

# ECHO

*Providing ways to master your finances*

**by ELEMENTARY**



# Executive Summary

Banking is a complicated space where many actions are unclear to consumers. Over the course of a year, we researched the portuguese banking ecosystem and designed a solution for many of the issues users have. We found that many problems users have with their banks deals with the aspect of banks being opaque to their users. This lack of understanding and insight into their finances produces large amounts of skepticism in their perception of their bank. Through designing a transparent banking application, users will see banks as more than just a place to store money, but as entities that help users accomplish their financial goals by empowering them to simulate complex financial situations. From dozens of user testing sessions and iterations, our application has been shown that this solution would be both benefit users as well as the banks that implement this system.



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# Intro

About Exictos  
The Brief  
About Us  
Final Solution



Intro

# About Exictos

EXICTOS, formerly known as Promosoft, was founded in 1989. They specialize in the production and implementation of core banking software, serving more than 60 banks in Portuguese-speaking countries. Exictos later expanded their offerings to include both mobile and online banking software as a layer over their core platform.

In 2015, Exictos was acquired by the Polish Asseco Group to strengthen its presence in Africa and to open up new opportunities for expansion in South American markets, especially Brazil. Exictos has offices in several portuguese speaking countries including Portugal, Angola, Mozambique, Cape Verde, and East Timor (Timor Leste). Their software is currently used in 86% of the consumer banking market in Angola and 50% of the Mozambican market.

Intro

# The Brief

Exictos tasked us with finding ways in terms of knowledge and technology that would help them to improve and adapt the way their customers interact with the products. Our final designs focused on Exictos's clients business-to-consumer interactions, which in-turn, creates a more valuable product for Exictos's clients.





## Intro

# About Us

Team Elementary is a group of four master's students in the Carnegie Mellon University and University of Madeira Master of Human-Computer Interaction dual degree program. We are a multi-disciplinary team with backgrounds in the humanities, psychology, and computer science. When working, we each take the lead on one aspect of the project, then collaborate to completion.



**Andrew Novotny**  
*Human Factors Design Lead*

Andrew's background work in human-computer interaction stems from previous work studying cognitive psychology and cognitive science. Before Elementary, he was designing interfaces for unmanned ground vehicles. He is known for trying to make amazing puns.



**Andrew R. McHugh**  
*Project Manager & Prototyping Lead*

Andrew uses his wide background, ranging from philosophy to design, to bring diverse perspective to the team. Before the program, he wrote a children's book and worked as a user experience designer.



**Jae-Won Kim**  
*UX Design Lead*

Jae has a background in psychology from Carnegie Mellon University. Before Elementary, she worked in several research labs where she got immersed into the world of human-computer interaction.



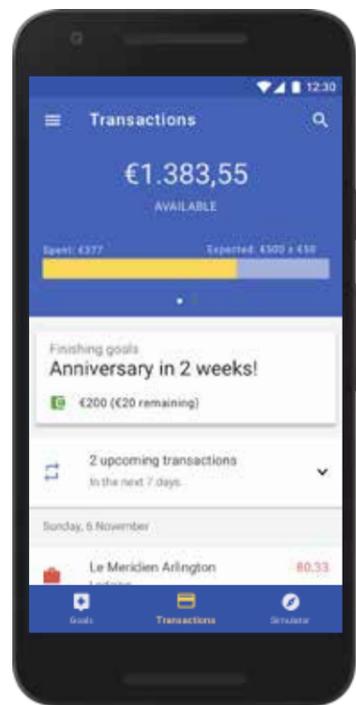
**Joel Rodrigues**  
*User Research Lead & UX Designer*

Originally from Madeira, Joel studied psychology in University of Madeira with a focus on cognitive psychology with a post-graduation in human aspects of technology. Before Elementary, he worked at CereProc (building a text-to-speech interface) and the Thistle Foundation. Unofficially, he is an ambassador for Madeira wine.

Intro

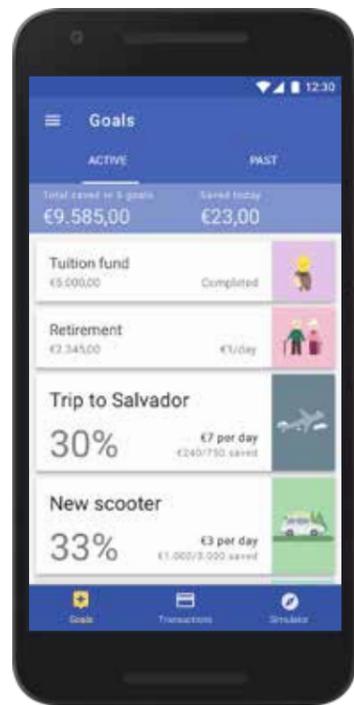
# Final Solution

Our final solution is called Echo, a mobile banking application that gives users clarity into their financial activity and actions. The application features three main sections: transactions, goals, and simulator. We took several design principles into consideration when coming up with our final solution: being a transparent app (letting users know what is happening), empowering users with the choices they make, and giving foresight, or predictions, into their future spending patterns.



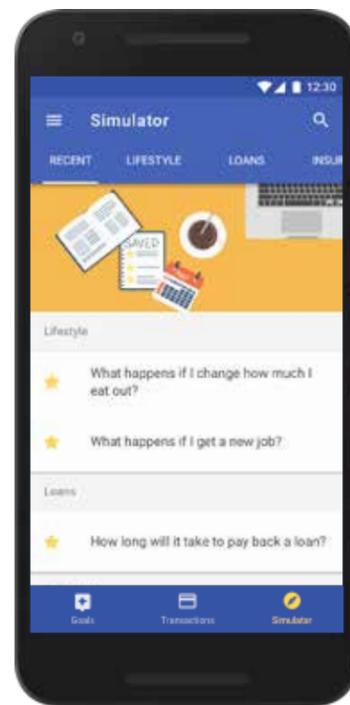
## Transactions

Transactions help users understand insight into their spending habits as well as seeing how they are doing currently. This section also provides additional insights such as spending variance as well as giving users insight into the frequency of their spending patterns.



