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INNOVATION THROUGH DESIGN THINKING.

SEFICI CASE

ALEXANDRA RENATA KLESZKEN

Tutor: María Luisa Flor Peris

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INTRODUCTION

Being successful in today's highly technological and globally competitive world requires a person to develop and use a different set of skills than were needed before (Shute & Becker, 2010). One of these skills is called design thinking. Design has been widely considered to be the central or distinguishing activity of engineering (Simon, 1996). It has also been said that engineering programs should graduate engineers who can design effective solutions to meet social needs (Evans, McNeill, & Beakley, 1990). Like problem solving, design is a natural and ubiquitous human activity. For firms working for global clients in relentless pursuit of new markets, new offerings, and new kinds of value creation, design itself is being remade (Tonkinwise 2010).

The objective of this work is to review the theoretical framework of design thinking, analyzing the different definitions of this term, highlighting its close relationship with management and related disciplines and defining the process, characteristics and its problems. Also, we are going to examine the process followed to develop a new product in a particular company through the lens of design thinking in order to help it to identify improvement areas to increase its innovation capability and results. With this analysis, we hope to contribute to an improvement of the competitiveness of the company in the long term through design thinking.

To do so, we separate this study into two parts. First we will speak about the concept of design thinking and its definitions from different points of view. We will explain the relationships that design thinking has with management and related disciplines. Also we are going to analyze the process of design thinking, its characteristics and the problems that companies may experiment when implementing the process.

Second, we present the design thinking process in a real company and its influence along the creation of one of its products. The study case firm is Soluciones Cuatroochenta an innovative company located in Espaitec, the Science and Technology Park of Jaume I University, which is specialized in the integral development of applications for smartphones and tablets and also offers advanced programming solutions as to improve work processes. The process of design thinking is analyzed with regard to the development of Sefici, a Cuatroochenta innovative product. Based on this analysis we are going to identify what improvements are necessary to continue being innovative and face their changing and competitive environment.

PART 1. THEORETHICAL FRAMEWORK

1. WHAT IS DESIGN THINKING

The first author that defined design thinking as a new way of thinking was Herbert Simon, in his work *The Sciences of the Artificial* in 1969. Simon viewed design as devising courses of actions to change existing situations into preferred ones. He affirmed that the fundamental idea for the design thinking practice was to distinguish between the thought as a consistent analytical process in separating the ideas and a way of thinking focused on design.

Design thinking has also been defined as a cognitive process that designers have in common across a wide range of design fields such as product design, architecture, engineering, and urban design (Kimbell, 2011). Professional design has a long tradition of giving form to tangible material objects, and, in a business context, has often been associated with crafting products and brands (Cooper, Junginger, & Lockwood, 2009). Hence, design includes not only material objects, but also the design of symbolic and visual communications, activities, and organized services, and dealing with complex systems and environments (Buchanan, 1992). Much of the work in this area did not explicitly use the term "design thinking," but utilized such terms as design methods, cognitive strategies in design, and "designerly ways of knowing" (Cross, 1982; Lawson, 1979).

From the management point of view, Hassi & Laakso (2011) refer to design thinking as a mental, cognitive process and thinking style, characterized by its abductive reasoning (the logic of what might be), reflective reframing, holistic view (360º understanding the problem), and its integrative thinking (bringing competing constraints into harmonious balance). Also from this approach, design thinking has been seen as a frame of reference to an anthropocentric approach on strategic innovation and a new paradigm of management for the value creation since it is a discipline that has to do with the cognitive flexibility and the aptitude to adapt the process to the continuous changes that present on a changeable market.

The first applicability as "Design Thinking" in professional settings was carried out by the design consultancy IDEO, being this organization nowadays the main precursor of

design thinking[1]. According to Tim Brown (2012), CEO of IDEO, design thinking "is a discipline that uses the sensibility and methods of the designers to make the needs of the persons coincide with what it is technologically feasible and with what a business viable strategy can turn into value for the client, as well as in a big opportunity for the market". So, design practice is being applied to a broadening range of activities, moving from the product and graphic areas to the design of digital interactions, the design of service, and even to business strategy and social policy.

