# INTERACTION DESIGN

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## GAMES4THERAPY

### THE DESIGN PROCESS OF A DIGITAL SOLUTION

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# ABSTRACT

Nowadays, technological advances struggle with the emotional
social context. Design is no longer an isolated discipline.
We are moving towards a new way of designing. Design is about
people. We can no longer think about design decisions without
having in mind all the related fields that are required to
develop a successful solution. We live experiences, we engage
with them and we hope they are meaningful to us, and deep inside
it always been like this.

Understanding the design process is therefore a need to the
Interaction Designer. She should be aware of the required tools,
how to use them and understand what they can provide her with.
Working in a team and experiencing an environment where creative
and innovative solutions are conducted is therefore the way
to have a more clear understanding of the process.

In this dissertation it is proposed to understand the role
of the author as an Interaction Designer, who will be working
within a multidisciplinary team, whose goal is to develop a tool
that can support therapy in early intervention of psychosis as
well as the process to answer the proposed research question.

# KEYWORDS

# ACKNOWLEDGEMENTS

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# ABBREVIATIONS

APP   APPLICATION
CBT   COGNITIVE BEHAVIOURAL THERAPY
HCI   HUMAN COMPUTER INTERACTION
IxD   INTERACTION DESIGN
RITE  RAPID ITERATIVE TESTING AND EVALUATION
Ux    USER EXPERIENCE

"...NA NOSSA PROFISSÃO,
O IMPORTANTE É FAZER SEMPRE AS COISAS
O MELHOR POSSÍVEL E ESTUDAR,
ESTUDAR MUITO, NÃO NO SENTIDO ACADÉMICO,
MAS MAIS NO SENTIDO DA DESCOBERTA
E DA ALEGRIA"

SEBASTIÃO RODRIGUES

# 01 INTRODUCTION

Design is about people. It is about life. It is about experiences. Being a designer is being able to understand people. Designing is a constant and dynamic process. It means trying, experimenting and not being afraid of failing.

Academic knowledge provides the structure for being a professional designer, but we can only evolve and improve if we make experiments, do research and work. Being a designer means being an observer of contexts, people and emotions.

The technological advances and the evolution of social sciences have shaped a new mindset towards the design function. The range of possibilities in the field of design crosses with other fields, such as Interaction Design, Interface Design, User Experience, among others. All those fields relate to each other and fulfill each other's needs. Therefore, it is important to be aware of all these fields, how they interact, what boundaries they set and how they relate in the design process.

The design process is the response to a problem in order to reach a solution. It doesn't mean that the solution has to be a technical or digital one(unless it is required). A solution is the answer to a problem. And that answer could be anything that could fulfill the user's needs. As a designer, the goal is to understand the user's problem, define it and find a solution for it.

In an experimental/research/professional context, the Interaction Designer should work together with a team of researchers, programmers and other related professionals in order to contribute with her expertise to the concept definition, designing, prototyping and testing.

The role of the designer is melted with the other roles. In the design process a team works towards a common goal and therefore they share knowledge and evolve together.

Understanding the design process by working whitin a real client situation context was the author's goal. Doing an internship allows the author to learn about her role as an Interaction Designer as well as the understanding of the team work flow and the process that it implies.

Going abroad allows the author to establish a new network, also improve the English language skills and acquire knowledge from a different point of view, due to the international context.

## 01.01  MOTIVATION

Learning is a process. The experience makes us go further
in our learning. Working in a real client context, being part
of a team and understanding the work process makes us understand
the role of a professional designer. Working in this context
shapes de mindset of the designer towards a real goal.

While working in a team, the team members share knowledge.
By sharing knowledge we also improve our skills and that makes
us understand what we are capable of and how far we can go.

Going abroad to another country, working in an international
environment, within a multidisciplinary team, fulfils the need
to put into practise all the academic education acquired so
far. By achieving that, we propose to understand the role of
an Interaction Designer as well as the Design Process required
to answer a research question provided by a real client.

This internship experience aims to enrich the academic
knowledge, the expertise, the technical and social skills,
such as socialization and networking and also put into
practice the academic knowledge.

The decision of going abroad was based on the possibility
of working in a experimental/research environment where the
IxD designer could explore and develop her expertise as well
as increase her knowledge about Interaction Design and related
fields.

## 01.02  LOCATION

MediaLab Amsterdam is a studio where applied research and
innovative interactive media applications are conducted with
partners from the creative industries and education. The focus
of the research is at its core the innovative character of
the digital applications. This approach allows the students
to develop a real project and they still have the possibility
of doing it innovatively.

In the MediaLab Amsterdam the author will be working in the
Games4Therapy project. This project aims to develop a digital
solution for people between 18 and 24 years old that have an
early indication of psychosis.

The digital solution will be developed to support the principle
of participatory healthcare. It should also be characterized
by including game elements, context awareness and social
aspects.

The client Arkin, is an institution that treats people
with psychiatric disorders, complex mental health and addiction
problems.

Arkin also leads training and conducts scientific research in this field. It is one of the largest institutions for the mental health in the Netherlands.

The Games4Therapy team will be working with the VIP (Vroege Indicatie Psychose/Early Indication Psychose). The VIP is a programm form Arkin. Their goal is to enable patients and their environment to increase participatory health care, by involving the patients and other stakeholders in the design process.

## 01.03 SCOPE

The research project will occur during 20 weeks. At the end the team needs to deliver a concept, a working prototype and a research paper. The goals of this dissertation are intimately associated with the goals of the project, which are:

01  Have a clear understanding of the IxD field and the role of the Interaction Designer;

02  Understanding the functioning of a team within the context of the research project;

03  Acquire knowledge about the design process in developing a digital solution in an experimental and innovative context;

04  Be aware of the innovative techniques and approaches to develop digital solutions;

05  Clear understanding of psychosis, therefore the user and the methods to understand him;

06  Participate and contribute to the concept development, designing, experimenting, prototyping and testing;

07  Deliver a final solution/working prototype;

08  Collaborate in the research and therefore the scientific paper;

09  Increase network;

10  Improve English language skills.

We expect to increase our knowledge and practical competences, ultimately leading to the development of strong theoretical and practical skills in the field of IxD, which can serve as a foundation for a professional career.

## 01.04 RESEARCH QUESTION

**How is the design process of a multidisciplinary team that
is challenged to develop a digital solution for people between
18 and 25 with early indication of psychoses? -** The goal for the
author is to understand the process, describe it, reflect on the
design decisions, develop the concept and the final solution.

## 01.05 WORKPLAN

Below, it is presented the 20 weeks workplan. It includes
the design process and development, workshops, presentations
and conferences.

| | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|

**DEVELOPMENT**
USER SCENE
SPRINT 1
SPRINT 2
SPRINT 3
SPRINT 4
SPRINT 5
RESEARCH
CO -CREATION SESSIONS
PROTOTYPING
TESTING

**WORKSHOPS**
THINKERING
SCRUM
PROBLEM DEFINITION
RAPID PROTOTYPING
SCIENTIFIC & THINKING WRITING
IDEATION
IDEA SELECTION
USABILITY TESTING
CODING
USER EXPERIENCE DESIGN
CODING II
INTERACTION DESIGN
PRODUCTION PLANNING
BUSINESS MODEL CANVAS

**CONFERENCES&PRESENTATIONS**
THIS HAPPENED IXD 2014
AMSTERDAM MEDICAL CENTER
HOGESCHOOL UTRECHT
BIG TENT: GOOGLE

**DISSERTATION WRITING**

**SCIENTIFIC PAPER**

## 01.06 SUMMARY

Chapter 2 includes a survey of the state of the art.
The goal is to understand the Interaction Design field and
the related subjects.

We also summarize our research about Serious Games,
Gamification and Psychosis in this chapter. Having clear
insights on psychosis is a major demand concerning the project
goal. Therefore this chapter shapes our mindset towards the
research question and our goals during the development of the
digital solution as well as the understanding of the user.

In Chapter 3 we present the methodology towards the
development of this project. The author will be working in
MediaLab Amsterdam and therefore, she will follow the studio
methodology. Along with the developing of the project the
author will also be attending workshops that aim to
structure the process.

Chapter 4 describes the development of the project, and
consequently the design process: the goals, the development
of concepts, design choices, prototypes, testing,
achievements, insights and the conclusions.

Finally in the last chapter we summarize the contributions
made in the scope of this dissertation and draw conclusions.

# 02 STATE OF THE ART

This Chapter is divided into five sections. The first one is dedicated to IxD and its related fields, for an overview of the designer role. The second one, about Game Design is dedicated to the understanding of the approach that should be followed for the development of a digital solution. The third one is about the Serious Games context and how health and games are collaborating nowadays, it is also important to understand the Gamification concepts. In the fourth section, the subject of the project is approached - Psychosis. Finally in the fifth section a synthesis and critical analysis is presented to summarize the State of the Art.

## 02.01 INTERACTION DESIGN

This chapter aims to understand what Interaction Design is, as well as User Experience Design, and how they relate to each other. The research on these fields has the goal of developing a more accurate understanding of the role of the designer in this field and, at the same time, to inform the development of the project associated with this dissertation.

### 02.01.01 HUMAN COMPUTER INTERACTION AND USABILITY

To understand the evolution of IxD, we have to understand its roots and how it has been approached during the years. Therefore, a better insight on Human Computer Interaction is needed.

In the 80's, Human Computer Interaction - HCI, emerged in the field of computer science, dedicated to cognitive science and human factors. Soon the area evolved and other fields of knowledge have embrace it. Now HCI melts semi-autonomous fields of research and practice in human-centered informatics.[1]

HCI developed along the emergence of the personal computer and the relation between humans and computers. With this change, the computer would no longer be used by technology professionals only, but by everyone. Because of that, human factors developed empirical and task analytic techniques for evaluating human-system interactions. A cognitive approach took place instead of producing systematic technical descriptions.[1]

This new cognitive approach used theories of writing, reading, and media with empirical user testing. HCI was now (1980's) an interdisciplinary project.[1]

Easy to learn and easy to use. This simple concept described Usability, which was the initial focus of HCI.[1] Usability is used in Human Computer Interaction to describe a way of behaviour. Understanding behaviour is essential to design any interactive solution that could reach the common user. In order to evaluate Usability, we can address to Usability Work which refers to the work that specialists do, supported by methods that should be used according to context. Research should start focusing on Usability Work, and that means that we must use evaluation methods not in an isolated research setting, but we must look upon the reality and the context of it.[2]

Nowadays we know that other qualities such as pleasure, fun, well being, collective efficacy, creativity among others are important to HCI. This multidisciplinary field of HCI ranges from visualization, information systems, collaborative systems and the system development process as well as many areas of design. HCI merges different fields of sciences and puts them all together, integrating all the perspectives. It has grown and it is far away from the early concept of a generic user behaviour, it has expanded from desktop to games, learning, education, commerce, health, medical applications and collaboration systems.[1]

HCI is a multifaceted discipline that ranges from various science fields. It is about understanding people, their actions, emotions, behaviours, aspirations, practices and having that in mind, designing towards it. It's a process that has no special formula, it is a co-evolution of an activity.[1]

## 02.01.02 INTERACTION DESIGN

Understanding the basis of HCI, helps us to go further on knowing about Interaction Design and how to approach it.

In 1984, Bill Moggridge with the help of Bill Verplank, felt the need to create a new discipline - Interaction Design, that could represent solutions in a virtual world, with the aim of designing behaviours, animation, sounds and shapes.[3]

At the time the design community was focused on usability and human factors to create methods to error-free interactions in user performing tasks. With the turn of the century, the notion of Interaction Design started to gain popularity, being considered not only useful and efficient, but also as a way of considering aesthetic qualities of use.[4]

There are many ways to understand what Interaction Design is. Jonas Lowgren (2013) says that IxD is about shaping things for people's use. For him the shape notion stands for a design process instead of an engineering process, because it is shaped to the world, it's not a rigorous process. In this sense, design is about transformation and the means to do it well in a specific situation.[4]

Exploring IxD also requires to explore various forms of participation. In IxD thinking we also need to consider the possible solutions at the same time that we look at the problem. Looking at different design solutions also implies different problems.[4]

To develop an effective Interactive Design we need to sketch it first, it's not about the medium used but the mindset of the designer and how he approaches it. If we think in IxD used in a digital context, it is also good to be aware of the technology used nowadays. Because of that and knowing that sometimes a structure has ongoing modifications, we should approach IxD as a process that sometimes might never end because it allows a collaborative communication between many users. Collaborative Media describes this concept and it is believed that this is a new field focusing on future conceptual developments.[4]

Initially Interaction Design meant to get the task done, efficiently and as correctly as possible. Now, with the developments of technology and the reach of the internet to outside the office, Interaction Design is much more than that. We can think of Interaction as a product for entertainment and pleasure.[4]

## 02.01.03 USER EXPERIENCE AND EXPERIENCE DESIGN

Interaction Design has a major impact in User Experience. People could have immersive experiences participating and interacting. Experiences implies emotions, knowing the users needs, their feelings, behaviours and trying to understand them, plays a major role in developing successful digital solutions. Experience Design and User Experience are fields related with IxD and therefore, we need to go a little further on this subject.

People often choose between real needs and pleasure experiences. The willing to have an experience is more challenging than fulfilling real needs.[3]

Leaf van Boven and colleagues (2010) study some stereotypes regarding participants that were focused on material achievements and describe them as self-centered, insecure or judgmental; on the other hand people that have experimental orientation were more friendly, open-minded, intelligent and outgoing. Nowadays, our society gives more importance to the experimental side. Engagement is the key factor, experiences can take place anywhere at any time. User Experience is about creating something with a meaning and although it is the major focus, the knowledge gained by the user in that experience has become a really important factor in how to design experiences that could remain through time.[3]

This idea is based on the assumption that we feed ourselves with past memories that we have saved, rather than on immediate pleasures. So this means that when we create an experience, it can be kept in our memories and we can improve it during time. If we can build an experience that remains in our memory, we are doing it right, it means that it has impact and causes engagement with the user.[3]

An experience can be described in psychology as the integration of perception, action, motivation and cognition into a whole that has a meaning. An experience is a story, and that storytelling causes emotions, the sound, actions, thoughts and motives contribute to put it all together to a consistent experience. It is subjective, and it matters as a whole more than its isolated parts.[3]

To better understand this complex concept
of experience, we can look at emotions as the
fulfilment of psychological needs, those emotions
can cause pleasure or pain, meaning that they
can be positive and happy or negative and sad.[3]

Stories are the bridge to the experience.
They translate it and make the experience have
a meaning. However, we must distinguish between
the experience itself and the user experience.
The experience is a whole that aims to create
a certain sense, but the way the user experiences
it can be different from one another or different
from the aim of the experience.[3]

The idea of Experience or User Experience
focus on a mediator. It is important to reflect
on that and realize the importance of the user
experience in a singular way. Maybe in the future,
technology and cognitive science will allow us to
develop experiences for a unique person, and make
them really meaningful.[3]

Although experiences are more an emotional field,
it requires a technology or support to intermediate
it. So people can not have experiences if they
are not material oriented and this means that we
have to buy an electronic gadget to have access
to interactive experiences. We can't have an
experience without the means to do it.[3]

Experience Design can be set into three questions:
Why, that refers to the needs and emotions
concerning the activity; having that in mind we
can provide the What, the response to the need,
and How we can provide it. This mindset helps
to provide a simple way to reach the Experience
Design process efficiently.[3]

Meaningful experiences need to be developed
in a storyteller context, and that story should
provide emotions and further engagement. It has
to respond to a need - Why, What and How question,
and keep users motivated during that experience,
it should go straight to the user's emotions and
cause fulfilling and exciting feelings through that
process. We should also be aware of the technology
used to achieve that and the importance of
ubiquity nowadays.

## 02.01.04  INTERFACE DESIGN

Knowing the concepts of Human Computer Interaction,
Usability, Interaction Design, User Experience and
Experience Design we can now set our mind towards
the Interface Design.