## Goals

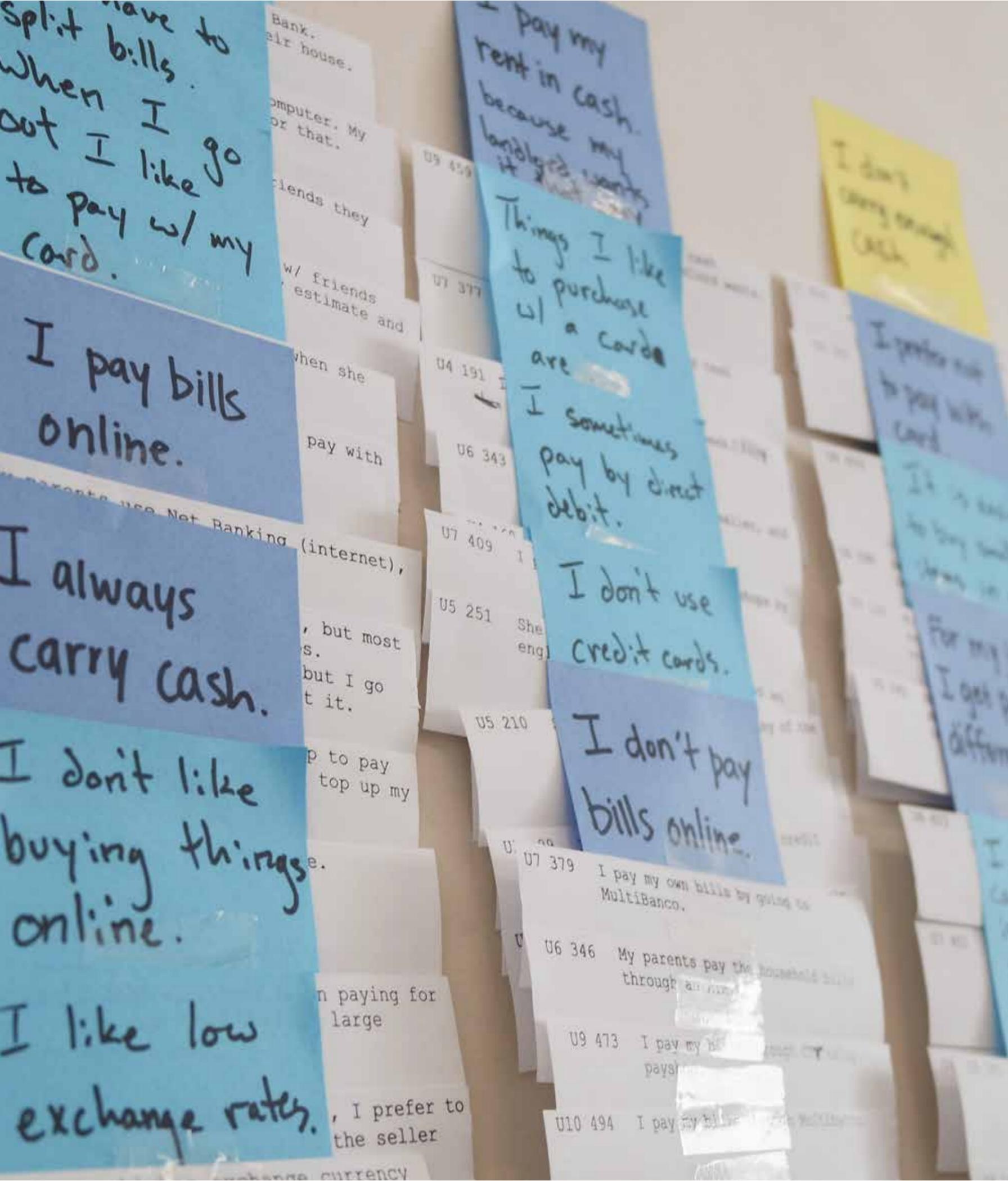
This section features the ability for users to create financial “buckets” or virtual saving accounts that help users achieve their financial goals easily while providing insights on what key factors can effect their ability to reach their goal on time.



## Simulator

Through the use of the simulator, users are able to truly understand and simulate complex financial concepts, such as the cost of child-upbringing or paying off loans.





# Problem Space

- Research Methods
- Research Insights
- Problem of Opaqueness

# Problem Space

## Research Methods

In order to guide our research, we created several core questions, with each question leading us to conduct a different research methodology.

Our core questions are as follows:

- What is known about the banking market?
- What are our competitors doing?
- How do our users currently live?
- What do users think about money?
- What do users already use and have?

- Literature Review
- Competitive Analysis
- Photo-Diary Study
- Interview
- Survey



### Literature Review

Reviewing technology trends through academic and business research gave us insights of how people interact with technology. Due to the increase use of smartphones, businesses are adapting to the market by creating mobile-first or mobile-only services.



### Competitive Analysis

We wanted to understand other financial technology businesses so we analyzed a total of 34 companies and products, examining metrics such as unique features, design strengths and weaknesses, types of users and size of customer base.



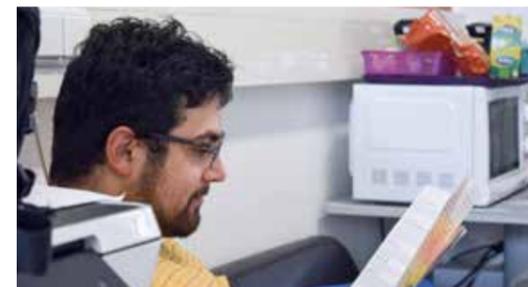
### Interviews

One-on-one conversations with our users helped us to understand thoughts on banking: their desires, goals, frustrations, worries, and how they use money. Interviews gave an in-depth look at the qualitative aspects of information.



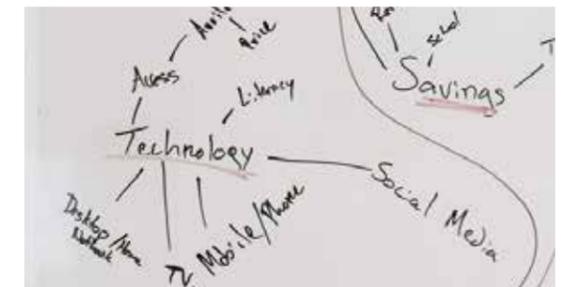
### Photo-Diary Study

This methodology allowed us to see into our participants' lives based on given prompts. We gained different perspectives into understanding how money is used and perceived in people's daily lives.



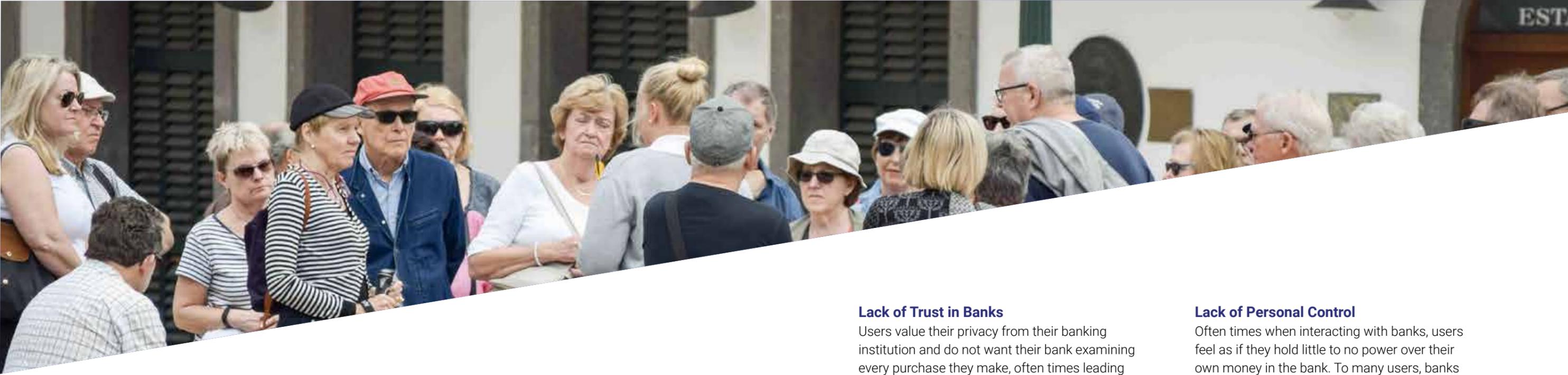
### Survey

We constructed a questionnaire, which included simple-to-answer questions that were formed for an easy analysis after data collection. We asked participants about their technology usage, banking habits, and online activities, and collected a total of 22 responses.



### Monetary Ecosystem

We wanted to explore what context really means for banking in various settings, including factors like people's moods, intentions, setting, and goals so creating a monetary ecosystem helped us further define the meaning of context.



## Problem Space

# Research Insights

When consolidating our research, we produced many research insights. These insights became a big factor in seeing what the user wanted in their banking app, which we took into heavy consideration when coming up with our design solution.