With regard to the organizational context, Idris Mootee, CEO of Idea Couture[2], says that the practice of design - that is, how a designer approaches the problem and how he applies the methodology - can help management professionals and entrepreneurs to generate ideas, solve problems creatively and expand their horizon (Moote, 2014). Nevertheless, she emphasizes that the organizations in which design thinking is used have an organizational culture based on the anthropocentric point of view, on speed and agility, on adaptability and flexibility, on inspiration, on disruptive thinking, on passion, creativity and innovation, on being connected and not hierarchic, on energy and boldness. Although these features are desirable for the deployment of design thinking, she alerts that very few companies have cultures based on these characteristics, fact that makes innovation difficult.

In the course of time, the design thinking has also infiltrated increasingly into the business world and different specialized journals such as Bloomberg, Business Week and Harvard Business Review have reported on this concept on their pages. Unlike authors who have adopted an academic approach, the management press treats the design thinking from a quite simplistic perspective, which is centered on the application of an anthropocentric approach to the problems identification and on the shape of prototypes of ideas on not functional tangible objects like resolution. That is it, in many cases they present the design thinking as a set of hardware of easy access to solve problems and to impel the benefit.

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[1] IDEO has created a broad range of design-thinking methods and tools, providing guidance for nondesigners (Leidtka & Ogilvie, 2011).

[2] Idea Couture is a global strategic innovation and experience design firm which has extensively applied design thinking to numerous organizations and contexts.

From the above definitions we can highlight that design thinking is a way of thinking focused on design, is a cognitive process that designers have in common, it is a discipline that uses sensibility and methods of designers in order to satisfy customers needs, it is a mental, cognitive and thinking style and it's a frame of reference to an anthropocentric approach. All these definitions have in common the fact that design thinking is based on the way designers think and solve problems by reducing risks and incrementing opportunities. Also, they all are centered on people's needs.

2. DESIGN THINKING AND MANAGEMENT RELATED DISCIPLINES

According to Brown (2008), the current system of the companies is quite traditional both from an organizational point of view and from the management processes. In many cases, companies do not encourage managers' creativity because they are focused to prevent them from committing errors and assuming unnecessary risks. So, in this context, design thinking can help top management in tackling complex, ambiguous and changeable circumstances and can be regarded as a new approach that is changing the foundations of traditional management and strategic thinking. If we apply design thinking as a tactic in the strategic area, this tool can help the company overcome the continuous challenges of a changeable market such as the economic crisis that have affected negatively many companies.

Simon's (1996) view of design thinking as a transformation of the existing conditions into favorite conditions can be applied to the development of **business strategy.** This author considers that this approach connects with Mintzberg's view of strategy formation. Mintzberg (1978) pointed out, that where these favorite conditions do not exist, strategy formation requires an adaptive learning process in which strategy emerges through the modification of intentions shaped by feedback. Hence, connection of design thinking and strategy can be traced as Design thinking encourages frequent testing and refining strategy early in the process because this provides an opportunity to gather feedback and uncover problems as the strategy unfolds, rather than waiting to assess the strategy after it is locked down and rolled out (Brown, 2005; Fraser, 2007).

Design thinking has also been seen as a means of addressing the imbalance created by overly analytic approaches to strategic management, providing a cost-effective means of discovering unmet needs of potential users early in the strategic planning process. The process not only provides flexibility and adaptive learning, but early-stage prototyping provides the opportunity for some tangible evidence to be developed and communicated in support of potential breakthroughs (Brown, 2005; Fraser, 2007). Therefore, design thinking in the field of strategic management can help changing existing situations into preferred one using a flexible and adaptive approach and by encouraging frequent testing and refining strategy early in the process they get a continuous feedback and an easy way to find problems. This is in line with Mintzberg's (1978) view of strategy.

Also, when related to **innovation management**, design thinking can play an important role, since, as it has been stressed, innovation management does not only consist of planning new products, services, brand expansions or technological inventions but it is also a new way to imagine, organize, mobilize and look for new way of competing in a continuous changing market.