Designing an interface fulfills a previously
established purpose. Being aware of the context and
the available technology is a key factor. We should
also consider user aspects, like preferences,
physical and emotional condition, also technology
aspects, regarding the available technical aspects
of the support, the environment, like context
of use, localization, noise and finally the social
aspects, like privacy, collaboration, etc. All
these aspects can influence the User Experience.[5]

The user should be naturally comfortable with
the display and its presentation, the tasks he
performs, navigation, structure, dynamics and
interaction are also important to contribute to
an effective User Experience. Being aware of the
users' previous experiences with similar tasks
is also important to design future tasks.[5]

The interface should provide all the needs
that the user will have using that interface
or performing a certain task. Having in mind the
device used, we should be able to design for it.
For example, it's different to design an interface
for a mobile or for a computer display as the
resolution is different and even the size of the
device can influence the use of the interface
as well as the way the user interaction with it.[5]

## 02.01.05  MOBILE INTERFACE DESIGN

Designing for a mobile device requires
a different mindset. Since it is mobile, we
must remember that the user might not pay too
much attention to it, the attention given could
be limited by the context of use or environment.

Because of this aspect it is important
to minimize the time to take a task, it shouldn't
have to require the input of lots of information,
the information displayed should be simple and easy
to read. Navigation through the interface should
be consistent and the same task should be performed
in the same area. We should avoid displaying
a lot of elements in the screen, also due to the
resolution, and to minimize the use of zoom.[5]

Nowadays we use a set of multi-devices in
our daily lives, and we count on those devices
to communicate with one another, so we could
provide experiences that come across multiple
devices. There are two ways of looking at this
subject. The first approach regards a sequential
usage, moving between devices to complete a task
and simultaneous usage that allows the use more
than one device to do the same activity. Dealing
with this information through devices can be
a challenge. The biggest problem in this idea is
the bad adaptation of the context of use and the
coordination between tasks performed in different
devices.[5]

We must be aware of the context of use of
the interface and if we want to use multiple
interfaces or if they should communicate between
them. Although it is important to have this
idea in mind, it is not necessary to use
if it doesn't has a purpose.

## 02.01.06 PARTICIPATORY DESIGN

Nowadays users often participate in the
creation or development of a concept or a solution.
Therefore, they play an important role on the
process of design. Users' relation with technology
and design is growing and we have to understand
them, as they are very often are co-authors of
the solutions or concepts.

There is a difference between designing
for users and designing with users. This is
a new approach on designing, focused on a new
perspective, methodologies, way of thinking,
feeling and working. It requires a new mindset
to look at people and reflect about them. We can
say that everyone has something different to offer
to design and a different opinion on how to use
it or do it. This can bring creativity and
even new ideas to design projects.[6]

Participatory Design melts the social sciences
with design, and that is quite recent. In fact,
the first experiments began in the 80's. These
experiments were made to understand and to
interpret the human point of view. It was called
User-Centred design process. In this process they
aimed to focus on the design ensuring that it would
respond to the needs of the user.[6]

The interface between both parts was worked by the researcher or scientist. This bridge pretended to make it easier to use and to respond to what the user needs to do or expects to do. In participatory experiences the user becomes a critical component of the process.[6]

## 02.01.07 THE USER

Understanding the user means designing efficiently. Although it is not an exact science, we can try to reach their emotions, feelings and behaviours. The way they act, more than the way they speak, tells us a lot about them.

Nowadays we talk a lot about design for experience but in fact we can't design experiences. Instead, the approach is to try to understand how people would react to certain experiences or how they would feel the experience. The human behaviour is on the spotlight more than ever to the design thinking.[6]

An experience is an activity developed through a certain time, and it requires two equal parts. On the one hand, what the user brings to the experience and by the other side what the experience bring to the interaction. When these parts communicate, then we can call it an experience.[6]

We will be better able to design for experiencing once we understand and access people's experiences - what they thought in the past, what they think in the present and the potential future. To understand the user we need to listen, interpret behaviours, make inferences about what users think, watch them, observe them, understand what they feel and what they aspire. Understanding people and what they do and say tells us a lot. Sometimes what they say is not what they do, so we need to observe closely and analyse behaviours, too. This can tell us how they percept experiences and by doing this, we can empathize with them.[6]

Another approach is to understand their dreams. They represent their future and therefore, their needs could be fulfilled. The new tools for understanding people focus on what they say, do and make and they are explored simultaneously and the more we understand them the more we can establish empathy and be successful.[6]

The "make tools" allows to perceive people's emotions through "emotional toolkits". Users make collages and diaries that show their state of mind, stories and dreams. "Cognitive toolkits" allow people to make diagrams, maps, processes and cognitive models. Every artefact tells a story. And by accessing people's feelings we can create a bound.[6]

We can no longer separate design, human sciences, engineering and the user, as well as the role of the researcher and the designer. These fields and roles are melting. The roles are interdependent and we can't think about them separately.

## 02.02 GAME DESIGN

Considering the role of the Interaction Designer, in this context, it is important to be aware of Game Design concepts and approaches towards it. Going a little further, it is interesting to acquire more knowledge about the concepts of persuasion, intrinsic and extrinsic fantasy and also be aware of different approaches in interfaces like tangible playful objects.

### 02.02.01 VIDEO GAMES AS A MEDIUM

Video games represent imaginary and real systems. They are an expressive medium. When players interact with those systems, they form judgments about them. Although video games are very successful, they struggle to be accepted as a cultural form.[7]

### 02.02.02 EXTRINSIC AND INTRINSIC FANTASY

Being engaged with a video game means being motivated to play it. There are two types of motivations towards video games: intrinsic and extrinsic.

Malone and Lepper (2014), wanted to understand how intrinsic motivations influence learning.[8]

They defined four categories that represented
the positive feeling caused by the computer game:
fantasy, curiosity, challenge and control. That
theory suggests that the level of engagement of
the player depends on his personal motivations
and personality. Not knowing what the player
will achieve, can also be important when playing
a game. The uncertainty causes curiosity and that
is engaging. The control level perceived is also
important for the player, more than the actual
level of it.[8]

We can think about the positive side of the
fantasy within the game to distinguish between
intrinsic and extrinsic fantasy. Intrinsic
fantasy can be described as the dependence between
the fantasy itself and the skill learnt during
it, they are related and provide a continuous
relationship between the context and the
instructions. Extrinsic fantasy refers to
the learning of a skill that will affect the
fantasy and not the other way round.[8]

The integration of the rule-system and the
learning content is more important than the
fantasy. If the fantasy provides an integral and
continuing relationship in the game, it should
be effective on educational context. Thinking of
intrinsic fantasy could not be the correct way for
educational games development that aim a different
objective from a regular video game.[8]

## 02.02.03 PERSUASIVE GAMES

Now that we have clear insights on motivation
towards a video game, we need to understand how
persuasive a game could be and how it could open
new domains in the context of Serious Games.

Ian Bogost (2007) says that video games work
through rhetoric procedures, which means that
they are build over a rule-based representations
and interactions instead of spoken words, images
or moving pictures. Recently, Serious Games have
been trying to implement video games on the support
of social and cultural positions. It has become
a tool for institutional goals, with which they
can change attitudes and beliefs. This power
towards video games in these contexts is due
to procedural rhetorics.[7]

Tenure (Figure 01) is a game that simulates
the first year of secondary school teaching.
The goal is to complete the first year and renew
the contract for the next one. While playing, the
user has to make successive decisions and those
decisions affect a lot of people. There are no
simple decisions, and each of them produces
a very complex situation in social, educational
and professional context. The game does not
provide any solutions, it rather suggests that
education takes place not only in the classroom.
All the other decisions in educational, social and
professional context can influence the game play.[7]



FIGURE 01 - TENURE

Procedurality refers to the way of creating,
explaining and understanding a process. In Tenure,
procedural rhetoric is suggested by the persuasive
and expressive practice at work. The process in
the game sets the path for defining how things work,
the methods, techniques and logics in the system.
Rhetoric refers to the persuasive expression and
its efficiency. Therefore, procedural rhetoric is
the practice of persuading through a process.[7]

Procedures are ways of doing things and
they structure behaviour. It can be read in
computacional and non computacional structure.
Processes in a computer are representational
and they are fundamental to its expression.
They operate in an inflexible system, therefore
mechanization overemphasizes rationalism. Still,
procedures create the logic that structure
behaviour.[7]

Fogg suggests seven types of persuasive tools.
Reduction, reduces complex behaviour into simple
tasks; Tunneling, leads the user to a set of
actions step by step; Tailoring, gives important
information in order for them to change their
attitude or behaviour; Suggestion, the program
suggests a behaviour on a certain moment;

Self-monitoring, allows people to monitor
their activities in order to achieve certain
goals; Surveillance, allows one party to monitor
the behaviour of another one and modifies it
in a specific way; Conditioning, refers to the
principles performed by the computer system
to change behaviours.[7]

Persuasion might only seem useful if it actually
persuades, that is, if the targets of the
persuasion change their minds or change their
actions.[7]

Wherever there is persuasion there is rhetoric
and wherever there is meaning there is persuasion.
Thinking about persuasion, it means the ability to
change certain attitudes or behaviours. We should
not be addressing everything, instead, we must
have a small target and use motivation triggers
to achieve it. What can keep the user motivated
is the framework of the system he is using and the
behaviour that it persuades to the user to have.

## 02.02.04 EMBODIED INTERACTION

Being aware of video games context, persuasion
and motivation we can now look further on how
interaction can be embodied and applied to games.

Some research has been done on the field of tangible
objects that are playful and promote interaction
between users. Embodied Interaction describes the
way we manipulate, create and share meaning through
an artifact. By doing that we relate to it and
engagement occurs.[9]

The concept of tangible interaction is framed
by Hornecker and Buur (2006) in four themes:
Tangible Manipulation, that addresses to the
tactile feeling towards the artifact; Spatial
Interaction, that refers to the physical space
in which the user is constrained; Embodied
Facilitation, the relation between objects and
the space itself and Expressive Representation,
that focus on the way the users use the artifact
and how they express themselves through it.[9]

ColorFlare (Figure 02) is a playful interface that
detects the player's movements and map them with a
color, it also communicates with other ColorFlares.
By doing this study, the author wanted to know how
children collaborate and create physical games.[9]

This aims to show the relevance of embodied
interaction in the social and physical context.[9]



FIGURE 02 - COLORFLARE

In this experience there were created objects
that allow the user to get feedback, the aim was
to stimulate physical play. There were created
open-ended objects, which means that they provide
opportunities for the user to explore input and
output options.[9]

Social interactions and physical play are
stimulated by playful interactions, because the
user can create his own goals and rules. Using
open-ended objects makes it possible to create
a large range of physical games. To design playful
interactions we should have in mind exertion
interfaces or exergames. We can describe these
two concepts as the requirement of exercise or
exertion. Also, when we think about this, we think
about a real world environment. This type of games
does not require screen based interaction, the
feedback is psychophysiological, competition
is often used to encourage social interaction.[10]

Designing an open-ended object means that we
are making a path on the way users play with it
or behave towards it. It is important to have in
mind the feedback, motivation, opportunities,
creation, rules and goals and therefore create
social player-interaction patterns.[10]

Cognitive and social skills are required in this
embodiment interaction. When controlling a game
with body movement it promotes social interaction
and the possibility of receiving feedback can
stimulate physical activity.[10]

Also, a direct link between the object and
body movement causes engagement. The aim of the
open-ended objects is to allow players to create
concepts, goals and rules.[10]

Being aware of this new approach towards games,
and the way they promote physical and social
activity, sets a new context of user interaction
and user experiences, although the open-ended
object seems more simple than a complexity of
a system in a game, it can provide the motivation
and engagement needed in a solution.

## 02.02.05 EVALUATING GAME EXPERIENCE

A video game is an experience. We need now to
understand how to evaluate that experience and
what keeps the user motivated and engaged.

It is necessary to evaluate the interaction
of the user during the process and how he can keep
motivated. These factors determine the failure or
success of the game experience. We need to evaluate
the experience, using some evaluative methods
focused on physiological and technical metrics.[11]

To evaluate this type of experience, within the
context of Serious Games, from the point of view
of Human Computer Interaction, User Experience
and Game Experience, we have to be aware of the
fact that the existing evaluation methods are not
developed towards Serious Games, therefore, we
have to be careful about the methods used because,
for example, performing a certain task could be
therapeutic.[12]

Malone's work (1980) has been influential on
game design, he describes challenge, fantasy
and curiosity as things that make the game fun
to learn and keeps the player motivated. However,
this could not provide methods for evaluating
game experience.[12]

Hassenzahl (2004) emphasizes that the initial
intention is not always accomplished by the player.
Regarding Serious Games, this is quite relevant
because most of the games are focused on the
pleasure, and serious games also aim other values.
Jordan (1999) proposed a pleasure model based on
Maslow's motivation model of human needs (Maslow,
1943).[12]

He describes four types of pleasure:
physio-pleasure, socio-pleasure, psycho-pleasure
and ideo-pleasure. The term playability has been
used by some researchers to apply a similar view
to this subject.[12]

During gameplay we can evaluate action needs
by recording player behaviours and emotional
responses, but motivational needs are difficult to
reach. Another proposed model for game experience
regarding temporal influences during game play,
such as before, during and after, proposed by
Fernandez(2008) should be considered to a good
basis for building an evaluation model.[12]

There are three important aspects of UX that
can help build a model for game experience
evaluation: addressing to human needs, affective
and emotional aspects of interaction and the
user experience nature.[12]

To design Serious Games, we have to know that
different people have different backgrounds, there
are many contexts of play, and in Serious Games
this is essential. In order to measure gameplay
experiences we need to have in mind that we
should adopt strategies from HCI and usability
to testing.[12]

Over time we can evaluate the gameplay experience
through three methodological categories such as
the game system experience that concerns the game
development process and test its functionality,
the individual experience, regarding
psychophysiological testing, eye tracking, persona
modelling, game metrics, player modelling,
qualitative interviews and questionnaires and RITE
testing, a data analysis that allows a rapid change
during the development process, and the quality
of the experience in a context, specially relevant
in the mobile games context.[12]

Some methodologies can be applied in order
to understand how the game is perceived such
as: ethnography methods that intend to evaluate
practices of a certain population, cultural
debugging regarding how cultural conventions
are perceived in different contexts, heuristic
methods, qualitative interviews and multiplayer
game metrics. Many factors could influence the game
design such as physical health conditions, time
of the day and so on.[12]

In Serious Games the individual experience is very
important because it will allow behavioural changes

and knowledge acquisition. We should also focus on affective measures for evaluating motivation.[12]

There are different learning theories: behaviourism, cognitivism, constructivism and social-cultural approach. There is an educational effort with video games, they aim to provide a learning experience with a specific goal. When the user plays and learns something we call it edutainment.[13]

Behaviourism describes that learning is a matter of relevant stimuli and response reinforcement. Repetition is crucial to learn and after that, it is necessary to give feedback with a reward. In the behaviourist approach regarding edutainment titles, extrinsic is preferred over the intrinsic concept. Behaviourism has proved to be very effective concerning health. Edutainment doesn't aim to teach a certain area, instead, it focus on training. Playing the game is different from learning from the game. Cognitive approach tries to integrate learning and game experience by building intrinsic motivation. Motivation could be found in the recognition of peers for example. Constructionism says that the concepts are not explicit but implicit, so edutainment with a constructivist approach refers to situations on game context that should be facilitated where there is a strong engagement with the game and the player will construct his own knowledge through the artifacts of the game world.[13]

There are several methods to evaluate the experience of the user while playing a game. To evaluate a game within the context of Serious Games, regarding educational and health, we need to be aware of its purpose and realise that most of the times the game aims for a change in the user's behaviour. It is extremely important to test with users and observe how they react to the experience.

## 02.03 GAMES AND HEALTH

Considering the previous research on Interaction Design we now need to go further into the proposed dissertation subject. We need to understand the context of Games and Health and what subjects are related to it. By acquiring more knowledge in this field we expect to have a clear idea about the subject and therefore this research should support the development of the project.