With these insights, we created several core questions to help us understand the Portuguese banking space. We focused on understanding how our users thought about and interacted with their money, what our users needs were, and what their goals were. By examining these questions, we were able to find many different problems users have with banking.

### **Lack of Trust in Banks**

Users value their privacy from their banking institution and do not want their bank examining every purchase they make, often times leading to a distrust in banks.

### **Lack of Personal Control**

Often times when interacting with banks, users feel as if they hold little to no power over their own money in the bank. To many users, banks feel like they are benefitting from their user without providing much benefit in return.

### **Lack of Simplistic Workflows**

Users often have to (or choose to) go through multiple steps in order to achieve their goals. One user described getting bank statements a month late, then manually entering this data into Excel for budgeting.

### **Unused Savings Options**

Often aware of savings options, few users have a savings accounts or other investments. Many say they “should have an account, but don’t”. Banks are not creating their savings accounts accessible enough or users are not being prompted to save in effective ways.

### **Tracking Expenses and Budgeting**

When users want to know where their money is going, they track it. However, the tools provided to them by banks are insufficient, leading most users to create their own form of expense tracking or budgeting.

### **Banks Fail Their Customers**

Banks are not providing services in a way that pleases their users. For example, users do not like seeing bank advertisements while interacting with their bank’s website. When customers have problems, they are unlikely to contact the bank about it. Instead, users get frustrated and begin looking for new banks. This is especially true when banks charge “maintenance fees”.

### **Lack of Well-Designed Smartphone Apps**

The Lusophone market is increasingly using smartphones and targeting the younger crowd since the older generations are often more hesitant to try new technologies and financial services. Banking applications are often lackluster in their design and fail to implement modern day technologies effectively.

Problem Space

# Opacity

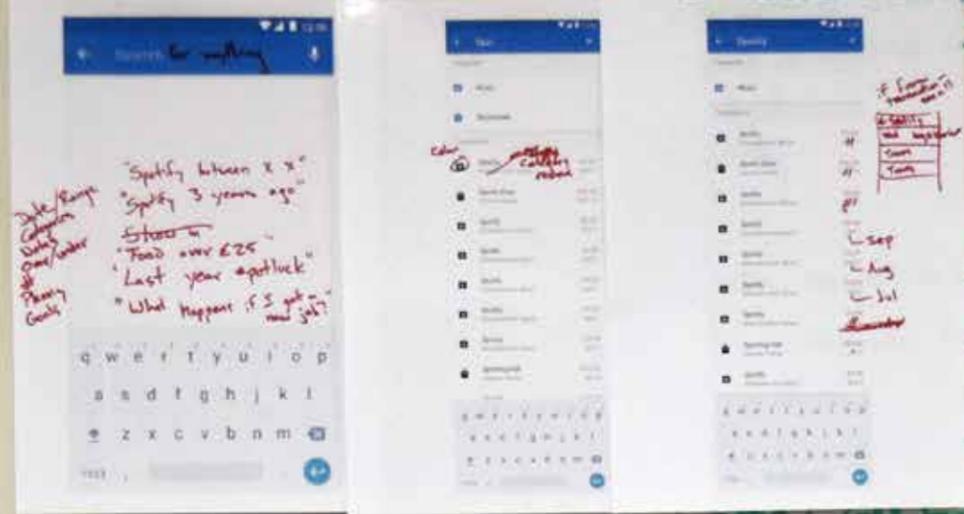
We found that many of the problems users had with their banks stem from banks appearing to be opaque with their users. By opaque, we mean that it is hard for users to truly understand what the bank is doing with their money, as well as what is happening with their money. This leads to users feeling like banks are using them to meet their own goals, and not benefiting the user, which leads to them searching for new banks if they have problems with their current bank. We resolved to solve the issue of opacity by designing a transparent solution that gives users insight into understanding their finances and maintaining the feeling of control over their finances.



1:00

Music simple, instr...  
upbeat  
Diversity notes  
"1.1.13 charts"

Multi...  
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Spotify between 2 x 2  
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What happens if 3 get  
more jobs?

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at not

Examples

story was fragmented

Music - too much horn

Maybe...  
showing  
process

held  
didn't vocalize

Hero + sidekicks

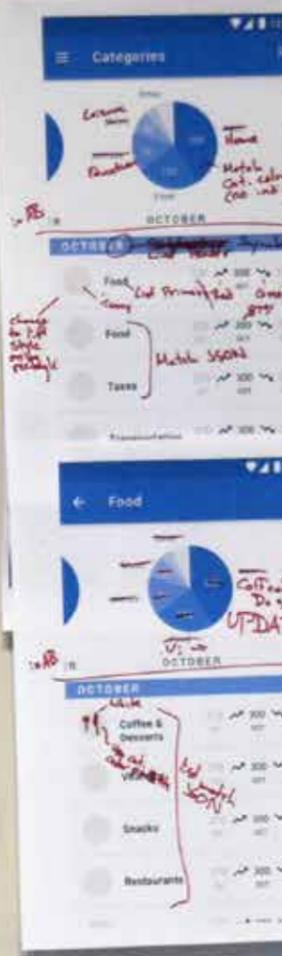
generated expressions

Music stopped w/ pub

Narrator was good

Pin...

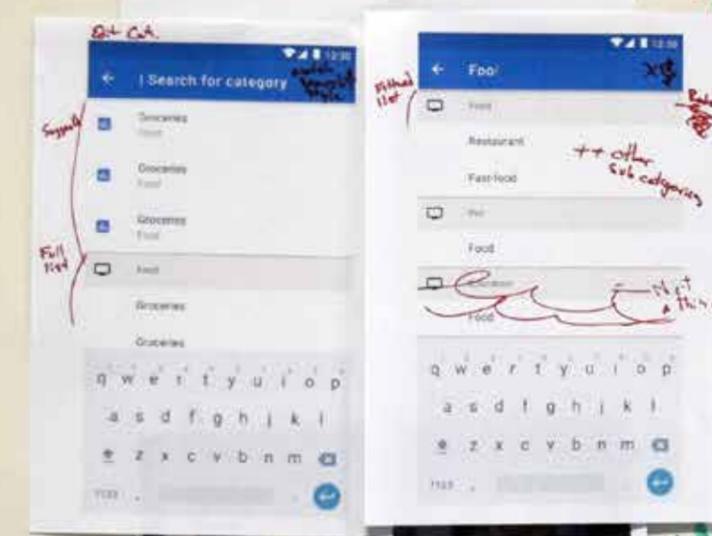
(book  
full...)  
research



0:42

# Concept Validation

- Design Principles
- Visions
- Sprints
- Prototypes



Q+CA

Suggest  
Full list

Final list

++ other  
sub categories

Hero + sidekicks

generated expressions

Music stopped w/ pub

Narrator was good

Pin...

(book  
full...)  
research



st...

Logout

(book  
full...)  
research



## Concept Validation

# Design Principles

To lay the groundwork of our design, we created a few design principles to keep us to our mission statement.

Our principles were:

- **Transparency**
- **Empowerment**
- **Foresight**

Transparency involves letting users be able to see what transactions are occurring in their bank account. We created designs to empower users to make smart financial decisions and feel secure in their financial well-being. Finally, we wanted to give users the foresight to be able to plan for future events and compare financial possibilities. .

### **Transparency**

Our solution provides users with clear and detailed information of both the banks' and the user's financial behaviours and decisions, letting the user stay informed about the status of their money at all times.



### **Empowerment**

We aimed to provide users with the power to achieve their life goals as well as being able to access knowledge that would otherwise be complex and hard to solve. We aimed give users the power to take complex actions and be able to understand them easily.



