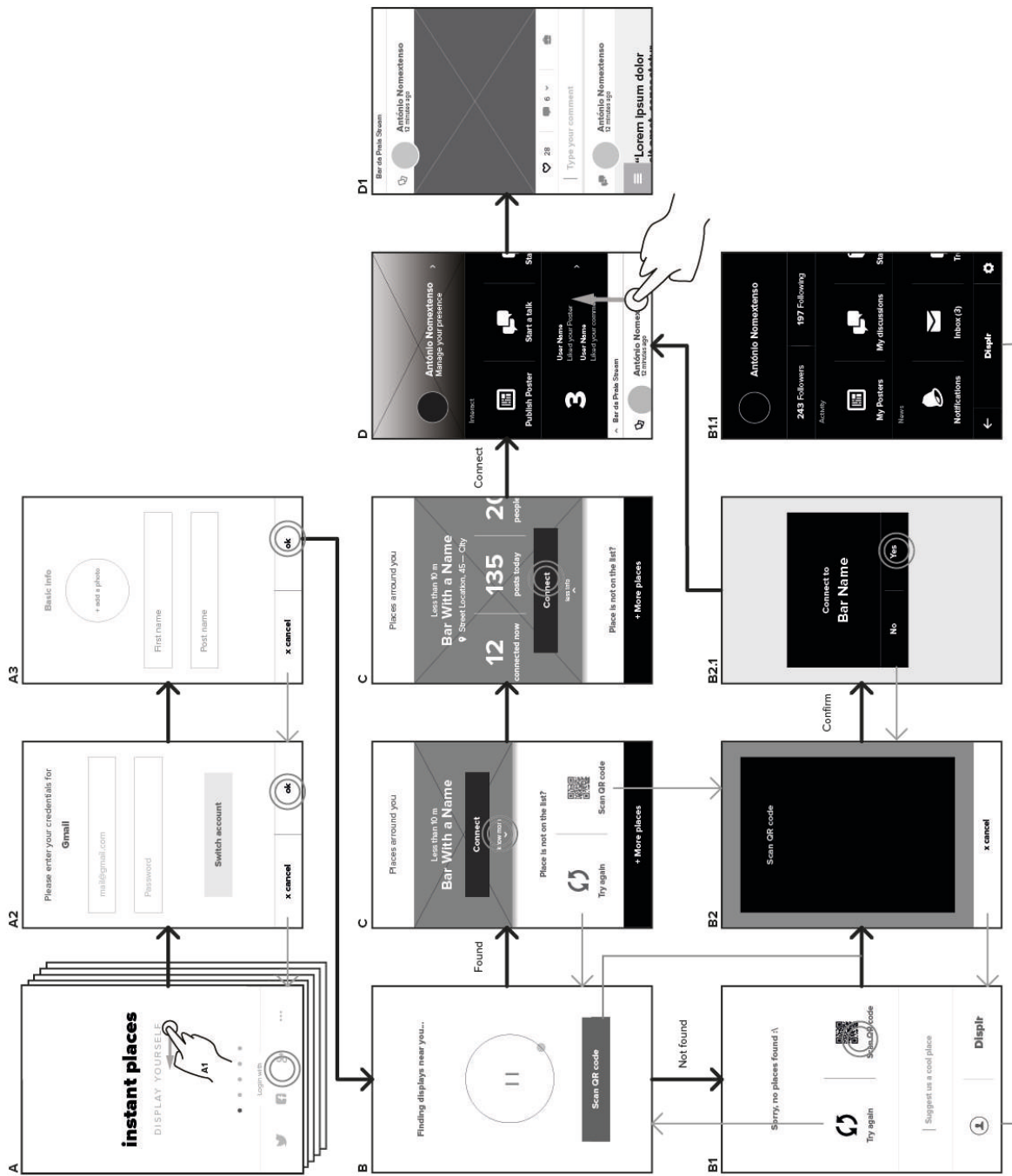


Figure 36 — Application Flow

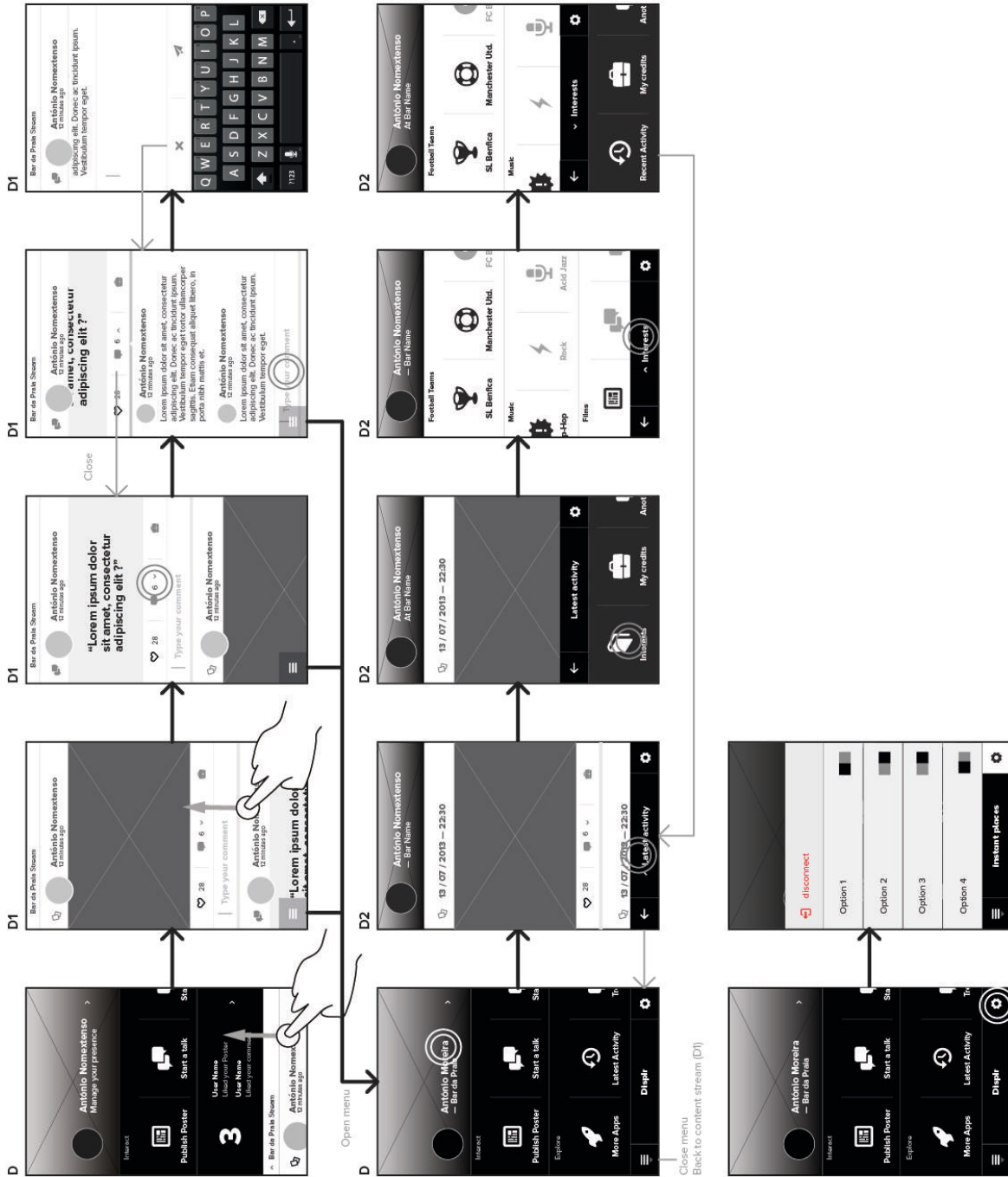


Figure 37 — Application Flow 2



## 5 — Testing



Figure 38 — Interactive PDF prototype.

Simplifying a complex interface is a long process, which involves testing, error, test and error again until a solution viable enough to develop a product. However, it is part of the designer role, before putting other people using his product, to think the best way possible to conceive it. According to Cooper (2007: 70), Usability Testing is a collection of techniques used to measure characteristics of a user interaction with a product. It is focused on measuring how well users can complete specific, standardized tasks, as well as the problems they encounter doing it. Cooper also points that Usability Testing should be done quite late in the design cycle, after there is a coherent concept sufficiently detailed to generate a prototype. On the other hand, Krug (2006: 134) refer that testing one user early in the project is better than testing fifty near the end.

One of our main concerns was easy navigation and reducing steps until a user reaches a goal. However, sometimes it is inevitable due to technical impositions (as it was discussed on “Connecting to a *Display*” chapter). Following the idea of Cooper, but also Krug’s advice, we started by testing ourselves the initial sketches, trying to find out how it could be improved. For example it was possible to reduce initial steps of making a new user sign in to Instant Places down to just three steps.