## 02.03.01 GAMIFICATION

We can describe Gamification as a paradigm that incorporates the metaphor of videogames in web applications and services.[14]

In that sense it is important to reflect on how this is leading the web, and the new users' behaviours.[15]

The Gamification theory is directly taking a major part in HCI. To the majority of users, the structure and logic of a videogame is part of their childhood, so this transition is neither intrusive nor completely disruptive. By using these videogames methods in the web, developers and designers aim to influence directly the behaviour of users and the way they interact with others.[15]

A good example of the Gamification theory is Facebook, which has changed the way people communicate and create bonds between them. Now the users can play games based on their networking cooperation. This is a rich experience in the web that causes a major engagement with the users, the web and the relation between them.[15]

This new engagement that Gamification provides can also be used in other contexts and with different purposes, for example motivating people to improve the quality of their health.[15]

Gamification is not necessarily the transformation of everything we do on the web into games. The idea is that the games are present but not in an immediate experience, they can be induced on the user, or simply use the metaphor, it is supposed to feel natural and therefore the user doesn't even realise that it is a game, or game based.[15]

The industry creates incentives that drive users to adopt certain behaviours. Kris Duggan lists three major categories that define the user's behaviour: the achievement of something, the group motivation and contextual communications.[15]

By keeping the user in a process of engagement and rewarding him, we are in fact creating a bond between the product/company and the user/customer. In that way we can control and predict certain behaviours and that is one of the most brilliant achievements in the Gamification approach.[16]

HIGH
MOTIVATION

TRIGGERS
SUCESS HERE

MOTIVATION

ACTIVATION
THRESHOLD

TRIGGERS
FAIL HERE

LOW
MOTIVATION

HARD TO DO    ABILITY    EASY TO DO
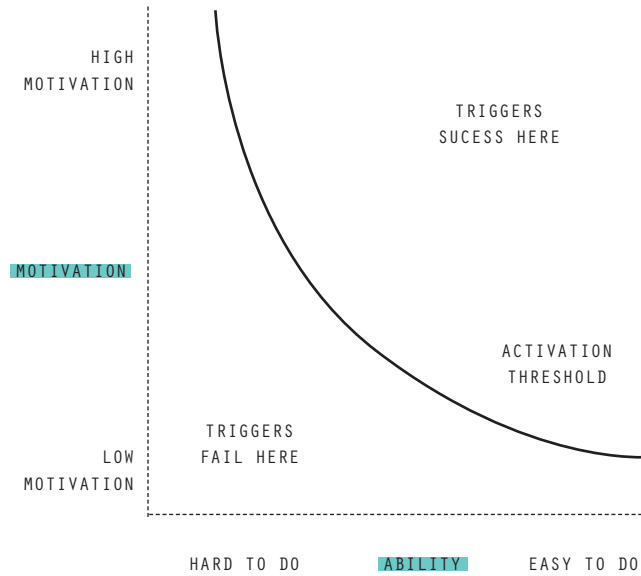
FIGURE 03 - FOGG BEHAVIOUR MODEL

The Fogg Behaviour Model (Figure 03) describes
the Gamification as: Motivation, the desire to
engage - personal interest, perceived value of
potential outcome, willingness to participate;
Trigger, trigger to prompt target behaviour,
it can either explicit (directing the user to
take action) or experimental; Ability, reflects
the individual's skill, time and mental capacity
to perform a task. This model, focused on these
three factors, helps to develop a successful
gaming system.[16]

The Gamification approach gives us new insights
on how to engage the user in an web or digital
based solution. This theory says that rewarding the
user or having videogame elements and/or mechanics
could provide an experience that creates stronger
bonds between the user and the product and at the
same time it is easier to understand him
and predict his behaviours.

## 02.03.02 SERIOUS GAMES AND GAMES FOR HEALTH

We now know that Gamification is being used abroad
nowadays. But using this approach doesn't mean that
we just use it for pleasure or fun. Serious Games
describe the games with educational purpose, either
academic, health care or professional context.

Serious Games aim to provide an engagement with
the users, motivating and educating the players.
Health Institutions/Companies have been increasing
the interest in this approach. They look at games
as an alternative treatment or side therapy. Video
games could provide positive attitudes towards
problems and that could modify behaviours.[11]

Engagement and positive effects in video
games activity are innovative ways to improving
health care. It is important to look closer
at these positive effects on playing games and
training skills. Although we do have the resources
to take care of our health, not always it seems
we take advantage of it. Most of the treatments
are not continued by the patients. Video games
are really changing the way we look at health
care. Games are not just fun, they can be Serious,
they could be designed to be educational or for
training. Games are now being seen as a side
therapy.[17]

One of the positive effects of video games is
that they increase motivation. Having in mind the
context of a patient as a user, this could be
a very powerful way of helping in therapy. Through
games the user can be educated and informed as well
as learn new skills. Playing games should also
provide empathy or viewpoints from different
people. For adults in the serious games
context we can also think about the capability to
learn cognitive, social skills for example that
could help a patient during the process
of recovery.[17]



FIGURE 04 - PLAYMANCER ISLANDS GAME

PlayMancer Islands Game (Figure 04), aims to prove that patients with behaviour disorders have potential capacity to change their cognitive process. The game has therapeutic game tasks, such as emotion recognition from speech audio data or motion tracking. In this game, researchers analyse the patient that also attends a specialist, plays the game every week and has therapy sessions. During seventeen weeks researchers analysed patients' behaviours. They aimed the patient to learn self-control relaxation, skills planning like working with impulsivity. Islands Game works like this: there are several islands and each of them allows the access to different resources that facilitate the patient character. On each island the patient completes tasks that are therapeutic.[11]
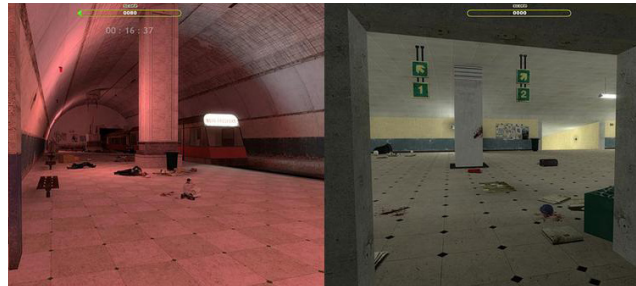


FIGURE 05 - CODE RED: TRIAGE

Decisionmaking Training In A Game Environment (Code Red: Triage) (Figure 05) was developed to test empirically a number of cognition-based design guidelines in crisis management training context. The aim of the game is to improve mental model construction. Little research has been done concerning empirical knowledge in designing learning games. As mentioned before, some games are more effective than others, so the goal of Code Red: Triage is to develop a game that can support this knowledge through a number of design guidelines, based on human cognitive system.[18]

Crisis management is the focus of studies developed in Code Red: Triage project. Time-pressure in dynamical and chaotic situations constrains the decision making in disasters environment. From a cognitive perspective the player is required to build a dynamic model representation that allows him to predict the direction of the events. The game acts like a reality simulation and the player is confronted with the consequences of his choices. A sensation of reality is given through the inclusion of sophisticated visual graphics, sounds and even

tactile sensations. This approach makes the
player have a more accurate sense of real crisis
management.[18]

Serious Games have a different purpose from
regular video games. They are focused on improving
decision making thought simulation of real
situations. In the two examples mentioned above
the goal is not to force a direction but let the
user be conscious of the actions he has made and
what it implies. Managing real situations with all
the choices and understand that all the decisions
causes reactions. By doing that the games are not
directly persuasive, they focus on developing
and improving cognitive skills and behaviour
patterns that should be helpful to apply in real
life situations. They have to practice logics and
reason instead of following pre-determined steps
in a specific situation. The major goal is to make
the user be aware of choices, decisions and his
reactions to them.

## 02.04 PSYCHOSIS

Going further, we now need to understand and define our
problem. To do that we need to some research and understand
psychosis and how it affects the user's behaviour, what are his
needs, expectations, weaknesses and therefore how we can support
him by providing a digital solution.

### 02.04.01 PSYCHOSIS

Understanding psychosis means getting closer to
the user. It is a very complex state of mind and
very personal for each one therefore very difficult
to reach.

Abnormalities of beliefs, thinking and perception
could describe a psychotic disorder. Those symptoms
are often related to other mental disorders and
they could be the result of drug abuse, medication
or toxin exposure. The deficits in the degree of
cognitive or neurobiological skills could predict
a psychotic disorder.[19] Psychotic disorders are
often characterized by delusions, hallucinations
and disorganized thinking.[19]

Delusions are described as fixed beliefs, and even when confronted with evidence that proves that they are not real, it's hard not to believe them. Some of the most frequent themes in delusions are: Persecutory, the belief that someone is going to be harmed or harassed by others; Grandiose, when the individual believes that he has exceptional abilities; Erotomanie, when they falsely believe that another person is in love with them; Nihilistic, when they are convinced that a major catastrophe will occur and Somatic, when the individual focus on his worries concerning health or organ function. Individuals with these delusions, believe in them so strongly that it is really hard to separate those thoughts from an idea. It is really hard to convince them of the opposite even with contradictory evidence. For peers those beliefs are really hard to understand and they find them bizarre.[19]

Hallucinations are vivid and clear, they are the perception of experiences, without any external stimulus. The individual does not take control and they have the same impact as a normal perception. The hallucinations could happen in any sensory modality, although auditory hallucinations are the most common ones. Auditory hallucinations are described as voices, either familiar or not, and distinct from the individual's own thoughts.[19]

Disorganized thinking is noticed by the individual's speech, for example when he switches from one topic to another, answers questions that are not related or have a complex connection. The speech itself could be incomprehensible because it is so disorganized.[19]

## 02.04.02 POST PSYCHOSIS AND RECOVERY

After a psychosis the individual loses cognitive skills and there is the danger of a relapse. During recovery phase individuals use severe medication and there is no pre established time for totally recovering from the psychosis.

A sense of reality should replace the fear and confusion once it passes. The individuals could recover the conscience of themselves, yet they have the notion that they could lose it again. Sometimes during the recovery, in the self-identity process of the individual, the discover

of a new talent could come along. Workins seems
to be helpful too. Having a secure house situation
is also very important.[20]

Positive attitudes and confidence play a major
role in this process. Friends and family also
play an important role during the recovery phase.
Combining those factors could help them believe
in themselves and the person they are.[20]

Initially the focus is on the control of
positive symptoms, and secondary effects like
insomnia and poor self-care. Through medication,
positive symptoms (the excess or distortion of the
normal function), as delusions, hallucinations and
thought disorder will be solved for most patients.
Part of the process is also dealing with negative
symptoms, which reflect a decrease in the loss of
normal functions. The treatment evolves to help
the individual to understand the psychosis and
overcome the trauma.[21]

In the post psychosis phase the individual needs
to be conscious of the disease and start to work
to recover some lost skills. Also, re bonding with
friends and family is very important to build the
individual's self-confidence. It is difficult to
establish a time for recovery, it depends on
the individuals.

## 02.04.03 STRESS AND ANXIETY

There isn't a standard way to treat individuals
with psychosis, each one is different and their
psychosis is personal. In that sense we can only
address to certain aspects that seem common in
a lot of individuals in this phase. Stress
management is one of those aspects that could be
a constant in several individuals. Also, cognitive
deficits seem to be a common aspect that should
be improved along with the therapy. Dealing with
adaptation or challenging situations could be
difficult because of the cognitive deficits.[22]

Reducing fear and stress is very important
in this phase. Biological predisposition and
environment influence the stress and vulnerability.
Working towards stress management is important
to empower the individual.[21]

Dealing with stress could also help on dealing with the illness itself and its consequences. For an individual with psychosis, due to the complex state of mind, the perception of a situation could increase stress. For the individual, it is important to manage stress because whenever they feel insecure about something or a situation, they respond to it with a change of the physical behavior.[22]

There is a need to cope between an emotion-focus level and the problem-focus. In an emotional-focus level the aim is to reduce emotional consequences of perceived stress actuators. To help with this, relaxation exercises such as breathing ones are very useful. By learning those control techniques, individuals could have a different perception of the situation and deal with it better.[22]

Problem-focus approach is the ability to improve the relation between those stress factors by reflecting and examining carefully those situations. Problem solving is a really helpful tool in those situations where the individual has to manage stress.[22]

Coping with these two methods could help the individual to develop strategies to manage the stress situations.[22]

## 02.04.04 COGNITIVE THERAPY

Cognitive therapy is part of the recovery process and the goal is, through changing dysfunctional patterns, address to behaviour and pathological feelings. This process is based on the relationship between the individual and the therapist. The focus is to change beliefs and thinking patterns into a more rational way of thinking. The cognitive therapy aims to increase control over psychotic symptoms and it acts as a side therapy that should go along with the treatment.[22]

In post-psychosis phase, in the early phase the problem-solving deficits are common. To improve the individual functioning, solving structured problems helps the individual to fulfill this deficit.[22]

In problem solving there are six steps: identify the problem; make a list of the possible solutions; choose one solution; develop a plan to carry on the solution and continue the plan and review it.[22]

There are two approaches on cognitive skills therapy. The first one aims to improve cognitive functioning by adding new skills or fulfilling the lost ones. The goal is to improve memory and attention. The second one uses environmental aids like visual prompts or memory aids, etc in order to attempt to adapt cognitive deficit.[22]

Cognitive skills could be divided in: Attention Skills, the ability to keep focused on one task; Divided Attention, the ability to remind information while performing a task, or doing two things at the same time; Memory, using memory to recall information from the past both short-term and long-term memory; Logic and reasoning, which is the ability to solve problems by using information by reasoning it from concepts; Auditory Processing, that is the ability to analyze, blend and segment sounds; Visual Processing is the ability to analyze and perceive visual images and it also refers to the ability of creating mental visualization based on concepts and finally Processing Speed that refers to how quickly a task is performed either simple or complex.[22]

Problem-solving is usually a technique used along with stress management, relapse prevention, cognitive therapy and social and skills training.[22]

Therefore, cognitive therapy is really important. It focus on fulfilling lost skills or it adds new one. Training the brain is very helpful for the individuals to manage their thoughts and reason on daily problems, either complex or simple. Several techniques could be applied and they all contribute to the improvement of cognitive skills of the individual.

## 02.04.05 SOCIAL REINTEGRATION

Over time the symptoms appear and change
and they are related to a gradual change in
psychosocial functioning. Some symptoms are:
Anxiety, irritability and depression; Cognition -
difficulty in concentration or in tasks that require
memory; Thought - unusual nature ideas that emerge
as a concern; Physical - loss of energy and sleep
disturbance and finally Social - loss of the role
in society that could cause deterioration at
school or at work.[19]

To individuals in this situation often lose hope
and motivation. Sometimes individuals lose their
jobs or their kids are taken away from them due
to the fragile condition of the individual. That
could lead to a depression and de-motivation. They
miss support, there is a sense of no future, no
plans, no goals. Medication could also influenciate
this state, it often increases sleep and appetite,
which could cause physical pain. Stigma and
discrimination causes the loss of relationships and
that leads the individual to isolation. The lack
of confidence, energy and friends also make romantic
relations very hard.[20]

Great suffering and loneliness are caused by the
loss of a social life and relationships. This pain
is specially reinforced by the need of love and the
feeling of belonging. Some patients deny that they
have a problem, and they expect that it will be
solved by itself, they only look for help when they
can't take it longer.[20]

In early psychosis, individuals have a deficit
in social skills, therefore they don't have a
big social network nor many friends. The basic
skills model consists on breaking specific social
behaviours into small behaviour components in
order to make it easier to deal with them.
Training social skills is very important to develop
competences such as assertiveness or simple motor
responses as eye contact for example.[22]

To facilitate social integration, meaningful
activities should be done. The amount of time to
achieve that depends on each patient's condition
and the type of social roles that have been
disrupted. Also, factors like self confidence play
an important role in recovering the social roles.[22]

Each individual is unique and therefore sometimes
it should be considered individual plans for them.
Creating lower expectations, could be a mean for
the individual to have the opportunity of discover
and explore his interests.[22]

Cognitive functioning help in the rehabilitation
and community function. In order to evaluate
functional abilities, occupational therapy is
very useful.[22] Peer groups are very supportive
for individuals and at the same time they provide
the opportunity to practise social skills. Social
support could be provided by the sense of belonging
within a support/peer group and therefore, this
could be a powerful way of helping individuals to
pursue their goals and get inspired by others.[22]

Developing or reinforcing social skills has
a major importance on the recovery of the
individual. Having support on this phase, helps
the individual to be more confident and therefore,
to rely on his role and on his relashionships.