### **Foresight**

Users should be able to easily understand the implications of their financial behaviour and choices. We gave users the ability to manipulate different factors in order to find out which financial options best helped them accomplish their goals in life.



## Concept Validation Visions

We expanded upon our principles by exploring different visions and research to focus our efforts in providing our users with a solution that can successfully answer to their needs. With the research insights in mind, we created a five part vision that addressed the different goals our users had:

- Prioritization of life goals
- Easy ways to save
- Anticipate costs
- Automatically categorize spending
- Simulate the future and learn from others



### Prioritization of Life Goals

Banks should be a place to store money for long term investments and security investments. We envisioned a future where banks could help users save for the goals they cared about in life like a new car, travel funds, and retirement.



### Easy Ways to Save

Users should be able to easily figure out which saving plans that best fit their needs based on the financial context of their life. They should also be able to easily save money and change their spending habits through easy to access information.



### Anticipate Expenditures

Many payments occur on a regular or semi-regular basis. With today's advanced algorithms and machine learning predictions, it is possible to give users estimates of their future spending events, giving users a better understanding of their financial status.



### Simulate the Future and Learn from Others

Income and spending habits change as users make large, one time purchases. We envisioned ways we could use data from a user's spending history to help guide users to an accurate visualization of complex financial actions, letting users simulate which options would best fit into the context of their life.



### Automatically Categorize Spending

Many payments occur electronically now. We are able to use these tracking numbers to help users see where, and on what, they spend their money on. Giving users the insight into their spending habits can let them see patterns that they otherwise would not be able to see.

# Concept Validation Design Sprints

To explore these visions, we used a methodology called the design sprint, which involved us spending a week per vision. While we started with a five part vision, we condensed them into four sprints as we felt we had explored “easy ways to save” well enough in our previous sprints. The design sprints involved a week of doing different types of research and design methodology each day.

These methods included:

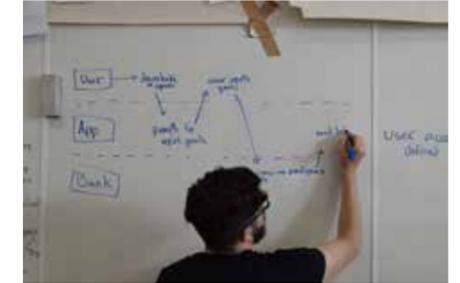
- Researching
- Sketching
- Storyboarding
- Prototyping
- User testing

For more information on the Sprint methodology, we recommend reading the book *Sprint* by Jake Knapp, Braden Kowitz, and John Zeratsky.



## Complementary Research

On the first day we defined our goals for users to accomplish, came up with questions, created high-level service blueprints, and interviewed experts.



## Sketches

We explored interactions of other similar products and services for inspiration. Then, we created low-fidelity wireframes and sketches.



## Storyboarding

After critiquing the sketches, we created storyboards to prepare for our mid-fidelity prototype.



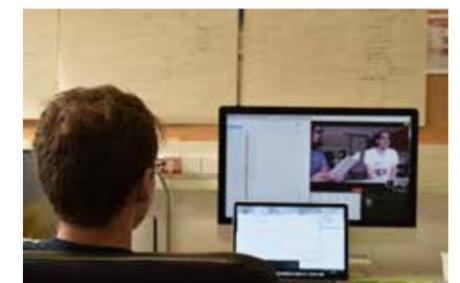
## Prototyping

We produced mid-fidelity prototypes for each design sprint using Sketch as our main design tool and put it into Marvel for our user testing.



## User Testing

We finished our weekly sprints by user testing 4-5 users per vision. This allowed us to gain insights on how to better improve our banking app.

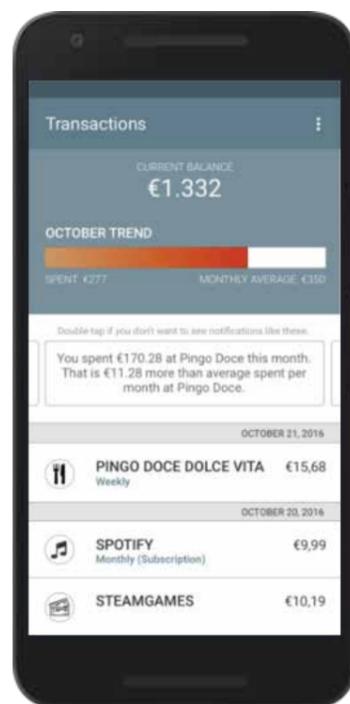


# Concept Validation

## Sprint Prototypes

From our four sprints, we designed four different prototypes. Each one of these prototypes focused on a different part of our vision and explored ways we could best help our users accomplish their goals. Through user testing, we were able to validate our designs in solving the user's problem.

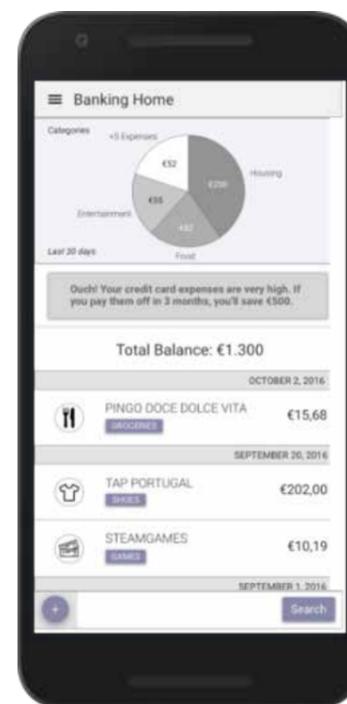
### ECHO



#### Anticipating Expenditures

We explored projected spendings of the upcoming future so that users would be more aware of how much they are likely to spend over the course of a month so they could be more confident in their financial stability.

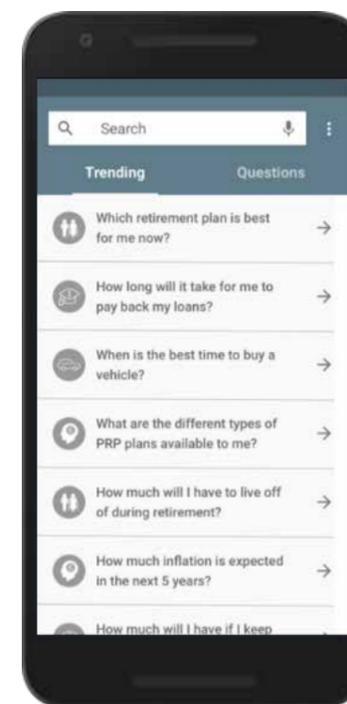
### FOOTPRINT



#### Automatic Cateogrization

We examined many different ways that users could compare costs and expenses between categories and time periods.