Brown (2008) mentioned that a company, in order to use design thinking as a way to innovate, must follow different steps. The company must involve design thinkers from the beginning of the innovation process. They need to take a human-centered approach due to the fact that innovation need to take into account beside the business and technology part, the human behavior, needs and preferences. They need to try early and often and start creating a prototype from the beginning and measure the progress during the process. If the process does not work how it should they need to seek outside help because the innovation system needs new opportunities to co-create with customers and consumer. Also another important aspect is to blend big and small projects. Innovation portfolio must include short-term and long-term projects in order to drive and fund incremental innovation and at the same time to initiate revolutionary innovation. The company needs to rethink funding approach as the projects are evolving find talent anyway they can by hiring people from interdisciplinary programs. The design process must define as a cycle which means that the company must plan the assignments so that design thinkers go from the inspiration to ideation to implementation.

Hence, design thinking can be seen as one of the tools that encourage the strategic innovation in a company because it can be used to create something new or to discover the secret value in the already existing products, services or technologies. This approach is reinforced by the fact that design thinking is based on a structured process and has as a result the creation of economic value, a differentiation regarding to other companies and a significant improvement in the clients experiences.

Design thinking has also been linked to the **entrepreneurship** discipline, where design thinking can be a tool to innovation, process improvement, the creation of new business models and high-performance collaboration. Hence, some authors also have adopted approaches to the business modeling stage, which show consistency with design-thinking perspectives (E.g., Blank & Dorf, 2012; Osterwalder & Pigneur, 2010). These approaches emphasize that business models should be prototyped and developed iteratively, since many of the initial business assumptions are likely to be wrong. In this vein, Osterwalder and Pigneur (2010) developed a visual "canvas," which

has been widely used to facilitate business model prototyping. Similarly, Blank and Dorf (2012) have drawn on the business canvas approach to describe a step by step process for building a start-up business based on extensive assumption testing and iteration.

With regard to **marketing**, design thinking emphasis on developing a deep understanding of the user would seem to mesh seamlessly with principles of marketing (Liedtka & Ogilvie, 2011). In traditional marketing, the real human beings creating "demand" are often subsumed in target markets segmented into demographic categories. Observing potential users and what they are trying to get done in their lives can provide better insights than conventional market research. This perspective includes not only functional, but social and emotional dimensions of the job to be done (Christensen, Cook, & Hall, 2005). Christensen et al. (2005: 78) advice to marketers to "turn off the computer, get out of the office, and observe" resonates well with the understanding that "the answer lies outside the building."

Design thinking powers faculties that have long been sidelined by the dominance of logic: emotional, sensory, and creativity. The goal of a marketer when using design thinking is to transform a market uncertainty into an algorithm that provides a practical solution that has cost advantages over competitors and create innovative solutions.

3. THE PROCESS OF DESIGN THINKING

The core set of design thinking steps and principles include (1) problem finding, (2) observation, (3) visualization and sense making, (4) ideation, (5) prototyping and testing, and (6) viability testing. This framework aligns well with depictions of the design thinking process that have been proposed elsewhere. Based on his work at IDEO, for example, Brown (2009) notes that this process can be seen as a system of overlapping spaces: inspiration (dealing with the problem or opportunity and engaging in observation), ideation, (generating ideas through brainstorming and testing ideas through prototyping) and implementation (determining how to move the product to market). Stanford's Design School Bootcamp Manual (2010) presents the design process as consisting of five modes: empathize, define, ideate, prototype, and test. Lawson (2006) presents a model of design consisting of five groups of activities and skills formulating, moving, representing, evaluating, and reflecting. Beckman and Barry (2007) discuss the innovation process associated with design thinking as involving four stages of generating observations, frameworks, imperatives, and solutions. Liedtka and Ogilvie (2011) use four questions to provide a structure for design projects in a business setting what is?, what if?, what wows?, and what works? All of these models represent a similar process. They move from developing an understanding of what is, to possible new conceptions, to shaping ideas into testable experiments, then exploring their viability and feasibility in a broader context of use.

This study is based on the Institute of Design at Sanford framework in which the process of the design thinking is formed by five stages: empathize, define, ideate, prototype, test. It is a non linear process since in any moment the users can go backwards or ahead, jump stages depending on their needs (Figure 1).