## 02.04.06 FAMILY AND FRIENDS

In the early recovery phase, individuals
and their families need to be conscious of
their experiences, worries and be aware of the
possibility of new episodes in order to prevent
a relapse. It is very important as well, for
individuals to understand psychosis in stress and
vulnerability terms and lead families to monitor
those symptoms. Also, families could help minimize
behaviours that could be dangerous for
the individual and lead to the possibility
of a relapse.[21]

Communication within the family is a very
important factor in this phase. Hostility,
emotional over-involvement or critical comments
could be described as - express emotion. To lower
the expressed emotion, key interventions are used.
Constructive problem solving, increases social
networks and developing coping mechanisms are part
of the strategy to oppose the expressed emotion.[22]

The family could provide information regarding
individual personality characteristics, therefore,
they play an important role in assisting the
individual. Being aware of behaviour changes and
being supportive are the key functions of the
family. The more the therapist knows about the
individual the more he can understand him and
be aware of the urgency of a specific situation.[21]

During this phase it is also important to
assist the family. Sometimes they are forgotten
and neglected in this process, although they

play an important role in the treatment. The family
usually experiences confusion, guilt, anxiety,
sadness and anger when someone on the family is
diagnosed with psychosis. Mental illnesses are
often misunderstood by the society, so it is very
important to clarify the illness and demystify
it.[21]

Having a clear understanding of the illness and
being supportive to the individual is an important
part of the recovery process. The family should
support the individual and be supported as well.
Understanding the individual is very important for
the therapist. Therefore, the more the family is
involved, the more helpful they could be in
the prevention of a relapse.

## 02.05 SYNTHESIS AND CRITICAL ANALYSIS

Interaction Design is a concept that involves many others
towards it. We can say that it emerged from Human Computer
Interaction which is itself a multifaceted discipline that
merges various science fields. Initially the focus of this
discipline was the way that the user relates and performs tasks
in a computer. Soon other disciplines got involved in HCI, and
did some research on how to evaluate and create a methodology
towards this process.

Usability is the concept that describes the performance
of the user while doing a task. Related to these disciplines
Interaction Design emerges. It can be described as the way
we shape and design things for the people's use. And by using
them, people have experiences. Experience Design aims to create
meaningful experiences, which are developed towards a story, it
should provide emotions and engage users. Getting closer to the
user is a major factor to success. Understanding their needs,
feelings and emotions helps us define the problem to which we
have to design an answer. We should be able to respond to
the Who, When and Why of our solution.

Concerning the research question presented to the team
Games4Therapy, designing a digital solution for people who had
psychosis, was important to do research on the fields of Serious
Games and Psychosis. Designing games for health implies knowing
its purpose in the therapy context. The user of this type
of games aims to accomplish some physiological skills, improve
them or change their behaviour. Keeping the users engaged means
gamifying the game towards their motivation. This means that
the game has to have a serious purpose and be playful
at the same time.

The user is an individual that had psychosis for the first time. Psychosis could be described as a very complex state of mind and it is very difficult to address to it on the precise phase that it is happening. During a psychosis individuals have difficulty in distinguishing reality from delusions or hallucinations. Heavy medication is used in the recovery, along with therapy.

Many times it is difficult for the individual to get his life back after the first episode. They need to work on the cognitive skills that they have lost as well as in the social skills and relationships. Having the support of family and friends is essential for preventing a relapse and helping the individual to recover his self-esteem. Most of the times the individual suffers from stress and anxiety.

Clearly understanding: the user, their emotions, feelings, behaviours, aspirations and practices gets us close to the solution. Designing a solution means working on a process, it is about transformation and shaping. The solution must suit a purpose and it has to be meaningful.

# 03 METHODOLOGY

In MediaLab Amsterdam students conduct applied research on innovative interactive media applications with partners from the creative industry and education. The goal is to do research within an innovative character to provide digital solutions. Each team has a focus on one specific subject. Each team member has an expertise, there are designers, researchers, programmers, media experts, copywriters and storytellers.

During 20 weeks each team is challenged to develop a solution and at the end a working prototype. The teams are guided by a coach that leads them and also have the support of experts in design, visual thinking and programming. During the semester students also have workshops that guide them through the process.

## 03.01 DESIGN CYCLE

The Design Cycle is a method used for problem-solving. The goal is to help to create and evaluate solutions in order to respond to a challenge. The method involves researching, planning, solving, designing and developing. In each sprint the mentioned method is developed, it starts with a planning meeting where tasks are defined and the goal of each sprint and its duration. At the end of each sprint a deliverable should be presented, either research achievements or prototype experiences.

## 03.02 SCRUM BOARD

Using the Scrum Board is a method implemented to help the teams organize their time towards their goals. Also, it should provide the effort each task demands and what it will need to be considered done. Everyday, the team has to do a stand up meeting where they reflect on what they did in the previous day and what they are going to do during the present day. The purpose is to have a guidance on who is doing what and to establish real goals for each sprint.

## 03.03  WORKSHOPS

In MediaLab Amsterdam we have workshops that support the
development of the digital solution. These workshops aim to
provide guidelines towards the design process and the methods
used to improve the workflow, as well as design thinking and even
business oriented strategies.

In Tinkering workshop we experienced the use of the Makey Makey
(Figure 06), using Scratch to programme it. The goal was to
build a quick game prototype based in the Olympics using
conductive materials (Figure 07). We developed a sword game
that when a sword touched the opponent it emitted a sound.
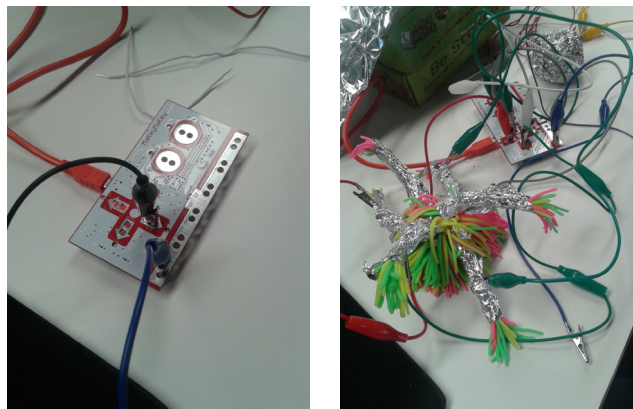



FIGURE 06 - MAKEY MAKEY



FIGURE 07 - SWORD GAME FOR THE OLYMPICS

In the Scrum workshop we learnt how to use Scrum during the
project development. Scrum is a method used in many workplaces.
The goal is to use stickers with tasks and their definition of
"done", so each day everybody knows what to do and who is doing
what. Also, it requires daily meetings where teams discuss what
to do and at the end of each sprint a review should be done as
well as a retrospective on the work performed in that sprint.
Although this method was implemented, it didn't work out for

our team – Games4Therapy. We found it really hard to fit
a creative and research process into specific themes or define
how many hours we would spend on it. As a team we found our
own way of working.

Charlie Mulholland led us into the workshops of Problem
Definition (Figure 08), Ideation (Figure 09) and Idea Selection
(Figure 10). During these three workshops we did brainstorming
about our subject, our target, their needs and focused on our
problem. We clustered our ideas, selected them and thought about
the requirements list. In the Ideation workshop we learnt that
failing is good, bad ideas are important to explore because
they can turn into good ideas. It is important to understand the
problem, recognize patterns and listen to the experts.
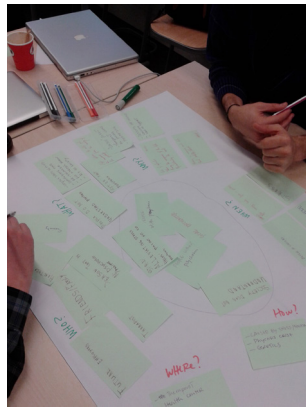


FIGURE 08 - PROBLEM DEFINITION
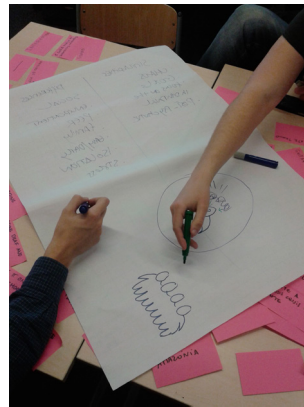


FIGURE 09 - IDEATION



FIGURE 10 - IDEA DEFINITION



FIGURE 11 - VISUAL THINKING

In the Idea Selection workshop we selected three concepts
from our ideas. The idea is implicit in the concept. A concept
starts in the idea, the concept is a more structured and defined
way of representing an idea. Also, we need to be aware of how
innovative we want the concept to be. It should be a vision of

the future. We should allways test it, making a bodystorming could also be very helpful. A bodystorming is a concept that describes a creative way of having new ideas, acting as if the object already exists and using an object that simulates it or even an individual acting like the object.

In these three workshops we learnt how to select our ideas, understand which ones were relevant and tried them to see if they worked. The most important achievement was learning not to be afraid of bad ideas and never avoid saying an idea or criticise other people's ideas because they can lead us into a good idea.

Another Interesting workshop we had was about Design Thinking (Figure 11), with Miren Fernandez Larrañaga. We learnt the basic principles of drawing simple elements that could translate ideas. Representing ideas by drawing them is much more appealing and it is a universal language. During the semester, we have often used this new technique to represent ideas and concepts.

We have also learnt how to write proper scientific papers with Marco Van Hout. In this workshop we learnt that we must write to express ideas, we should be precise, everybody needs to understand and have the same focus. Each paragraph should be related to the next one. The ideas should present persuasive arguments and show evidence. It should be structured, responsible and supported by reference books and sources. We should read and review, create the outline and write again, revise, edit and proofread. The topics should be organized into introduction, main ideas, research question, supported ideas and conclusion. The structure of a paper should be: abstract, introduction, body and conclusion.



FIGURE 12 - PROTOTYPING STREET GAME

Another important workshop was presented by Tamara Pinos – Prototyping, low to hi-fi fidelity. Low fidelity prototypes are paper prototypes (Figure 12). They help us understand what we are doing and test it to see what is important and what we

can discard. It is important to observe the user interacting
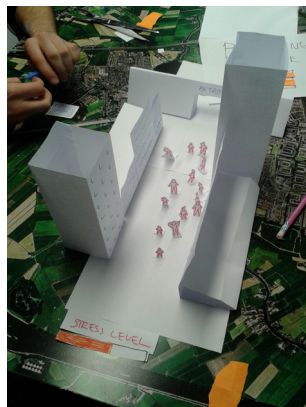with the prototype. Prototyping is about people, what they feel
and their needs. Therefore, observing users should lead us into
designing a more effective solution. Hi-fi prototypes should
be done when the concept is really clear. It is very close to
the final prototype. We also get aware of tools where we could
test prototype for mobile and web such as Popup and for
data visualization Raw.

In the Usability Testing workshop, presented by Jochen Riester,
we get close to the user. We defined 4 types of users and tried
to understand how they feel and behave. The four types could
be described as: the emotional type; the user that is confident
only when he wants; the user that goes by his emotions and
cognitions, not confident, confused and the user that believes
in the powers of the universe. By doing this analysis we wanted
to understand how they think and feel and how they would react
to decisions and behaviour.

Marco Van Hout led the User Experience Design workshop.
We started by understanding how emotions emerged in the design
discourse. That evolution makes the difference for consumers.
Engaging people through interaction and ease of use has been
emerging in the last years. User Experience is the sum of the
parts and their relation, not just usability, task performance
or error. Focusing on this in an isolated way doesn't solve
anything. We should be aware of social and cultural context
and also how previous experiences and expectations influence the
interaction. User Experience is a complex concept, it relates
to the world, it relates to the use of a system and how
people use that system.

Experience itself is subjective, where product qualities need
to be perceived, it is holistic, has goals, it is situated,
depends on context, dynamic, it changes orientation over
time and it causes pleasure and pain, or both. It is very
difficult to measure emotions. Emotions are brief and intense
and User Experience can encompass positive and negative
emotions. Emotions are important in Ux because they guide our
perceptions, feelings, memories and behaviours, they are not
the same as affect, mood or attitude.

There are several ways to evoke emotions in a product. Giving
a personality to a product is one way, also embodiment, using
facial expressions and posture or mediating touch without
touching, human features in non human objects - Anthropomorphism
is also a way of evoking emotions (Uncam Valley, is a product
that feels like human but is not, we have an awkward feeling).
And at last Skeuomorphism, which is a design principle where
cues are taken from the physical world. All these approaches
could evoke emotions with the user.

In the Interaction Workshop, presented by a designer from
Soda Studio, the main insights we had were to design for what
our users are. In that sense we need to contextualize current

technological tools available. We need to be aware of where
our users fit in, if they are novice to the technology or
experts. We should facilitate users' tasks. The IxD flow puts
the concept in the middle surrounded by technology, business and
users. From users we go to the wireframes, graphic design and
programming. Design decisions are involved in each step. In our
product we need to fulfill functional needs as well as emotion
needs, and those are layered and are complex.

Concerning Emotion Design and how to get there, we thought about
Customer Journey (Figure 13), and all the moments that required
a service. In every moment emotional needs changed.
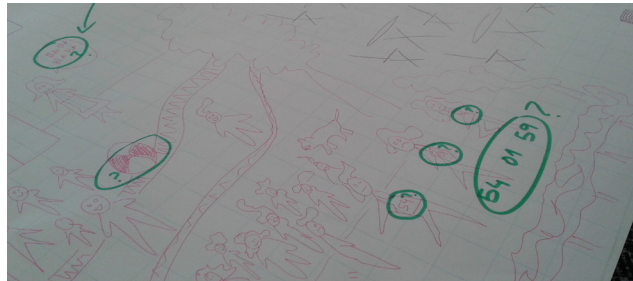


FIGURE 13 - INTERACTION WORKSHOP

The final workshop we had was about Business Model Canvas. The
goal was to think about how to make the project work in the real
world. The main ideas we got are that we have to be passionate
about our product, we need to build a business model canvas
(Figure 14) to explore customers, evaluate value propositions,
key resources, partners and finally evaluate and look back.
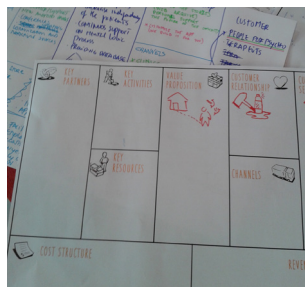


FIGURE 14 - BUSINESS MODEL CANVAS

During the workshops we have always directed the proposed
assignments towards our own project. By doing that we reflected
on a lot of possibilities and it helped us to define our work
plan and method. A lot of insights along with knowledge came
out of these workshops. Our ideas were shaped towards design
thinking and the process it should follow.

# 04 DEVELOPMENT

Design is a process. It's about people, their needs,
their feelings. It's about testing, designing and testing it
again. Developing a concept starts by understanding our user and
therefore the problem and its definition. By doing that, we
should move towards a solution.

## 04.01 USER SCENE

To better understand our problem, we needed to understand
the user, so, to achieve that, we started by doing some research
on psychosis, what it is, how it affects people's lives and the
surroundings. We started by talking with our assignor and tried
to understand about the process of dealing with an individual
that had a psychosis and about the recovery process. We also got
insights from a user that had experienced psychosis and tried
to understand how he was dealing with the disease and how
it affected his life. By understanding the user and doing some
research we expected to develop a concept or idea that could
fulfill the users' needs.

From the insights from our research and user testimonials
we tried to demonstrate how we saw the user, and how he behaved
in a certain situation. We wanted to demonstrate our point
of view on the individual's behaviour. We aimed to demonstrate
a specific activity, context, emotion and conflict. We demonstrate
a normal situation for everybody, but from the individual's
point of view while he was having a relapse into psychosis. The
individual is going to a job interview, which is a stressful
situation for everybody and suddenly in his mind he starts to
make a lot of associations and his thoughts get more and more
complex towards a certain subject. We aimed to demonstrate how
this could be seen, through the eyes of a psychotic individual.