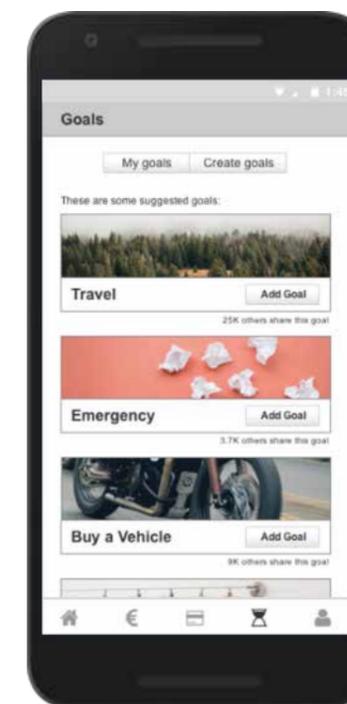
### TELESCOPE



#### Future Simulation

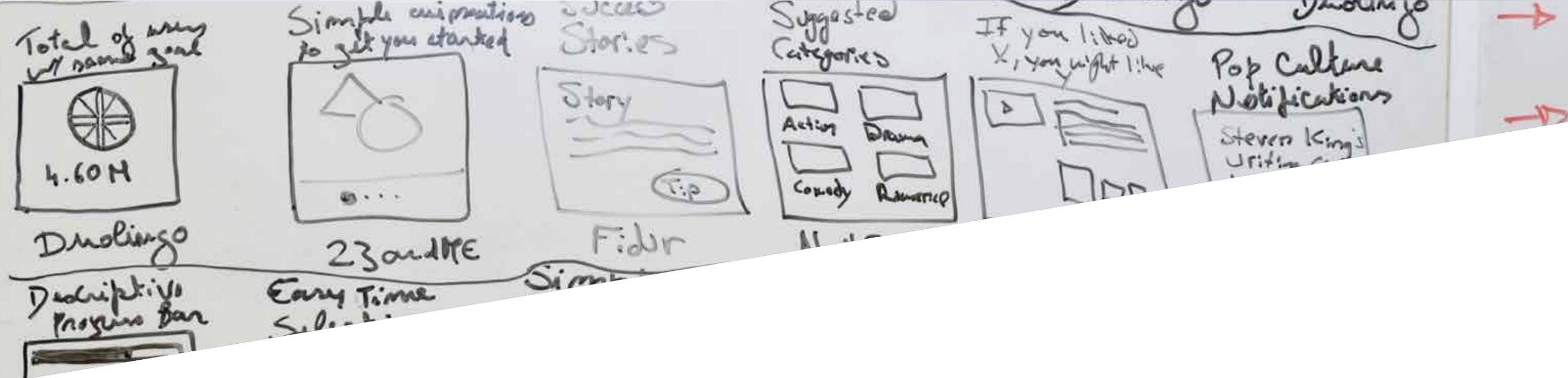
We explored ways that users could simulate various questions they would have about their long-term future, such as retirement plans, loans, and mortgages. Users would be able to see which options best fit into their plans.

### POCKET



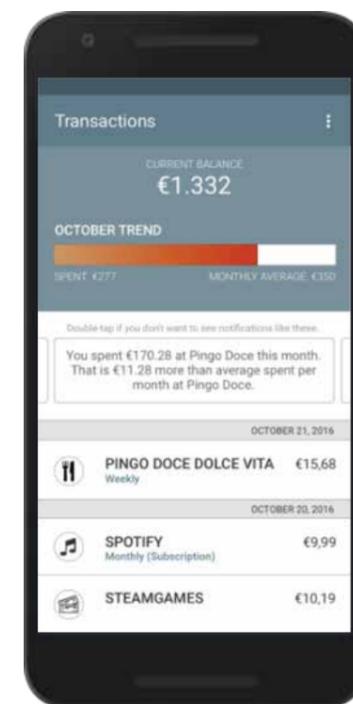
#### Goal Prioritization

We created a system that would allow users to save for their goals in a realistic manner. The app would put away money into a virtual account automatically at a rate that the user would be able to self-determine.



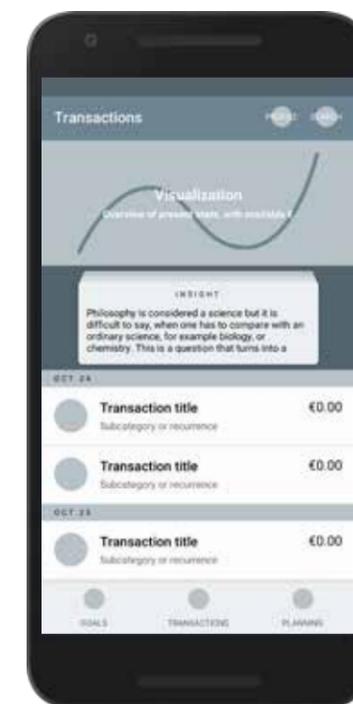
## Concept Validation Iterations

After validating our designs, we set to work on creating a cohesive product. Applications should be designed so that they feel like they all work to provide a complete picture. Through continuous iterations, critiques, and user testing sessions we removed several aspects of our designs that felt out of place and improved clarity and functionality of the application. As a result of this long iterative cycle, we were able to create a solution well-fitted to solving the problems users had.



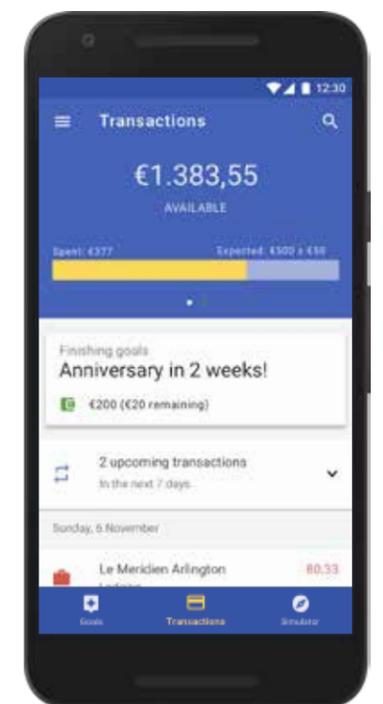
### Low-Fidelity Prototype

We started from low-fidelity prototypes that was created during our design sprint process.



### Medium-Fidelity Prototype

This phase included combining all our low-fidelity wireframes to one working prototype. This phase included determining our final look and feel of the app.



### High-Fidelity Prototype

We determined the final colors and fonts from our medium-fidelity wireframes and kept iterating to eventually get to our final high-fidelity prototype.



## Echo

Our solution, Echo, is a transparent mobile banking application which features three main parts: **transactions, goals, and simulator**. These different applications work together to solve the many issues users have with their finances providing them with easy to understand information.

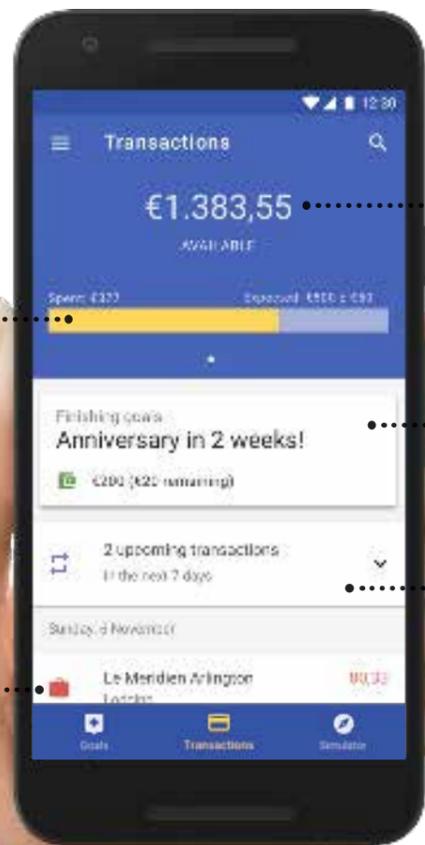
# Echo

## Main Transactions

We designed the transaction to give users a clear understanding of their spending habits and patterns. To be able to truly understand their transaction history, we created a way to let users focus in on a single transaction's insights while also being able to focus on the ability to see their total spendings categorized.

The user's available balance is prominently displayed and can press to view their goal total balance.

Each transaction is labeled into a specific category and subcategory.