## 5.1 – Method

We started by using InVision<sup>26</sup> web application, which allows creating interactive prototypes through the browser. It was enough to understand navigation issues and opportunities, although didn't provide ergonomic concerns like button positions and target size, since it was tested on desktop with a computer mouse. We also tried paper prototyping, but it didn't satisfy the answers we were looking for. Nevertheless, later on, it was created an interactive PDF with InDesign software, which was clickable on mobile devices using Adobe Reader application.



Figure 39 — Tests

According to Nielsen (2000), the best usability results come from testing no more than five users and running as many small tests as it's affordable. Although, he doesn't advocate that all the design process should be done with just five users. What he does argue is that five users are sufficient to detect usability problems and the following users tested will keep showing the same things. However, as tests have been done during the process till a viable navigation concept, we asked these five users to test the app on a smartphone device with an interactive PDF document. Users were asked to use the device as they normally do.

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<sup>26</sup> InVision — [www.invisionapp.com](http://www.invisionapp.com)

All users held the device with no need for both hands, but one. And all used just their thumb to interact manipulate the interface. Also buttons have proven to be comfortable enough and no errors have been registered in that way.

We were not able to test every single section of the application. As an example, “Settings” is not completed, nor “Presence Management” is. However, the main goal was to make users reach that and not all features within. Before any test, we explained the Instant Places concept, showing a video and Instant Places website information. We assume all users are unregistered and stated some tasks for users to execute:

- 1. See more information about Instant Places**
- 2. Sign in and create an start your identity (Name and Photo)**
- 3. See more information about the *Display* and then, connect.**
- 4. Choose an App to use**
- 5. (When viewing Activity Feed) Use an App**
- 6. Go to your Presence Management**
- 7. (Inside Presence Management) Change from “Activity” to “Credits”**
- 8. Return to Activity Feed**
- 9. See comments on a post**
- 10. Logout**

It is important to realize that these kinds of tests are not really conclusive, because there are many ways to conduct a user through a digital interface. Designers can take advantage of digital environment to create animations and effects that give user hints and help to reach their goals. Tests made by “clickable” prototypes don’t give a truly conclusive perspective.

We also asked users to think aloud, as Nielsen (2012) refers: “*In a thinking aloud test, you ask test participants to use the system while continuously thinking out loud — that is, simply verbalizing their thoughts as they move through the user interface.*” It allows testers to discover what users really think about the design, which usually turn into actionable redesign recommendations. It also allows gives a perspective about misinterpretations by the users, and the opportunity to solve it.

No recruitment criterion was used, since we have no specific targets. However, the average age of users testes oscillates between twenty and thirty years old, male and female.

## **5.2 — Results**

Tests have shown a positive result. Table 2 shows collected data from the tests, which represents a great majority of succeeded solutions. Although, there are some notes worth to take into account.

Users are represented from A to E (five users) and tasks from 1 to 10. “All ok” means user didn’t found any problems executing the task. “Some notes” means user did the task, but had delays. “Must change” means the user didn’t understand how to execute that task at all.



Tasks	Users					
	A	B	C	D	E	
1	~	✓	✓	✓	✓	✓ All ok
2	✓	✓	✓	✓	✓	
3	✓	~	~	✓	✓	~ Some notes
4	✓	✓	✓	✓	✓	
5	~	✓	✓	~	✓	✗ Must change
6	✓	✓	✓	✓	✓	
7	~	✓	✗	~	~	
8	✓	✓	✓	✓	✓	
9	✓	✓	✓	✓	✓	
10	✓	~	~	✓	~	

Table 2 — Tests results

### Task 1 — See more information about Instant Places

**A** — User took a while to understand he could swipe to get more information. Although, realized the small buttons are familiar to this kind of navigation.

**B, C, D and E** — Rapidly understood how to do it.

—

### Task 2 — Sign in and create an start your identity (Name and Photo)

**A, B, C, D and E** — None users reveal any problem.

—

### Task 3 — See more information about the *Display* and then, connect.

**B and C** — Showed some delay realizing how to see more information about the place, but nothing critical. Both users said the problem was the graphic

element (the little arrow bellow the name) wasn't very clear. Connecting to a place was very obvious.