See Attachment 01. User Scene

## 04.02  STAKEHOLDER ANALYSIS

Our Stakeholder is Arkin, which treats people with psychiatric disorders and complex mental health and addiction problems. It also conducts scientific research and training in this field. As a team, although Arkin is our major stakeholder, also users and MediaLab are. As second level stakeholders we have user's families and friends, therapists and job coaches form Arkin's VIP programme (Figure 15).
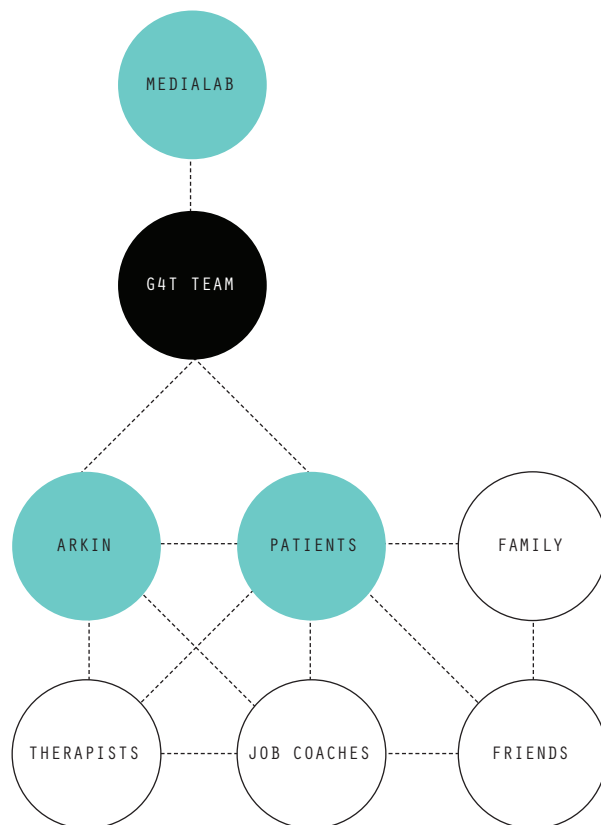


FIGURE 15 - STAKEHOLDER FLOW CHART

## 04.03  SPRINT 1

We have talked to our assignor and started to get more focus on the post psychosis phase. In this phase the individual needs to be supported in many levels to get back to social activities, relations, jobs or school. From conversations with specialists we understand that psychosis is a different experience for each person, so we set our mind towards finding patterns that could reach all the users.

We have started to do some brainstorming towards important
needs that we wanted to fulfill, so we have built paper
prototypes that reflected our ideias. Based in our meeting
with specialists from Arkin we started thinking towards
responsibility, time-management, and how to keep the mind
occupied as well as socialization.

## 04.03.01 CONCEPT DEVELOPMENT

For this sprint, our goals were to develop
a solution that focused on socializing, increasing
self-confidence and gaining responsibility.

To promote socialization, through task management,
we thought about an interactive calendar that aimed
to track free time and suggest social activities
with friends that were physically close or were
sharing the same mood.

In order to manage stress we thought about
a breathing controlled game. Remaining calm
should also contribute to the increase of
self-confidence. We also perceived the need, from
the conversations with experts, for the user to
keep the mind occupied.

To occupy the mind we thought about concentration
games. We also thought about the importance of
keeping a personal diary to monitor the user,
and how we could make this useful for the
therapist. Gaining responsibility is also one of
the purposes of the therapy. Having that in mind we
thought about the idea of taking care of something,
like a pet. This pet should be the bridge between
all the functionalities that the app has and the
user's daily agenda.

We proposed "U" (Figure 16 and 17). An interactive
agenda that operated through a pet that the user
had to take care of, feed and put to sleep. This
was a virtual pet. The pet's needs were related to
the user's needs. For example the bed time should
be linked to the bed time of the user, as well as
the food time, activities, etc. The games proposed
by the pet should focus on mind games and stress
management. Also, the pet should suggest physical
activities in order to help the individual to
go out and meet with friends and family. The pet
should also provide feedback and reward the user
when he was performing positively.
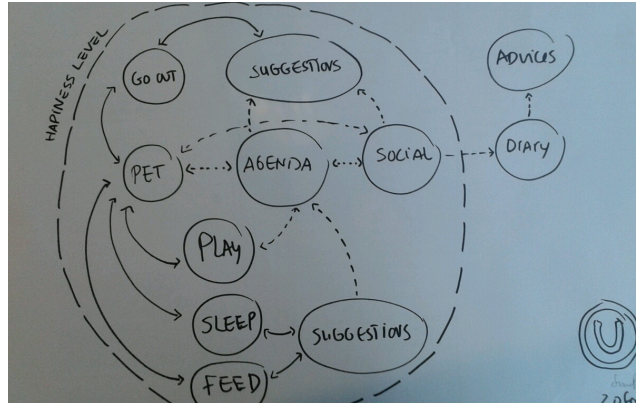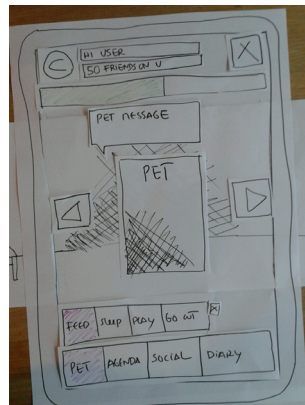
FIGURE 16 - DATA FLOW STRUCTURE



FIGURE 17 - "U" PAPER PROTOTYPE

## 04.03.02 CONCLUSIONS

After having presented our approach to our
assignor, we realised that we were addressing to
too many things at the same time. After that, we
decided that in the next sprint we would focus on
small problems and try to solve them instead of
addressing to too many things at the same time.

## 04.04 SPRINT 2

We changed our mindset and tried to simplify concepts and ideas in order to respond to a specific need. In order to do that we decided to address to a specific target within a certain context. We decided to write user's stories based on individuals who had just had a psychotic crisis. They were under treatment, had a therapist, were unemployed, had a supporting system like friends and family or other, had no children, didn't have any physical activity, the family situation was stable, they understood psychosis but didn't like to talk about it often and were adaptive natives in the Netherlands.

## 04.04.01 CONCEPT DEVELOPMENT

In order to continue our process and start prototyping we decided to write user's stories and based on that we started developing simple ideas that could fulfill the users' needs.

We focused on stress management, communication, brain exercises and breathing exercises. In this sprint we wanted to understand the relations between the user/objects, user/user, user/family, family/objects and family/family. Also, how the users relate to games and objects and how they experience physical manipulation or multiplayer scenarios. We did research by designing first, so we started prototyping our ideas based on our research and insights from experts.

See Attachment 02. User Stories

In this sprint we decided to try our ideas towards stress management and communication. We developed a few prototypes and evaluated them.

An aspect that seems to be constant in individuals in post-psychotic phase is stress management.[22] We also wanted to help individuals to communicate and rebuild social skills. Embodied Interaction seemed to us a way of providing that. The type of games that use tangible interfaces could promote physical and social interaction.[10]

We started developing low-fi prototypes based on these ideas. We thought of a stress ball that could communicate with other stress balls through vibrations and light signals. The goal was to create an object that acted like a stress reliever by pressuring it and at the same time, by doing

that, it would enable communication with peers
in order to create contact and possible relations
between users. The user it  send a signal to
a friend that would receive it and send him
some feedback to calm him down. We built the
prototype (Figure 18) using LittleBits, LEDs,
a bending sensor and a vibration mechanism.





FIGURE 18 - STRESS BALL PROTOTYPE

See Attachment 03. Stress Ball Prototype

Individuals in post psychotic phase often have
problem-solving deficits. Solving structured
problems helps the individuals to fulfill the
individual functioning.[22]

In the next prototype we have developed, based on
research, we wanted to explore concentration games
to fulfill the lost cognitive skills. We aimed to
develop a game that could keep the mind occupied
and motivate the user to play the game. We started
by exploring the Simon Says memory game. In this
game, the user has to repeat a color sequence that
is generated by the game itself.

The sequence will get longer and longer, and the longer the user can reproduce the sequence, the higher his score will be. We made a version in Scratch and used Makey Makey to build the interface (Figure 19). We did build an interface because we still wanted to explore the creation of tangible interface and see how the user related with it.
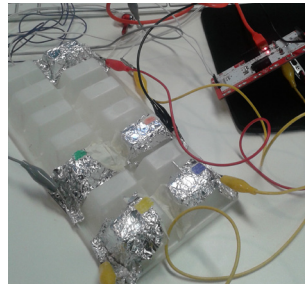


FIGURE 19 - SIMON SAYS GAME PROTOTYPE

See Attachment 04. Simon Says Prototype

Still focused on stress management we found out that breathing exercises were very helpful to remain calm.[22] We started developing ideas towards a biofeedback game (Figure 20). We programmed a simple game in Scratch, and using an Arduino and a Piezo sensor the user could control the game by breathing into the sensor. The game started normally and it got difficult or more chaotic if the user didn't breath calmly. By doing this we wanted to help the user to control the breathing in order to remain calm and by doing that he could intuitively remain calm in real life situations.
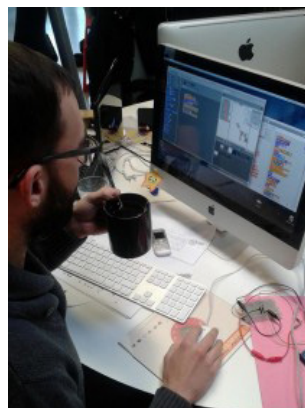


FIGURE 20 - HELICOPTER GAME PROTOTYPE

See Attachment 05. Helicopter Game Prototype

After developing this prototypes we met with the
Game Design teachers and they gave us new insights.
We needed to test our ideas a little more.
Concerning the breathing game we soon realised
that using the Piezo and breath into it was not
working, it didn't measure breathing accurately.
We also wanted to test if users could use a regular
microphone (Figure 21 ). We found the same problem,
because of the surroundings it was very hard to
measure the breathing, although this idea
of biofeedback continued to interest us.
Based on promoting communication within users, we
though about an object - speakers, that could link
families and friends through the recording and
feedback of voice messages (Figure 22).
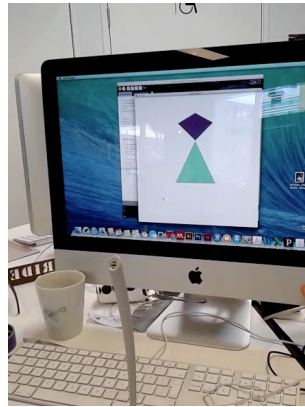


FIGURE 21 - MICROPHONE TESTING PROTOTYPE

See Attachment 06. Microphone Testing Prototype



FIGURE 22 - SPEAKERS PROTOTYPE

See Attachment 07. Speakers Prototype

Later we developed a Simon Says Multiplayer
version to test if we could promote communication
and social skills (Figure 23).
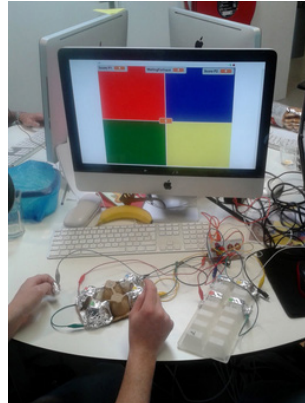


FIGURE 23 - SIMON SAYS GAME MULTIPLAYER PROTOTYPE

Still focused on communication, we developed
a game that could trigger conversation. We had an
actor that asked questions to the users (Figure 24).
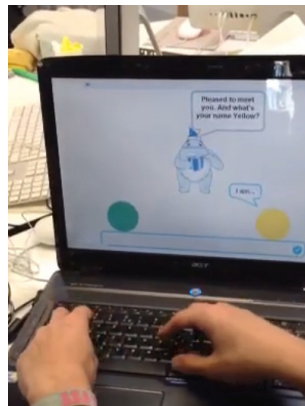


FIGURE 24 - CHAT GAME PROTOTYPE

Concerning biofeedback we wanted to go a little
further on this idea. We thought about a game that
could simulate a real environment, like a street.
The goal was for the user to get to the entrance of
a station. On his way he had to face a crowd. If
the user was not breathing correctly, the scenario
would start to shrink and would get more crowded.

FIGURE 25 - STREET GAME PROTOTYPE

See Attachment 10. Street Game Prototype

We did test the games to understand if our ideas
were viable. We did a user observation test session
with secondary users.

## 04.04.02 PROTOTYPE EVALUATION

With the stress ball we wanted to understand how
we could provide multiplayer interaction through
a physical object.

By observing secondary users we noticed that
the way people related to external objects seemed
to stimulate interaction and emotional contact to
the object itself. So it was a positive response to
the manipulation of the object, it was playful and
provided a different way of communicating. On the
other hand, by introducing a new object into the
user's life could be an obstacle, due to the fact
that the user needed to adapt to a new way
of interacting.

Memory Games also seemed interesting for secondary
users. The users were very engaged with these games
and wanted to challenge themselves. One of our
goals was to understand if the physical interfaces
could add anything to the experience of playing. It
didn't seem that adding the new interfaces would
add any value to the experience of playing the
game. In the multiplayer version that we developed,
users seemed confused about its functioning. We
noticed that the use of the sound to memorize the

sequences was very important. We tested the use
of a microphone in our breathing games prototypes.
With this test we wanted to understand if we could
use an already existing object in the experience.
We used a processing code that detects the sound
from the microphone. A graphic object would move
according to the detected frequency. It was proved
that measure breathing is very sensitive, the
sounds from the surroundings have a lot of
influence on that.

In The Helicopter Breathing Game we aimed to
train a person to breath correctly. In this game
the user had to chase an helicopter around with
an airplane. However, when the user didn't breathe
correctly, the screen would turn darker and the
helicopter would get faster as it tries to dodge
the user. The interaction between the virtual side
and the physical side gave the users a feeling of
empowerment. Combining physical interaction with
the virtual game was positively received.

Measuring breathing accurately was proved to be
very difficult. In order to measure his breathing,
the user had to blow into the sensor. Therefore
the iteration was not capable of teaching a good
breathing method.

The Street Game was developed to see if we
could make the Helicopter Breathing Game concept
a more interactive and engaging experience. In
the paper prototype we realised that combining
physical interaction with the virtual game was
positively received. Also, it worked as a metaphor
for individuals.

Being focused on communication, we developed
prototypes. We wanted to see if we could use
a third actor to trigger conversations between
two users. We wanted to know if it was possible
to overcome social anxiety through a chat service.
Users did like the questions and thought the
concept was interesting. The questions themselves
were personal and the answers unique. Conversation
was triggered, which shows promise. But because
we lacked breaks in between questions, people were
only curious about the next question. The testers
sat next to each other, which means it wasn't
anonymous or "safe".

In the Voice Messages Device we aimed to promote
communication and support for families, users and
friends. Families also suffer from stress in these
cases and they have many doubts on how to deal
with it.

The speaker was a tangible object that could
be provided by Arkin. The idea was that families/
friends/users could leave their questions and also
get feedback, using a wireless connection and voice
recording. According with the information in our
research, technology can be quite complex. Since
we could not create a useful prototype, we could
not test it properly.

By developing all those prototypes we learnt
that testing provides a more specific view of
the concept we had visualized. Communication
between multiplayers seemed to be a strong idea
for providing support, social interactions and
connection. Using physical interaction to play
a game could help on stress management and engage
the user with the game itself. It also reminded
us of our power over our body and its presence
in every action that we take.

## 04.04.03 CONCLUSIONS

It has been proved to us that psychosis is
a very complex subject to address. We can neither
solve it, nor provide a solution for it. But we
can support individuals in the recovery phase
by providing solutions that could fulfil physical/
mental needs. Stress and anxiety release, brain
training games, communication and socializing
and create awareness are aspects that we could
address in our solution.