Users clearly see their available balance and can click to view goal balance.

Users are shown swipeable insight cards about their spending patterns, goals, and other useful data.

Users are able to see their upcoming transactions of the next 7 days.



### Clear Representation

Users wanted to see a clear representation of their available balance when they first opened their banking app. As well as showing their available balance, we present users two ways to examine their spending habits in relation to the past. The bar visualization shows users the amount of money they are likely to spend that month and how much they have already spent. The line visualization shows users their total spending per month.

Icon	Category	Amount	Frequency
🍴	Pingo Doce Groceries	16,86	Weekly
💰	Elementary Income	+500,00	Monthly
🎧	Spotify Music	4,99	Monthly (Subscription)

### Two-Tier Categorization

By categorizing spendings, users gain knowledge about where they spend the most. The icons on the left show a broad (parent) category, such as food, and the second (child) category is shown underneath the name of purchase, allowing a more specific idea of what users spend more on.

Icon	Category	Amount	Expected Date
📺	Netflix Online	9,99	Expected 19 Dec.
🎧	Spotify Music	4,99	Expected 17 Dec.

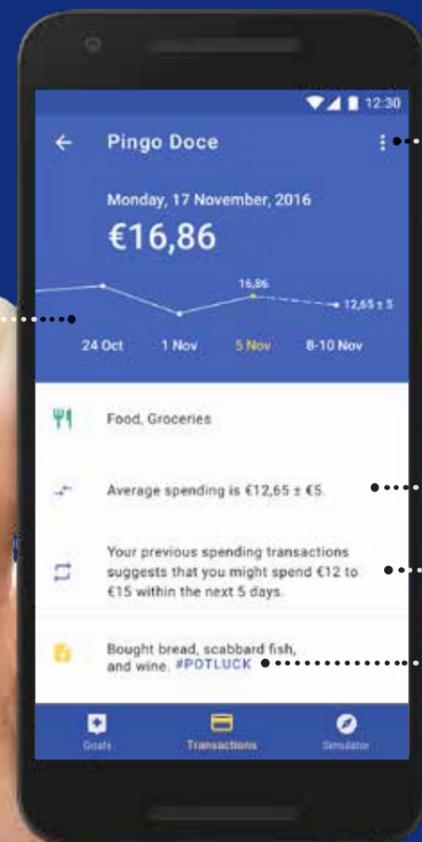
### Upcoming Expenses

Through the use of machine learning, we can accurately describe purchases users make through different time periods. As well as seeing subscription services that occur on a monthly basis, we can also predict regular purchases like grocery store expenses.

# Echo

## Individual Transactions

To give true transparency into users purchases, we wanted to utilize technology in order to work for users to give them more insight beyond just presenting a purchase as a list of numbers. Through the use of machine learning, we give users visualizations of previous spendings, the frequency and average purchase range at a location. We created a system to allow users to add personal notes to individual transactions as well.



Users are presented with their past transactions and prediction of how much their visit might cost.

We give users the ability to report suspicious activity and to be able to see a list of all transactions that share the same name.

User are presented insightful spending patterns in an easy to understand way.

Users can easily add notes and use hashtags to easily create a "third-tier" category.

# Echo

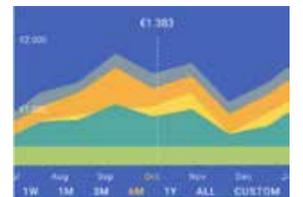
## Categories Overview

By categorizing transactions, we are able to give users an informative, cohesive picture of their spending history. We take the information we gained from categorizing and display it in ways that helps users truly understand where their money is spent.



We represent the past month's purchases by segmenting categories in a pie chart.

Users can also access a line graph visualization which compares categories total spending.



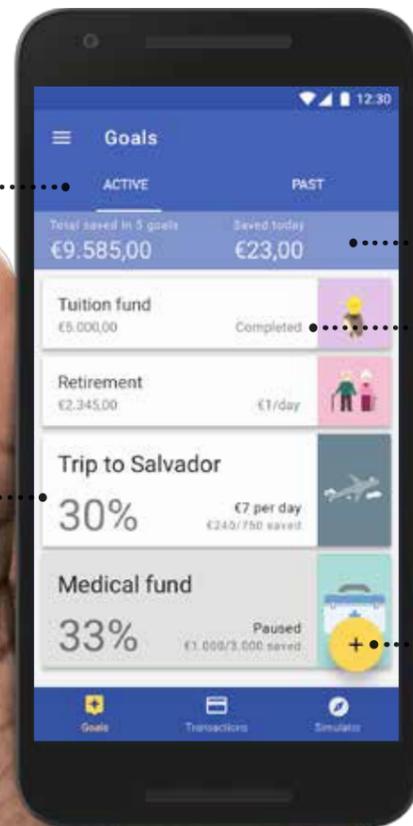
We show users a comparison of their past month's spending as well as a predicted expense for the next month's transactions. Users have the ability to further examine and to see a breakdown of a category to see purchases by sub-category.

# Echo Goals

We created the goals section to aid our users in being able to easily reach their financial goals in life. We do this by creating virtual accounts that the money moves into on a daily basis. How much is saved daily is shown on a daily basis, which gives users a better understanding of the impact of the goal on their finances.

Active goals are the default state filled with goal cards that users are currently pursuing.

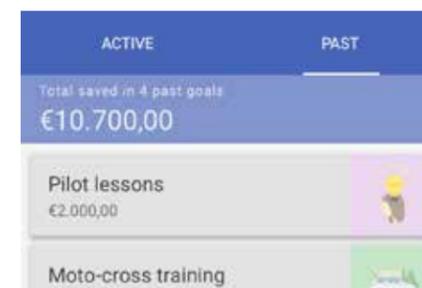
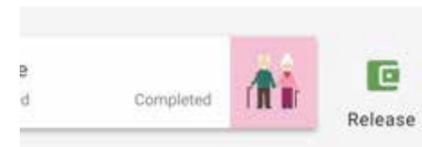
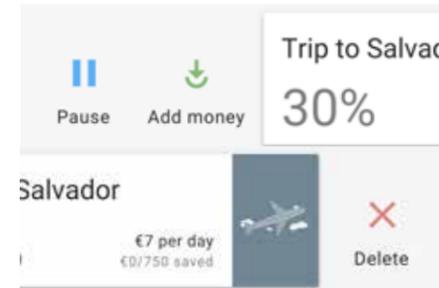
Users see how much is saved in a goal per day, and see their completion toward their finished goal.



Users clearly see how much money they put aside for their goals and how much they save daily.

Completed goals stay in the goal account until the user interacts with the money and releases it back into their available account.

Users can create a new goal by pressing here.



## Goal Card

An overview of goal cards show the percentage amount of goal achieved, along with how much is collected per day. If user presses on a card, more details, such as the date expected to achieve the goal, appear. Users can also access options to pause, delete, and take out money from the goal.

## Pausing and Deleting Goals

For users more familiar with swiping gestures, they have the option to either delete or temporarily pause the goal. Users found this useful as they can do these actions within a click of a button.

## Releasing Goals

Once users have completed their goal, swiping to the left will allow users to release the money to use it for their particular goal.