**A, D and E** — Everything normally executed.

—

#### **Task 4 — Choose an App to use**

**A, B, C, D and E** — After connecting to a place, users found no difficult to select an App to use.

—

#### **Task 5 — (When on Activity Stream) choose an App**

**A and D** — The main problem was not to reach the goal (select an App), but to realize the position of the Menu button, which is, according to users thought, unusual to be there.

**B, C and E** — Users easily recognized the Menu button and selected an App.

—

#### **Task 6 — Go to your presence management**

**A, B, C, D and E** — Users revealed no difficulties executing this task. It is noted that the arrow on the right side helped to indicate the “photo and name” area is shortcut.

—

#### **Task 7 — (Inside Presence Management), change from “Activity” to “Credits”.**

**A and D** — Probably the solution that revealed more hesitation by users. Although, user “A” and “D”, despite having taken a little to understand the functionality, revealed it was easy enough, and one of them highlighted the

fact of every navigation buttons being at the bottom.

**C** — User took an excessive time to realize the navigation bar would open up, arguing he's not an usual approach by other apps he's used to.

**B and E** — Not too obvious, but found how to do this task fast enough. It was decided to maintain this solution because we registered the issues found is a matter of learning the first time.

—

#### **Task 8 — Return to Activity Feed**

**A, B, C, D and E** — Users found no difficult. The button used to access the menu is on the same site to return to Activity Feed.

—

#### **Task 9 — See comments on a post**

**A, B, C, D and E** — Nothing to be noted. We had the idea users started to recognize iconography and the same actions for different tasks. In short, started to understand the interface, which was our goal.

—

#### **Task 10 — Logout**

**A and D** — No difficulty.

**B, C and E** — Users thought the logout button was on main Menu. In general, all users were consensual that it must be on Settings section. A conclusion they took from previous experiences in other applications.

In general terms, the tests performed have proven good results, in part due to the previous work done before it is tested. We believe with the application finished, users will get a even better experience. There were little details we were not able to prototype for the tests, but, according to all the research behind, all the articles read, all the information consumed for this dissertation, digital interfaces live by the wonder of easily using, but also aesthetically pleasant as well. Details like colours, typography, animations, speed, etc. will provide a more pleasant usage. Having said that, what come next are some previews of the final work to be executed.

## 6 – Visual Design

The following images are the final visual design to be applied on *Displr*<sup>27</sup> mobile application. It follows the lessons we took from this study, adding vibrant colours and concise typographic work. The typeface — Proxima Nova — by Mark Simonson from 2005 has been redesigned from the original Proxima Sans, for a better on-screen behaviour. Its characteristics make it a font adaptable to several sizes from big, bold headlines to tiny little descriptions.

The dark background, besides being distinct from other well-known social mobile applications, makes it more comfortable to read in negative contrast. The minimum font size recommended is 0.6em, which represents around 10px or 8pt. The background also allows the use of vibrant and distinct colours to create hierarchies and make use of “*touch and feel*” possibilities. As an example, when a user hits “like” on a post, the symbol will change its colour, indicating a confirmation of the action.

Only when completely developed, the interface will reach its characteristics, because unlike print design, digital can implement extra factors, like animations, effects, etc., that will provide a pleasant usability.

---

<sup>27</sup> NOTE: Meanwhile, the project name changed to Displr.