For the sprint 3 we wanted to start testing
with users or get them involved in our concept
development. At this phase we were towards two
directions: addressing communication and physical/
mental training. In the sprint presentation the
assignor seemed interested into the breathing
concepts we created. Therefore we were focused
on researching and testing towards the
biofeedback game.

## 04.05 SPRINT 3

In this sprint we focused on developing a more accurate breathing device. We wanted to explore the biofeedback games. We did some more research on this and developed a prototype to test it.

## 04.05.01 CONCEPT DEVELOPMENT

Our focus was still on the stress release and the breathing techniques to support that to users in the post-psychotic phase. In this phase we can find some patterns among individuals and therefore there are some aspects we could address in our solution.

The post-psychotic phase takes time. Reducing fear and releasing stress are very important in this phase.[21]

By breathing in a slow, steady and deep manner, a person's heartbeat slows down and relaxes, blood pressure become normal, stress hormones drop and muscles loosen. Proper breathing exercises can help to solve the severity of these symptoms, increase muscle strength, and improve posture and mental ability.[24]

Also, for the individual it is very important to have a social integration. Meaningful activities should be done. The role that the individual plays in social context could increase self-confidence. Having the support from peers also contributes for the sense of belonging and could help individuals in this phase.[22]

Based on these ideas, we wanted to focus on reducing stress and at the same time relating that with the promotion of social communication and integration. The biofeedback multiplayer game developed in this sprint focus on stress relief through a breathing control game system.

The use of physiological signals in games are a huge tendency. The real-time processing of those signals are presented as an alternative to the interaction with computers in a much more intuitive and natural way of communicating. An innovative technique for game interaction is based on breathing - measuring the respiration. The player could interact in a much more natural and intuitive way with the game environment. This trend in games is being explored in different technologies that use physiological signals

for input. Cardiovascular, electrodermal, muscular tension, ocular, skin temperature, brain activity and respiration measurements are physical signals that can be measured. Physiological signals are reliable, sensible and provide real time feedback and that could enrich the game interaction as well as offer insight on mental and physical state.[23]

Respiration measurements are usually obtained by the use of a belt sensor placed over clothing in the abdominal area or around the chest. Through a breathing device we can have access to respiration rate, respiration period, respiration amplitude, speed of inhalation, speed of exhalation. Physiological signals provide potential for a natural and intuitive game interaction. They provide favourable characteristics as a gaming input device, as well as a medium to evaluate and enhance the player's experience.[23]

Based on the previous research, we wanted to prototype a functioning game that works with a chest band that could measure breathing. By breathing correctly the user could interact with the game and command it. We also thought that this could be a multiplayer game. So each level had a challenge related to the intimate proximity of users. Therefore, for instance the first level should be played with the closest friend/family. The goal on doing this was to help social integration. The more the game progresses the more non intimate teamed users should be.

The game itself should suggest simple concentration tasks that could improve cognitive functioning. The goal was to improve memory and attention.[22] At the same time the user should be engaged by the challenge and also unconsciously breath correctly.

## 04.05.03 PROTOTYPE

The game mechanics was based on using biofeedback and the breathing pattern. The game challenged the player by level to increase confidence by playing with other users by intimate proximity. At the same time, the game in each level aimed to support the cognitive lost skills, by using memory elements, concentration and attention features.
In the first screen the user had to calibrate his breathing by following the steps. After that he could choose five friends by the level of intimate

proximity. He starts to play with the closest person. The goal is that the user, at the end, can play with a range of unknown users (always within the Arkin network). By doing that, the users that were playing in the same game/level had to work as a team and trust each other.

To measure breathing we developed a chest band (Figure 26). We used conductive fabric, a rubber band, a Piezo and Arduino to read the values. We developed the game in Scratch for Arduino. Its functioning of it was quite simple. When the chest band was stretched because of the breathing, it detected values from the Piezo. Piezo has crystals inside, if they move they generate a value. That value was processed by Arduino. We mapped the values and the time those values were on. By doing that we could detect the breathe in, out and hold. This way we tried to map the breathing of the user.
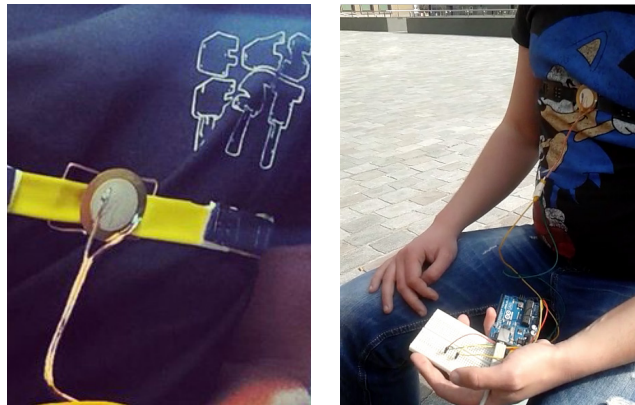


FIGURE 26 - CHEST BAND

See Attachment 11. Chest Band Prototype

The game story itself should be simple enough for the player to understand the physical input in the game, so our goal was to create games based on balance and expertise skills.

For instance in the first level the goal was to balance a ball during a certain time. To be balanced the users should breathe correctly, otherwise the ball would start to fall and they would lose the game. The ball should stay on the board without falling into the floor, by breathing wrongly the board gets unbalanced and the ball falls. Another idea was directing the ball into a tube without touching the walls. Another idea was to move the ball within a crowd of balls, always controlled by breathing input (Figure 27).
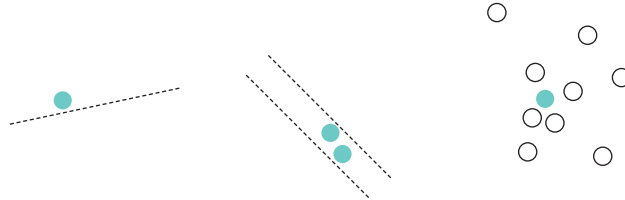
FIGURE 27 - BIOFEEDBACK GAME LEVELS

Having decided about the game mechanics, we started
developing the code and the layouts (Figure 28).

## keep it

TO CALIBRATE GAME INHALE, HOLD, AND EXHALE

INHALE
**3**

---

## keep it

BREATH AT THE SAME TIME THE PLAYER 2.
DON'T LET THE BOARD FALL!

START

JOSEPH   I'M READY        READY?   YOU

---

## keep it

BREATH AT THE SAME TIME THE PLAYER 2.
DON'T LET THE BOARD FALL!

**3**

JOSEPH   I'M READY        READY?   YOU
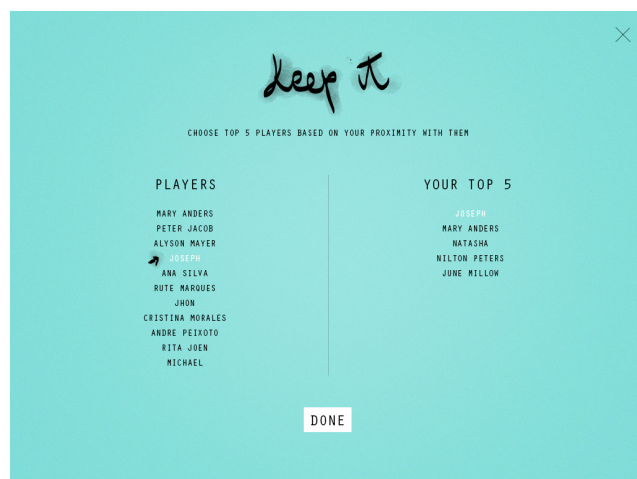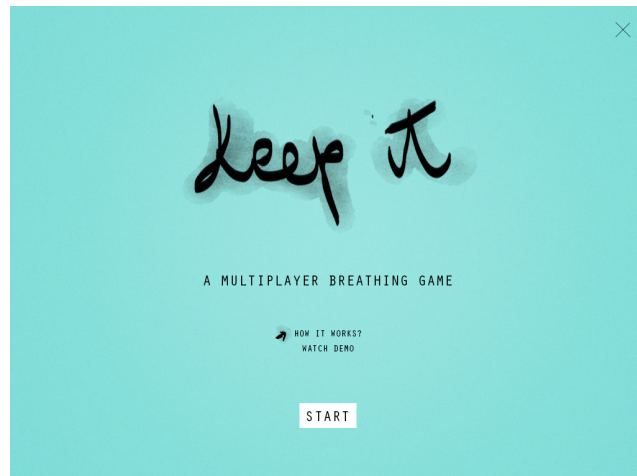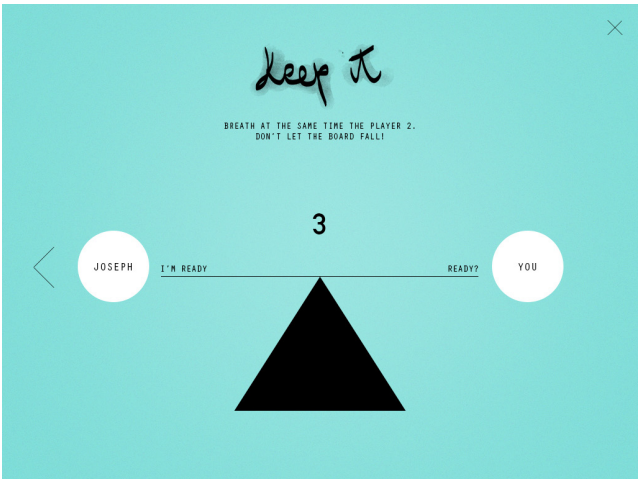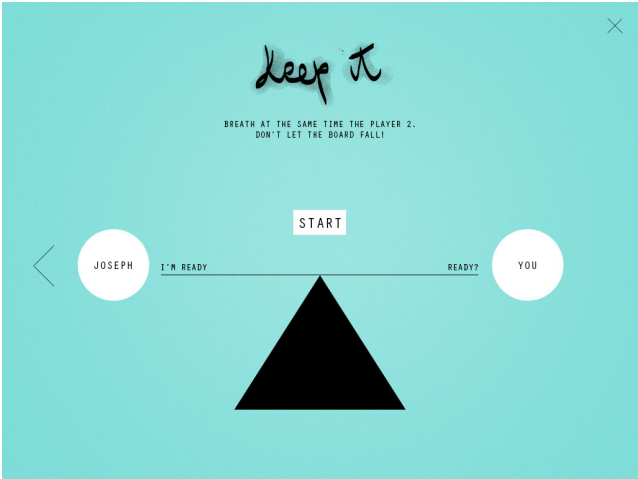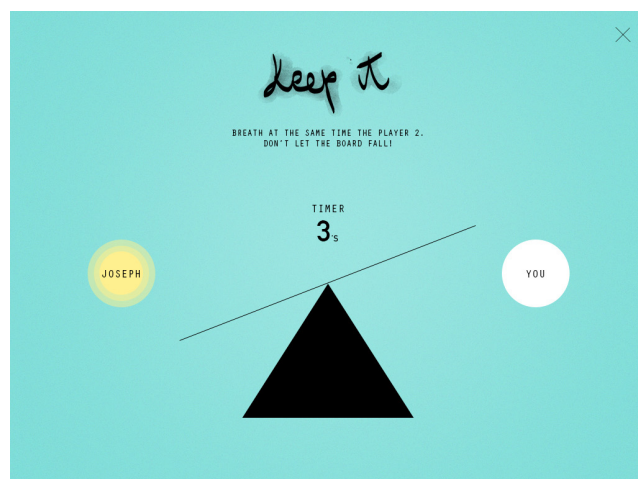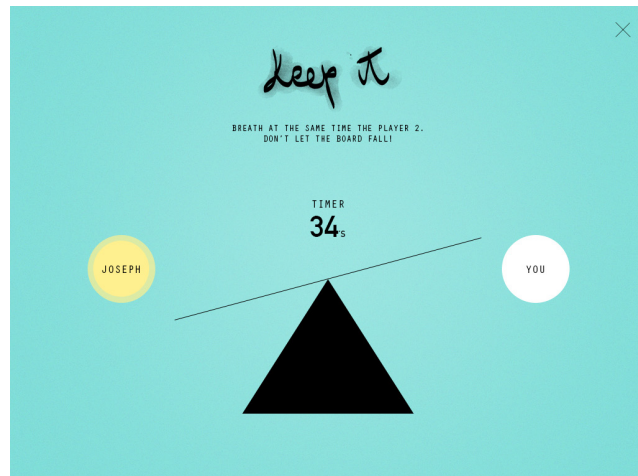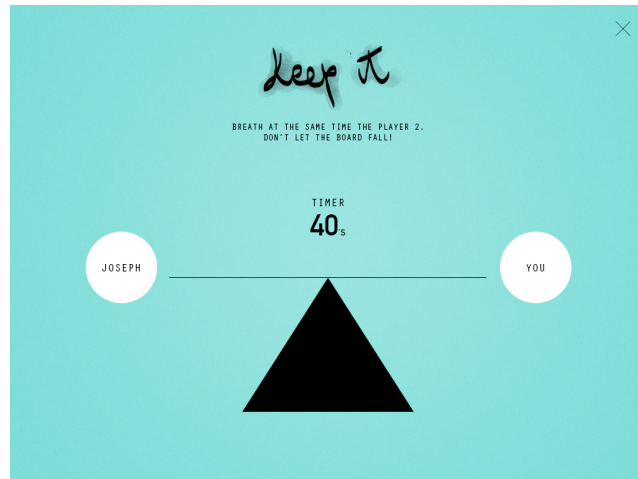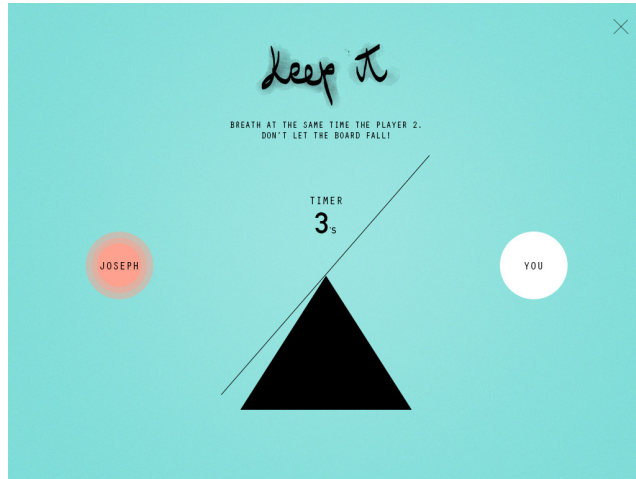
FIGURE 28 - BIOFEEDBACK GAME LAYOUTS

By building the chest band we soon realised that measuring breathing accurately was really difficult. The user had to breathe really deeply for the chest band to notice the movement and detect the values. It was painful and uncomfortable. At the same time we were developing the prototype, we also started to do some research on the market for other products that could measure breathing accurately. We found out two solutions that could work with our project.

Thinké (Figure 29) is an app that has five multiple circles, moving in different speeds. Each circle represents a breathing pattern which the user has to follow to control the breathing.

FIGURE 29 - THINKÉ

We also had a meeting with a representant of the
Inner Balance (Figure 30) sensor. It is an app that
also helps the user on breathing correctly. After
the meeting we understood that the code used was
not available and we could not use the data.



FIGURE 30 - INNER BALANCE

We wanted to show the users the app and analyse how
they react to the breathing techniques and how they
react to the introduction of a new device in the
phone.

## 04.05.03 CO-CREATION SESSIONS

In this sprint we started the Co-Creation
sessions. In the first meeting with the users we
did small exercises to try to get into the user's
thoughts and feelings. We started by introducing
ourselves and then the users. We participated

in every exercise to make the users feel more comfortable, regarding their fragile mental condition.