Figure 1. Stages of the design thinking process
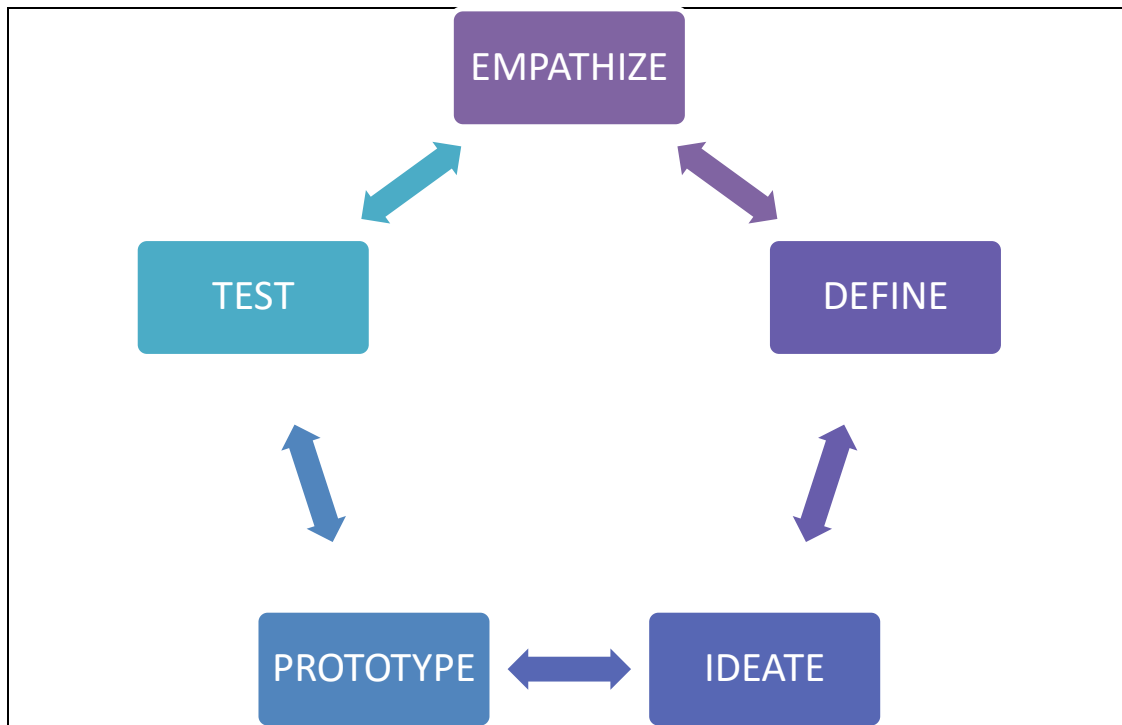
Source: Mini-Guide or the methods form the Bootcamp bootleg document (Institute of Design)

The first stage, **empathize**, is the base of the process and it is based on the users. Empathy is the essential element of the design process since it is a question of solving problems not well known by the designer in which he must understand their physical and emotional needs and the factors that made them take that action. This stage is also called "immerse" because the designer must sink in a sea of learnings. . The basic thing to empathize is: to observe, to interfere and to look and listen.