## Paused Goals

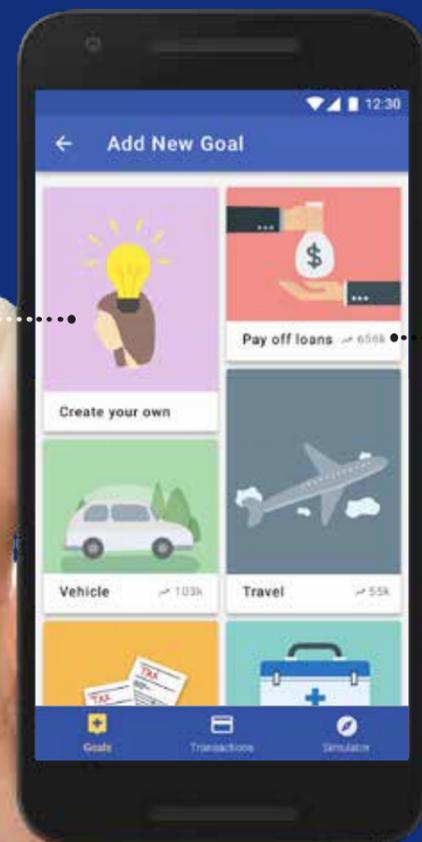
By pausing a goal, the money stays in the goal account, but money is no longer transferred into the goal until the goal is resumed. Paused goals are grayed out so that users can distinguish them from active goals.

## Past Goals

Past goals are goals that users already accomplished and show the title and how much they saved. Users felt seeing goals the app had previously helped them accomplish to be motivating.

# Echo Add Goals

To add a new goal, we created a simple and structured workflow to help users easily be able to start a goal. When first creating a goal, users select 1 of 7 predefined goal categories (paying off loans, vehicle, travel, emergency, retirement, taxes, and moving). Each of these categories contain different questions that best help users in determining how much their total goal savings should be.

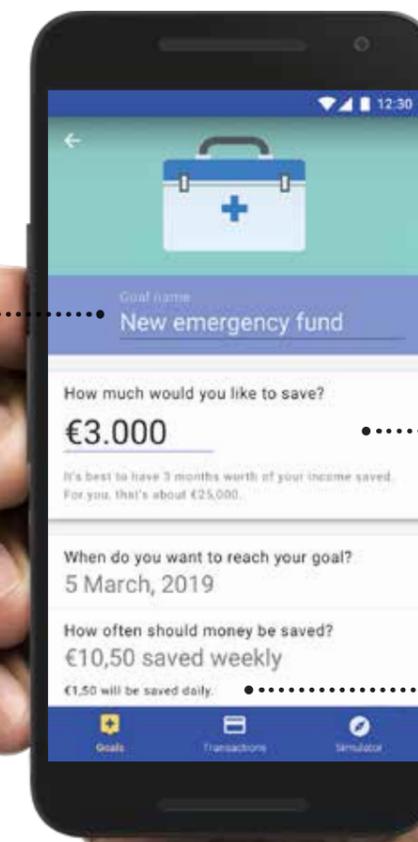


“Create your own” is for goals that are not listed in the options (eg, buying a camera).

Users can see how many other people have an active goal of each category.

# Echo Creating a Goal

Once users select a goal that they want to achieve, they are led to a page with a structured input so that users can get a clear sense of the factors that influence the achievement of their goal. The simplified workflow makes goals feel more achievable and users are more enthusiastic to start their goals.



Users can create their own title for their goal name.

Questions that users are currently on are expanded as users can change their answers. The bottom note shows insights and advice that users should take into consideration.

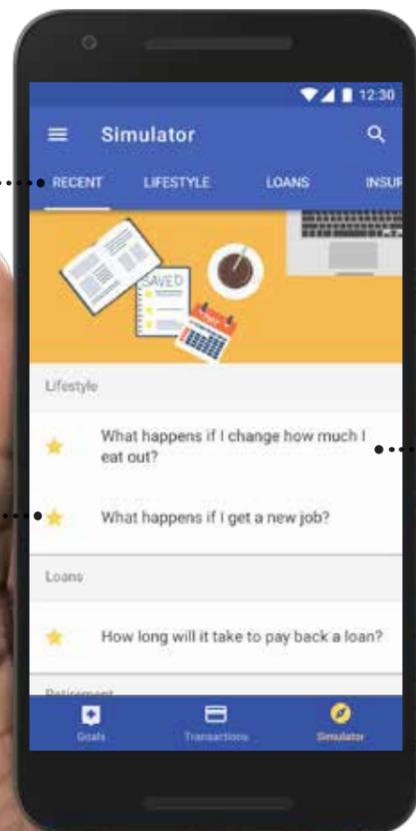
Once the questions are filled out, the app shows how much will be saved daily.

# Echo Simulator

Many financial situations are complex and do not exist in a vacuum. Simulator is designed to empower users with the knowledge they need to understand which financial options are available to them, and which ones best fit their needs. Simulator allows users to follow and understand the ever-changing financial environment they live in and how it might affect them.

Simulations are grouped by topic in order to create a more structured input method for users to find what they are looking for.

Users have the ability to "star" the results of a simulation so that they can easily access the result at a later time without having to re-enter their data.



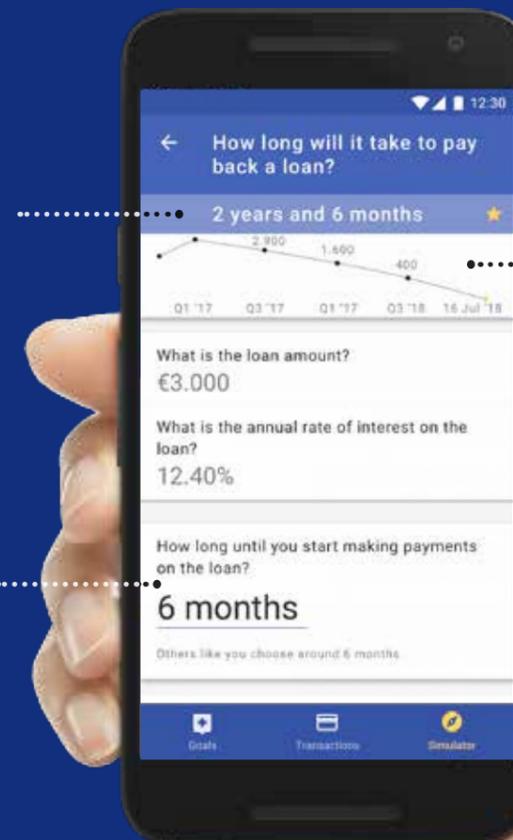
Pressing onto a simulator question enters into the simulator question.

# Echo Simulator Question

Users want to clearly see the impact of different factors as they edited the simulator. We created each simulation questions with a structured input system that helps users understand which of the factors play an important part in the result of their simulation. As users edit and manipulate the input information, they get accurate, real-time data and feedback letting them figure out which options are best for them without any risk.

The answer is displayed underneath the question with the option to star or favorite the question.

Questions that users are currently on are expanded as users can change their answers. The bottom note shows insights and advice that users should take into consideration.

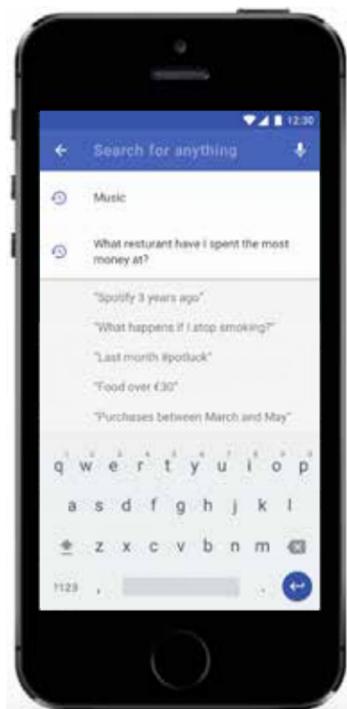


The answer and visualization (when applicable to the question) are always visible to the user. The graph moves into a compact (as shown here) form when users scroll down in order for them to instantly see the effects new changes would have on their answer.