The first exercise consisted in describing a regular day (Figure 31), we wanted to know what the users usually do. The second one consisted in describing an ideal day, we wanted to do this to try to understand if there were any needs we could fulfill. As the meeting was going on we let it flow with the talking. By talking to the users we understood that although they didn't have regular common lifestyles, they used computers as well as mobile phones. Stress was a daily problem and it seemed that using breathing exercises was useful in stress release. We also found out that multiplayer games could be too complex. The main idea was that users wanted to focus on something different rather than the stress situation itself.
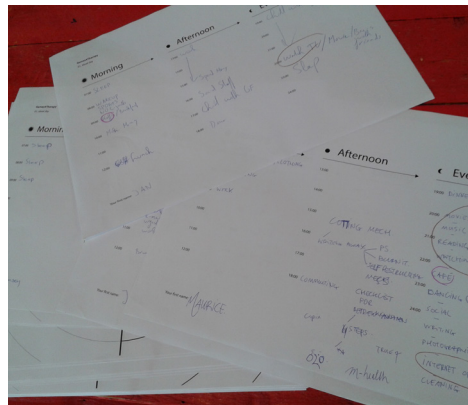


FIGURE 31 - CO-CREATION SESSIONS

In the second meeting, we talked to users and got new insights on their needs. They talked about re-thinking the day and building mental strategies to help them deal with delusions. They also talked about a paper form they fill in about their feelings and reflections.

After this co-creation sessions we had a new input: the need of a support on the mental strategies, but, we also wanted to see if our previous ideas supporting the stress relieve would work.

## 04.05.04 CONCLUSIONS

Co-creation sessions have proved to be very useful.
Having the user's insights on the development of
a solution has made us be closer to them and their
daily problems and needs. Having these new ideas
in mind we also had different questions on how to
design the solution. We didn't want technology
to become a part of the distorted reality. We
wanted to achieve a solution that could distract
the user from the stimuli and the surroundings.
We questioned about the use of a breathing device
in these situations of stress and over stimuli.
We were now walking towards a different solution.

## 04.06 SPRINT 4

In this sprint our goal was to choose a concept to follow,
based on the co-creation sessions insights, and start developing
the solution.

## 04.06.01 CO-CREATION SESSIONS

In the final co-creation session we wanted to
decide about our final direction based on users
insights. At this point we were still very
interested in reducing stress by using a breathing
device. At the same time we had two more different
ideas towards mental logical process and how to
support it. We needed to test our ideas, so we did
basic prototypes to analyse the user's insights
towards the presented solutions.

First we focused on presenting two biofeedback
games based on breathing exercises. We also had
a sample of the Inner Balance device and we wanted
to try it with the users to see how they would
react to it.

When we presented the prototypes and explained
the functioning of the games, the users didn't
seem interested, it was too much stimuli and too
overwhelming for them to cope with. The first game
was an action game (Figure 32) that by breathing
correctly the main character of the game gained
more powers. We did invert the logic of the first
ideas on games. In this phase we wanted to reward
the user by the good performance instead of
punishing him when he was not breathing well.
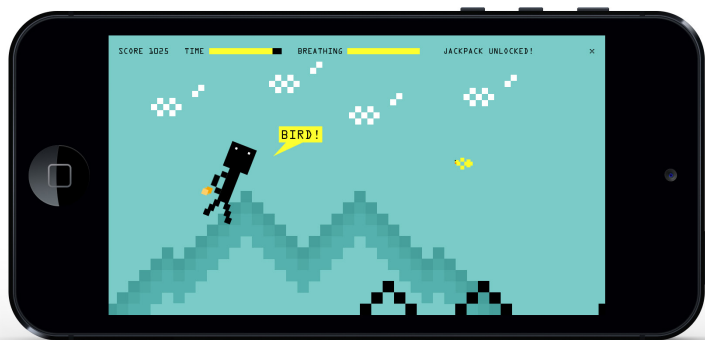
FIGURE 32 - BIOFEEDBACK ACTION GAME

In the other prototype we designed, a biofeedback
memory game (Figure 33), the functioning was the
same, but instead of being an action game, it was
a memory game that aimed to fulfill cognitive
attention skills.
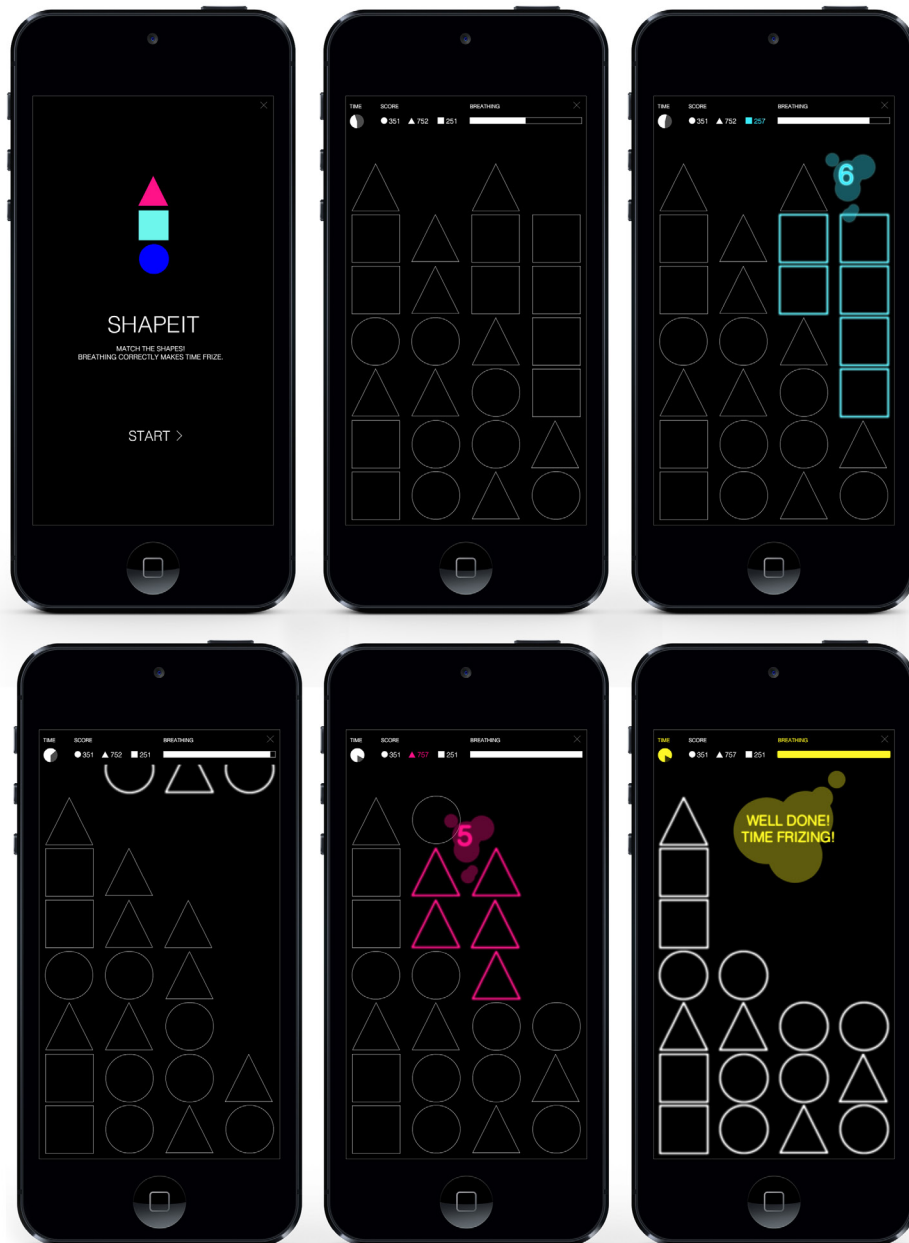


FIGURE 33 - BIOFEEDBACK MEMORY GAME

We also had two more ideas to present them. The third idea we presented was a snapshot mobile app that had stored positive moments, like videos, images and text notes. When the user was feeling negative or stressed he could go to the mobile application and relax or try to change his mood into a positive one. We also thought about tracking by GPS the localization and see the notes on that place, if they were negative, the user would receive a positive message. The users did seemed interested in this idea.

The other idea we presented was a mental map of strategies to help the users build patterns on logical reasoning. This was the idea the users seemed to like the most and could be more useful for them in their daily lives.

From the co-creation sessions we did learnt about the value of involving the user in the design concept and its development. Although we did a lot of research and talked to experts, talking to real users got us closer to the problem and therefore the solution.

For instance we really focused on the breathing games, but it was understood that for people in the recovery phase of a psychosis it was too much stimuli and therefore not supportive. We decided in this sprint to work towards one direction - developing a solution that could support a mental strategy when the user has some kind of hallucinations or doesn't feel confident about some situation.

## 04.06.02 CONCEPT DEVELOPMENT

Based on the co-creation sessions and feedback from the users, we were now focused on developing a mental strategy digital tool.

In the recovery phase the individual is under treatment and he goes to a therapist. The positive symptoms, the ones that the individual creates like delusions and hallucinations through medication would be solved. The negative ones, which the individual projects, such as the loss or decrease of cognitive skills are treated with cognitive therapy.[21]

The Cognitive Therapy Techniques are used to help the individuals to understand the logic and process of situations. By addressing to pathological feelings and behaviours, the therapy aims to change dysfunctional patterns. This is a collaborative relationship between the therapist and the individual and the goal is to challenge individual's beliefs and thinking patterns, and try to adapt them to a more rational way of thinking.[22]

Problem-solving deficits are common in the recovery phase. Solving those problems in a structured way could be beneficial for the individual. There are six steps to structure problem-solving: Clearly identify the problem; make a list of the possible solutions; choose one solution; develop a plan to carry on the solution and finally carry on the plan and review. Problem-solving is a technique that is usually used along with stress management, relapse prevention, cognitive therapy and social and skills training.[22]

After an individual has had a psychosis, he will have to get reintegrated into society again. During the post-psychotic phase, the brain has been under great stress, resulting in poor cognitive functions. This causes the individual not to be able to do things as well as he used to do before his psychosis. Building a mental logical process when he faces situations that he could understand as a delusion or not, is therefore very important.

Our solution needed to be meaningful, private, with no links that could make the logical thought bigger or worst. Our goal was to break the thought into small lines of thoughts to understand them and get back to the reality. It should be intuitive, very clear. It should work as a compliment for Arkin therapy, affordable and personal.

Our solution goal was to support the individual on building a mental strategy when he faces a possible delusion. We also wanted that our solution could provide feedback regarding evolution through the process and reward the user for it. We wanted to develop a user friendly mobile application. It should be engaging and keep the user motivated during the process.

We really believe that developing this application, based on our research and co-creation sessions, it is a useful and supportive tool for users in their daily life. It doesn't replace therapy but supports it.

Our user is in a very fragile mental situation, therefore we didn't want to develop something that could be negative to their state or lead them into a bigger problem. We wanted to speak with experts, psychologists and therapists to help us design the structure of the application. Once we had a prototype we wanted to test it and analyse the results.

## 04.06.03 PROTOTYPE

The solution supports the structure of a line of thoughts. The goal is whenever the user feels the need to "get back to real life" or reflect about something that is bothering him, he can use the application to help him step away from a negative mood to a more positive mood towards the logical process of realising the situation itself.

At first we focused on users' stories and their examples of situations where they didin't feel comfortable. We set up the first trial as a map, where we set a situation, the people involved, the physical space where the individual was and his feelings. We did a paper prototype (Figure 34) that could represent the flow of the content.
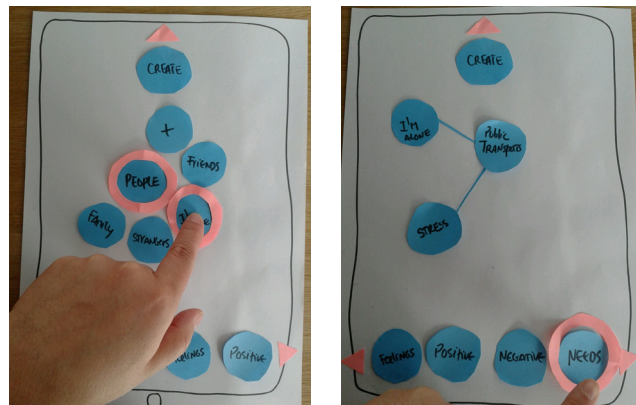


FIGURE 34 - MIND MAP PAPER PROTOTYPE

See Attachment 13. Mind Map Paper Prototype

In this prototype we wanted to evaluate all the steps. The user could create a new story, save notes and check his improvement on the mood state. Also, he should be able to share his story with

others. We needed to go further, so we started
developing a navigation map, still without having
support from any therapist or psychologist, we did
some research on CBT, Cognitive Behaviour Theory [25]
and based on that, we develop a simplified version
in order to apply it to our solution.

See Attachment 14. Navigation Map

The flow of the application starts by asking
the user some questions. The idea is that the user
follows the path and the application frequently
checks his mood to track how he is feeling. The
goal is that the user can get support to solve
a situation he finds difficult or confusing. We
start by the situation itself, what is happening,
after that the automatic thoughts: what the user's
immediate thoughts about that situation are and
how he feels about it and how much he believes in
the situation. The application continues leading
the user into questions that could help him build
a logical thought about that specific situation.
Alternative thoughts towards the situation are also
asked by the application, proposing a different
way of thinking about the situation.

The app also asks for evidence about the
situation or the belief. If the user is still
in a negative mood, the application asks for a
counter-evidence and a behaviour to adopt, if the
user is still in a negative mood, the application
ask him a counter-behaviour. From the behaviours
decisions we go to the consequences of that change.
During the process the application tracks the mood
and the progression from the negative to
a positive mood.

We started developing the first layouts (Figure 35)
and built a mobile prototype with POP - prototyping
on paper (Figure 36).

KEEP IT!

BUILD YOUR MIND MAP

CREATE   MY STORIES   OTHERS STORIES

HOW IT WORKS?
SETTINGS

OPEN KEEP IT!

TO OPEN KEEP IT! FASTER JUST SHAKE YOUR PHONE!

DO YOU WANNA TO ENABLE THIS OPTION?

YES | NO

KEEP IT!

BUILD YOUR MIND MAP

CREATE   MY STORIES   OTHERS STORIES

HOW IT WORKS?
SETTINGS
SHAKE MODE → ON

SETTINGS

EDIT THE QUESTIONS BY SELECT THEM AND DRAG AND DROP TO SET THE ORDER

SELECT A CONTENT:   AUTOMATIC THOUGHTS

01. WHAT IS HAPPENING AROUND?
02. WHAT IS PASSING THROUGH YOUR MIND?
03. WHY DON'T YOU TRY TO SEE IT FROM ANOTHER ANGLE?
04. HOW MUCH YOU BELIEVE IN IT?
05. HOW DO YOU FEEL ABOUT IT?
06. AND NOW WHAT ARE YOU THINKING?
07. HOW DO YOU FEEL ABOUT IT?

SETTINGS

EDIT THE QUESTIONS BY SELECT THEM AND DRAG AND DROP TO SET THE ORDER

SELECT A CONTENT:   AUTOMATIC THOUGHTS

ADD NEW QUESTION

What do you think about it?

SAVE

06. AND NOW WHAT ARE YOU THINKING?
07. HOW DO YOU FEEL ABOUT IT?

CREATE

NAME YOUR STORY HERE

WHAT IS HAPPENING AROUND?

FIGURE 35 - KEEP IT! LAYOUTS

FIGURE 35 - KEEP IT! LAYOUTS

FIGURE 35 - KEEP IT! LAYOUTS

FIGURE 35 - KEEP IT! LAYOUTS

CREATE

PEOPLE LOOKING AT ME

IT SEEMS THAT
YOU ARE IN THE GOOD PATH!

FINISH IT!    CONTINUE

---

CREATE

PEOPLE LOOKING AT ME

IT SEEMS THAT YOU ARE IN
THE GOOD PATH!

---

CREATE

PEOPLE LOOKING AT ME

CHOOSE ONE PATH

REINFORCE THE
THOUGHT

---

CREATE

PEOPLE LOOKING AT ME

WHAT IS PASSING
THROUGH YOUR MIND?

YOU BELIEVE IN IT
70%

WHAT IS
HAPPENING AROUND?

---

CREATE

PEOPLE LOOKING AT ME

WHAT IS PASSING THROUGH YOUR MIND?

I think people are looking at me because
this red pants that I have.

WHY DON'T YOU TRY TO SEE IT FROM
ANOTHER ANGLE?