First Screen



Searching a Display



Displays not found



List of Displays



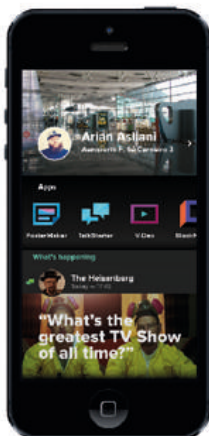
More info about Display



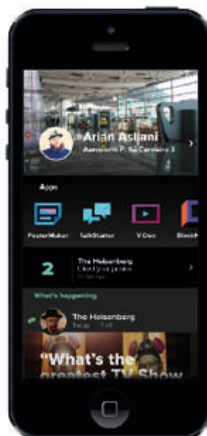
More Displays or Scan QR Code



Connected to a Display



New notifications

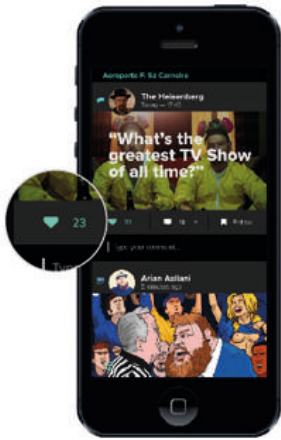


Example of a coach mark



Figure 40 — Visual Designs 1

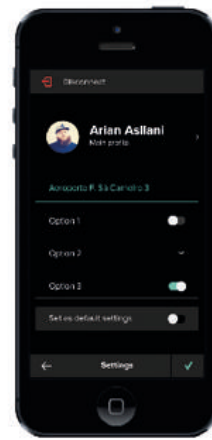
Activity Feed



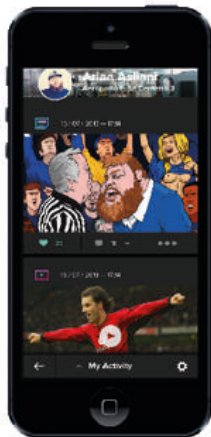
Comments on a post



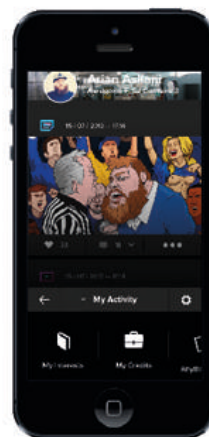
Settings



User Activity



Navigation Bar opened



Presence Management

Main Menu

Apps Panel

Notifications Centre

Place Options

Navigation Bar



Figure 40 — Visual Designs 1





## 7 – Conclusions

We can't assume this project has a closed conclusion. It has reached the basis and fundamentals to conceive Instant Places mobile application interface, both in its usability and appearance. Although, we live in a world where technology changes at high speed, which will force inevitable changes as the time goes. Phones will get better. Network connections too.

It is important to note that, during this study period, there were technology changes and will certainly occur more in a few months, and so on. This document focused, in part, on the difference between traditional Human-Computer Interactions (keyboard and mouse) and touch-based interfaces. However, we are now assisting to new gesture and speech-based interfaces on incredibly powerful mobile devices, which we can operate without even touching them. It's certainly true that the mobile phone we carry on our pocket today is more powerful than the desktop computer we own some years ago, however we believe it will not stop here.

Designing complex interfaces for small viewports can be a painful job, although it forces to keep focusing on what is really necessary. Performance is yet a limitation for designers and developers, especially when not conceiving a native application. Interface design on digital environments, namely touch ones, can make use of natural gestures, like “swiping”, “pinch”, “drag”, etc., but designers must keep in mind if the technology they're designing for support such interactions. When it works correctly, it can provide a better experience, although it can become an unpleasant one if too much animations and interaction gestures cause lag and slow performance.

Unfortunately, is impossible to present here all the process until the final solution, all the mistakes, sketches, tests, etc. that will be turned into the final result. The very first goal of this study was to solve Instant Places issue on its mobile

application interface, but there are possible adaptations to other cases. Since it's an applied project ready to be used by real users, it'll certainly need to follow some familiar patterns, due to users habits on several other applications. However, some of the less "unusual" solutions we created have proven to be viable, and respect the human-factors we discussed.

Even though there are many user interface issues that have been left, it is important to note that the great majority of application development is conceived by teams, composed by specialists in different areas — as the top example of IDEO —, in a larger period of time. Once again, the goal was to design the basis of an under-developed project, and not to say: *"This is the only option that should never be changed"*. Time and user metrics will help to improve certain aspects, by understanding user's behaviour in a larger scale and make the User Interface even simpler.

#### **Main ideas:**

Less is more.

The Future is Mobile.

Be objective, goal-oriented and user-centred.

Simplify.

Fewer features.

Only needed features at the right time.

Fewer steps.

Design for people, not for users.

Make it comfortable.

Make it easy!

Take hardware limitations/capabilities into account.

Know the technology.

Never despise usability.

Never despise aesthetics.

User Interface is not User Experience, but a huge part of.

Test it!

Less is more.

Instant Places mobile application success is expected, in part, due to applications created to run on the system. More User *Display* Interaction will be generated by those applications, which may follow this document to design its User Interface.

Again, this project isn't finished. And will never be. On a social environment, such as Instant Places, user behaviour, habits and interests are always changing and we must track that. Likewise, more devices will come, more powerful, larger, smaller, wearable, etc. Hopefully this study and work might continue henceforward and this document might be helpful for whoever keeps, or be, involved with the Instant Places project — or any other project involving a touch-based mobile interface.



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