# Echo

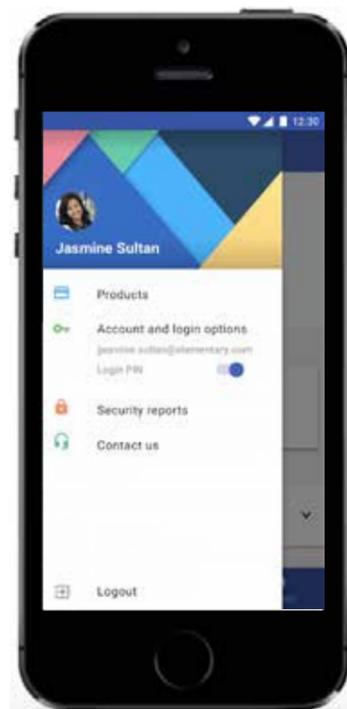
## Other Features

When designing our product, we included additional features that were also important for the final application to include to meet all the goals a banking application should be able to provide.



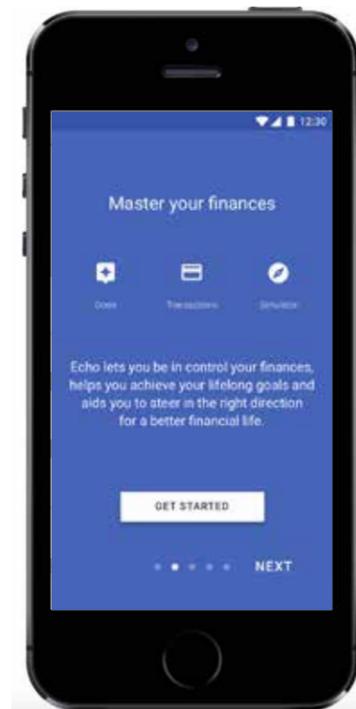
### Search

We created a search function that incorporates fuzzy search. Fuzzy search enables users to search in more human contexts such as "all food purchases last month." This gives users powerful accessibility options to find specific transactions or activity that they may be looking for.



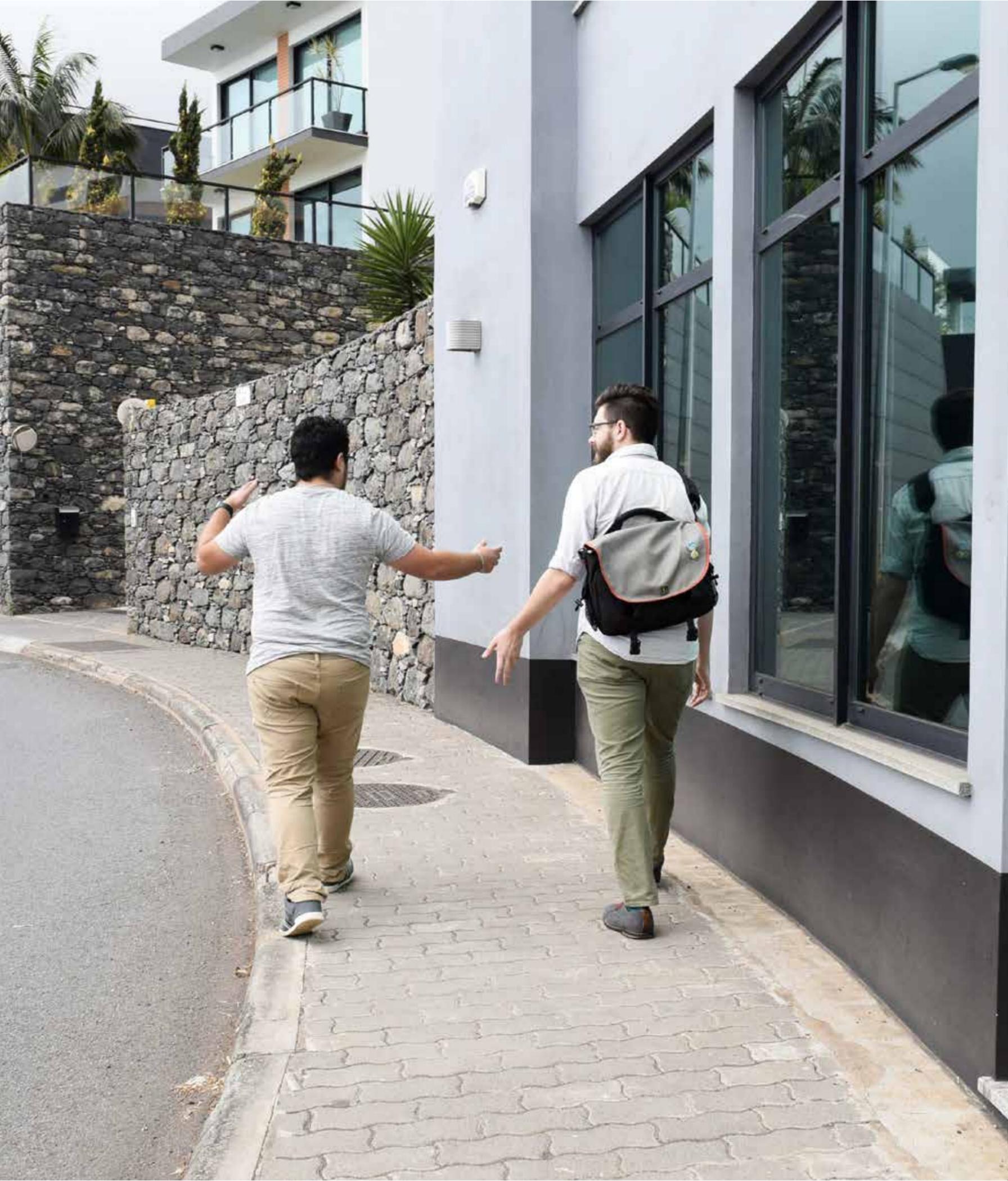
### Profile

We created a profile section that shows users their products, account information, and security options. This gives users quick insight into their account identification numbers as well as letting them compare between their different accounts.



### Onboarding

We created a short, delightful, onboarding walkthrough that explains to users how each section of the application works. We inform users of the benefit of each section and what they can gain from using the application.



# Conclusion

Recap

Acknowledgements

## Conclusion Recap

Our final product is the culmination of eight months of research, visions, designs, prototypes, and iterations in the Portuguese market. Through extensive testing, we have hard evidence that our solution solves a very real problem in the Portuguese community and brings value to users. By bringing more value to users, this in turn helps Exictos' clients retain their users as well as grow their base.

By focusing on transparency, we resolve many of the issues users have with their banks, returning trust to the bank-client relationship.

We empower users to truly understand their financial actions in the past, present, and future. These designs will drastically improve the way users interact with their bank.





## Conclusion

# Acknowledgements

We would like to thank the University of Madeira, Madeira Interactive Technologies Institute, and the Human-Computer Interaction Institute at Carnegie Mellon University. We would also like to thank our many different participants for their time and feedback.

We would also like to thank our dedicated mentors, Dr. Simone Ashby, Dr. Valentina Nisi, and Dr. Mónica da Silva Cameirão for their guidance through our design process. We also thank Pedro Camacho, our primary source of contact at Exictos.

From all of us here at Elementary, this project would not have been possible without you.

Thank you.