Ok, maybe i just have this feeling...people
look around everyday. This are a cool red

---

CREATE

PEOPLE LOOKING AT ME

SAVE YOUR STORY

CHOOSE A CATEGORY TO BE MORE EASY
TO LOOK FOR IT, OR ADD A NEW ONE!

STREET

SA                        AND SHARE

FIGURE 35 - KEEP IT! LAYOUTS

FIGURE 35 - KEEP IT! LAYOUTS

FIGURE 35 - KEEP IT! LAYOUTS



FIGURE 36 - USING POP

By using the POP application we realised that some buttons were not useful. Doing prototypes is very important to test it and try it, by doing that we realize the functioning of the application.

## 04.05.03 CONCLUSIONS

We presented our solution to our assignor and to
our colleagues in MediaLab. The response was very
positive and enthusiastic with the concept. Still
we didn't have access to experts and at this phase
we really wanted to talk to experts to evaluate our
CBT model adaptation and try it with users.

## 04.07 SPRINT 5

In this sprint we wanted to focus on finishing the programming,
do secondary user tests and evaluate them. Also, we wanted to
write a scientific paper about our project, so that we could sign
up for conferences in the future.

## 04.07.01 THE SOLUTION

Keep It! is an application based/inspired in
different self-techniques to process thoughts
from psychology, using the CBT (Cognitive Behavior
Therapy).

The original system proposes different sequences
of thinking that individuals may follow to
understand their thoughts, their position in
certain situations, to calm down, to objectivize
and self reflect.

Each exercise may take a while to accomplish,
they are complex and individuals complain about the
difficulty to remember the specific situation since
it could occur before the form filling in.

The application merges the CBT techniques, creating
a sort of game of thinking, and works as a diary
of the momentum, it proposes individuals to write
those thoughts (while having them) trying to lead
them to a more positive way of thinking, giving as
well, the possibility of choice to construct and
deconstruct their logic.

While using the application the user needs to
keep updating the level of belief on the thought
and the intensity of his/her emotions (positive
to negative).

Because CBT is a therapy, Keep It! should be
presented at first by a therapist.

In this sense the app also becomes a new way
of communication between the therapist and the
individual. The users also have the possibility
of sharing their stories with other users of the
mobile application. We want the application to
work like a tool for the therapist. It should be
possible for him to personalize the questions for
each individual according to his unique situation.
We also think that this relation between the
therapist and the individual could be a strength
in the recovery phase.

To support the explanation of Keep It! we developed
a document that explains the application (Figure
38). With this booklet the users and therapists can
understand the use of the application as well as
the concept of it.

This application does not aim to replace any kind
of therapy or treatment. The goal is to make Keep
It! a support tool that can provide a structure
in reason and logic for users that had a psychosis,
when they are in the recovery phase, during
stressful situations or delusional thoughts. It
proposes to follow that line of thoughts based
on the CBT, creating a sort of mind map.



FIGURE 37 - BOOKLET KEEP IT!

See Attachment 16. Booklet

## 04.07.02 USER TESTS & EVALUATION

It was not possible to test the application with
primary users. We tested it with secondary users
(Figure 39). We asked them to read the booklet first
and then we asked them to think about stressful
situations or about something that was bothering
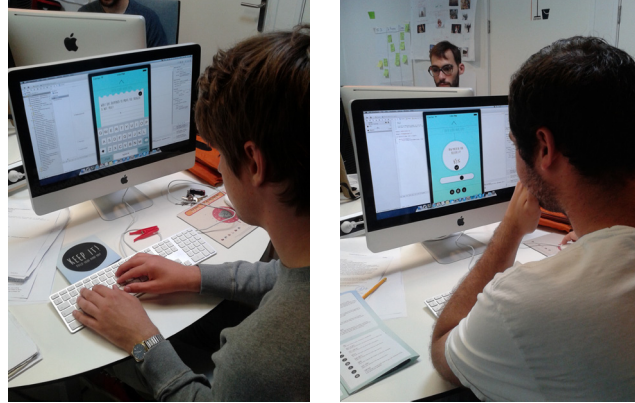them so that they could use the app properly.

FIGURE 38 - SECONDARY USERS

See Attachment 17. Keep It! Secondary Users Test

In this first test, we had five secondary users. Their comments while trying Keep It! were focused on the user interface and the functioning of the application.

The users seemed confused about the mind map flow, some questions were repeated.

Once the user was in the 'Create' menu he did not realise how to go back to the main menu. Although we designed the icon with the name in the layouts, it was occupying a needed space, therefore we decided to use the top arrow only, but it seemed not to work. We wanted to solve this with a complementary text.

On the choices where the user had to choose between three paths, five of them felt confused about the its functioning. In order to change it we wanted, to do a drop down menu instead.

The 'save' button icon was not perceptible either. The pop up window asking the user if he really wanted to save the story was also missing in this app version. Once clicked, it went right away to the start.

The 'notes' icon was not very perceptible either. We wanted to solve these icon problems with pop up boxes that appear once those icons are pressed saying what users had chosen and asked them if they wanted to do it.

Some users also felt frustrated about not being able to edit the previous answers.

Our goal was not to allow users to edit their
thoughts, so that they could feel confident about
what they were feeling at that time. Although
we wanted to do it in that way, we questioned
ourselves about this decision. In that sense we
thought about including the edit button in the
previous question, preventing a wrong interaction
that conducted the user to the next question.

Some users didn't understand where to write the
story name either. To solve that we wanted to
present a pop up box, and once the user clicked
'Create', that would require the story name.
If the user didn't want to do it right away
he can do it later.

Users spent in average 20 minutes reading the
booklet and using the app. After a few minutes
we noticed that they were no longer interested.
However we have to understand that we tested
a mobile app in a computer environment, so the
display and functioning is different. Some of
the frustrations come out of that.

Some users felt the application was helpful in
the sense it helped them to think about the problem
from a different point of view.

Although five users were observed, three of them
have answered the survey. In average the users
started using the app feeling negative and they
ended up feeling more positive. They spent less
than 10 minutes using Keep It!. Only one user
didn't change his mood when had finished. One user
said he might use the app again and the others
said yes. In average they found the application
appealing but not very intuitive. They struggled
to understand what they were doing. Two of the
users only felt frustrated once and one of them
a few times.

Overall some questions were not that clear to
understand. The messages were repeated. Most of all
there were programming errors that we could revise.

See Attachment 18. Keep It! Secondary Users Test Survey

After the first test, we decided to review it and
test it a second time before the final presentation
(Figure 40).

Mostly the application was now presenting some
coding errors, easy to solve. Users still found the
questions were a little confusing, they suggested
to have the previous answer visible and also

FIGURE 39 - SECONDARY USERS TEST 2

See Attachment 19. Keep It! Secondary Users Test 2

editable, because once, they picked the next one
the previous was no longer available for editing.
Sometimes it was just a mistake to go to the next
one.

There were also some issues related to the save
interaction. The users suggested the story should
save automatically when they pressed the menu to
go back to the main screen.

The 'save' button was not working properly either.
The suggestion was to have the 'save' button in
the bottom menu and not having the message asking
again, if they had already saved.

The function of renaming the story was not working
properly either, it was saving every story name
introduced so far, even when renamed with a new
one.

The bar colours with the green and the yellow
colours were mixed and not correct. When the user
was in a good mood, the application presented the
notes as an overview and that was confusing, the
message to choose, to finish or continue should
appear instead, giving the possibility to see
the overview.

In average the users spend 15 minutes using the
app and the comments were positive in a way that
the application could make them think about their
problem from another point of view, and that could
calm them down and make them feel more relaxed
about the initial problem. The test was with 5 new
secondary users. In the final prototype

version there are a few design details that are
missing, or are not so accurate, still this was
a prototype version and our goal was to work
properly, concerning the time we had to finish it.
To get a more clear idea of the designs and the aim
for the visual result of the application, we should
take a look at the layouts (Figure 35).

We asked the users to fill in the same survey as
the first users did while trying the first version.
From 5 different users, we got 4 answers. The start
feeling was more positive than the previous test,
though it ended up by improving the positiveness.
Also the users spent less than 10 minutes using
the app. All the users said that they changed
their mood and they would use Keep It! again. In
average they answered that the application was
appealing, and intuitive enough. One user struggled
to understand what he was doing and three of them
struggled a few times. Two of the users didn't felt
frustrated while navigating in the application,
one user only once and the other a few times.

See Attachment 20. Keep It! Secondary Users Test Survey 2

Overall the errors presented were coding related.
Only the 'save' button seemed to be confusing,
perhaps due to the fact that the application was
tested in a screen and not in a mobile device. The
way we interact with it was not contextualized
and the confusion was because the way we interact
on screen is different from the mobile. Still, we
needed to test it, but due to some lack of time and
the end of the project we could not do it.

All users found the use of Keep It! useful to
change their mood and think about their problems
from a different point of view. We also noticed
that the user spent in average 10 minutes in the
application, and at the end they changed their mood
into a more positive way of thinking. In this sense
our aim while using Keep It! was very positive.

## 04.07.03 FURTHER DEVELOPMENTS

We arrived at a stage of the project where we
do need to get psychologist and therapist expertise
on further developments.

It was not possible until now to get closer
with these expertise from Arkin due to the lack
of availability.

We have a few ideas about the development of the
application such as the possibility of co-writing
the stories with the help of friends, that could
help the individual to step out of the situation
he is dealing with. We also thought about the
possibility of having an emergency link to the
therapist when the user gets stuck in the process
and cannot come out of the negative mood.

We also feel concern about the possibility of
the application being harmful in the way it could
emphasise and support a negative behaviour. We are
limiting the space to write, so that the user could
be focused on a simple thought, but we don't know
if that might be frustrating for the user.

We wanted the application to be more playful.
It doesn't mean that it should have game elements,
we were more directed to the playfulness of the
interaction with the application.

For now we would like the app to be opened when
the phone is shaked. That action represents the
emotional release of stress. We want Keep It!
to be intuitive, and by using that action we want
to create an emotional bond between the situation
and the application. We feel that we could explore
it more.

To do that we really need to have insights from the
experts and also do a controlled user test. Until
the end of the project we didn't have the means
for doing it.

## 04.07.04 PRESENTATION AND CONCLUSIONS

In our final presentation (Figure 41), we explained
shortly our process, conclusions and solution.
In our video we presented the context and goal of
using the application. We had an exhibition about
our project, where people could try our application
and talk to us about our project.

FIGURE 40 - FINAL PRESENTATION

See Attachment 21. Final Presentation

We had a lot of positive insights on our project. The audience, which included our assignor, Arkin, therapists, psychology students and people from the creative industry were really enthusiastic with Keep It!. They saw a lot of potential and wanted to know if we would continue developing the application and the research. It was really rewarding to see the interest in our solution within the mental health professionals that seemed really interested in try Keep It! with their patients. Also we were suggested to find a way to commercialize the product because they saw a lot of potential on it.

Currently the application needs to be further developed further with the support and knowledge of professionals in the mental health industry, in order to develop the most suitable map flow for the user. We also need to develop the areas of the application that we didn't have time to.

We are finishing a scientific paper that summarizes our research, developments and conclusions. Later we would like to submit it to conferences, medical magazines and suitable openings for this type of subject.

# 05 CONCLUSIONS

Design is about the process. Working in a multidisciplinary team allows the IxD designer to participate in all the related fields. The role of the IxD merges with research, conceptualizing designing and programming.

We started the project with a research question. We wanted to develop a solution that could support individuals that had the first psychosis. This was our problem definition. Our problem required a solution. To design that solution we needed to understand psychosis deeper. Although we understood very soon the complexity of it, by talking with real users we could better understand the condition and what it implies in their lives and in the lives of their family and friends.

This complex state of mind that defines the condition is very difficult to address. Providing a solution while the individual is having a psychotic crisis was impossible. Therefore we soon realised that we should contextualize our solution in the recovery/post-psychotic phase.

In the first development we started by trying to fulfill every need we could find. We understood that we were not focused on one solution but in too many at the same time. It didn't fit a specific need therefore we continued struggling with the deep understanding of psychosis and a way to support individuals.

During the design process, failing is good. We should try, test, get feedback from users, from peers. By understanding what doesn't work we found out what could work. Trying ideas and developing prototypes to express them, was also proved to be essential in the process. The idea itself could be better represented with a prototype where everyone could have the same vision on it. While researching by designing we learnt that a lot of the ideas that could work for us, didn't worked at all. The opposite is also true. From simple ideas and low-fi prototypes we could see the idea for the next step.

Designing is a dynamic process. It keeps changing and improving over time. Users are people, and people change their feelings and emotions and we need to be updated with that. Creating for people could mean creating with the people. We did that. Getting closer to the user, is getting closer to the solution. Understanding the real needs and observing users' feelings and emotions is more effective than a passive research.

We aimed to create a meaningful solution that could really create an impact on the user's life. On the other hand the challenge was to create something both engaging and persuasive.

We set the context, the user and then it was time to make experiments. We focused and put a lot of effort on the stress release. We tried to find patterns in the users' behaviour that we could address in order to reach to a higher number of users. Dealing with stress proved to be a way to support the user in her daily life. We also got enthusiastic about the possibility

of designing a biofeedback game. The goal was to educate the user to breath correctly by playing a game. Although it was really difficult to accurately measure breathing, we tried and developed prototypes. We tested with users and the answer was not positive to the combination between breathing and the games. The breathing technique is used a lot, but isolated. Users prefer to have little stimuli since some of their cognitive skills are missing or damaged.

The main achievement for us, was to understand the power of the co-creation sessions and testing. We soon realised that the real need should be something to get the user out of situations with too many stimuli into a way they could focus on one thing. Structure their logic and reason is a daily exercise. The user reflects a lot about everything that happens in a day. In Arkin, individuals fill in a Cognitive Behavioural Therapy form. This need to build a structured reasoning about situations, led us into our final solution.

Changing from a negative mood caused by a misunderstood situation or delusion into a positive mood is our main goal towards the user's behaviour. They should rely on the solution to support their thoughts patterns in situations where they feel uncomfortable or insecure about what is really happening. By reflecting and examining the situation the user could have an overview about it. Breaking the situation into small steps could help the user to understand it better and therefore deal with it better. The user is supposed to make the line of thoughts himself. The solution provides the support structure, not the correct or standard way to do it. It is a personal approach on the user personal way of dealing with psychosis in the recovery state.

Our solution is a mobile based application. We wanted to provide a portable solution that could be used whenever it was needed.

In the future we wish to conduct experiments in order to validate our model and application. Having the collaboration of therapists and experts could bring us new insights. Conducting tests with primary users and analyzing the results may also reveal opportunities for refinement of the proposed solution.

To test the application we conducted a secondary user test. They were asked to thought about something that was bothering them or a stress situation they had recently. While testing the application we observe some mistakes regarding navigation, mainly programming errors. We corrected them after the test.

It was also interesting to analyse the survey and see that all the users had changed their mood to a more positive one by using Keep It!. They took less than 10 minutes to do it and that has fulfilled our goal of using our application everywhere in a easy and fast way.

As an Interaction Designer the role of the author was to share
knowledge, participate in every decision and in every phase.
Designing the interface of the solution, prototypes and user
testing were the main activities, but there were others: doing
research work, preparing the co-creation sessions, elaborating
the concepts, evaluating results and designing all the graphic
elements/brand.

All the graphics and paper prototypes presented in this
dissertation were developed by the author. The author also took
a huge part on the prototypes development. Since the team had
a developer, the author didn't take part on the programming of
the digital solution. However, the author worked close to the
developer when working with Arduino code to implement in Scratch
and also while implementing the design of the final app.

The author now feels that she has the initial skills to work
as an IxD or Ux Designer. She is aware of the design process
and what it requires. The author is now aware of her role. The
initial aim was successfully achievied by providing a working
prototype that fufills the users' needs.

In conclusion, the Design Process is about steps and decisions.
It is about failure and success. Trying and testing.
It is dynamic and continuous.
It is about users. About emotions. About feelings.
It is about people.
It is about discovery and joy.

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