In the **define** stage the designer tries to determine well what the project consists of and it is based on what he learned from the user and his context. The designer turns into an expert regarding that problem since he empathizes with the user and with everything that affects him. During this stage he tries to create coherence in the information he previously has gathered. He should comply with the criteria: frame the problem from a direct approach; inspire the team; generate criteria in order to evaluate and to oppose different ideas; capture the attention and hearts of the study subjects; help develop concept useful to everybody.
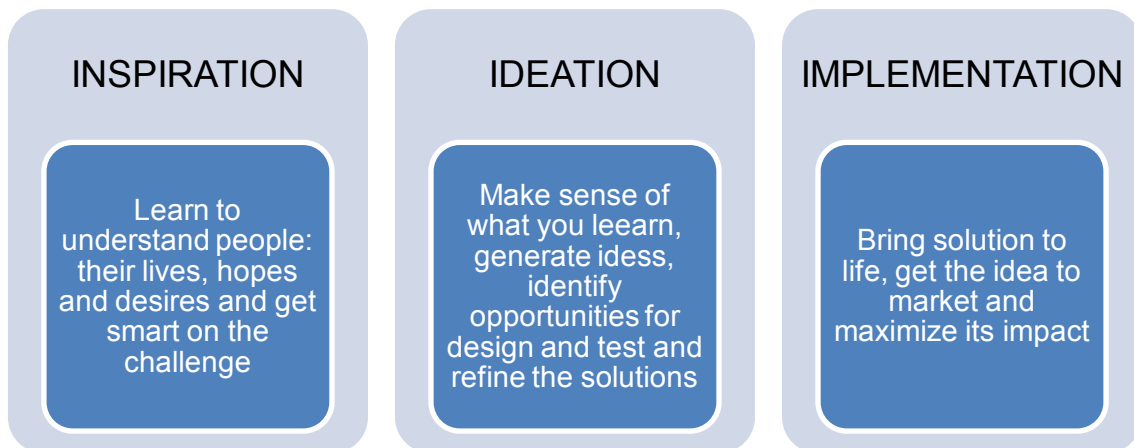
In the **ideate** stage the process of design and the generation of multiple ideas start. This delivers the ideas and the resources to do prototypes and to create innovative solutions. This process allows the company to find out solutions that are obvious and to increase the potential of the current innovations and to increase the number of possibilities; to take advantage of the different points of view of the team; and to discover unexplored areas in order to create new ways to innovate

Next, the **prototype** stage follows. The main objective in this stage is answering different question which brings the company to the final solution. During this stage the designer is improving the idea but in a rapid and cheap way so he can be able to offer a prototype on which he can receive feedback from the users. The prototype will advance and during that period it will present more functional and formal characteristics.

The final stage is **test** (evaluation). This stage consists of requesting feedback about the prototype. It is useful because it help refine the prototypes and the solutions, helps learning new things about the users, helps refined the idea that was chosen and framing from another point of view the problem and helps comparing different prototypes.

IDEO has proposed a simplified view of the design thinking process. At IDEO.org and IDEO, they have used human-centered design for decades to create products, services, experiences, and social enterprises. IDEO defines human-centered design as a creative approach to problem solving that starts with people and ends with innovative solutions that are tailor made to suit their needs. Using this human-centered approach, they simplify the process of design thinking (the five stages) into three main phases: 1) inspiration, 2) ideation and 3) implementation (Figure 2).

Figure 2. Phases of design thinking process

INSPIRATION	IDEATION	IMPLEMENTATION
Learn to understand people: their lives, hopes and desires and get smart on the challenge	Make sense of what you leearn, generate idess, identify opportunities for design and test and refine the solutions	Bring solution to life, get the idea to market and maximize its impact

Source: The field guide to human-centered design (IDEO, 2015)

During the **inspiration** phase the company collected insights, stories and inspirations from people through planning and conducting a field research. They interviewed people based on an interview guide previously prepared. Also in this phase is chosen the design challenge and a plan for research methods are made. The objective is to capture learnings.

In the **ideation** phase, the company translated the learnings from the Inspiration phase into frameworks, opportunities, solutions, and prototypes. The key themes and insights that are identified are: scalability, resource and profit, awareness and inspiration. During this phase an important aspect is to get feedback and to integrate it and iterate in the process.

The **implementation** phase starts with realization of the designed solutions through rapid revenue and cost modeling, capability assessment, and implementation planning. This phase supports and will help to launch new solution into the world. The implementation phase also requires understanding the target, keep getting feedback and iterate and a scale toward impact is necessary.

There have been developed different **methods** to facilitate and structure the DT process. These methods can be related to the stages of the DT process. Design methods and design process are often used interchangeably, but there are significant differences between the two. Design methods are techniques, rules, or ways of doing things that someone uses within a design discipline. Methods for design thinking include interviewing, creating user profiles, looking at other existing solutions, creating

prototypes, mind mapping, asking questions like the five whys, and situational analysis. Because of design thinking's parallel nature, there are many different paths through the phases.

In table 3 we can see the methods used in each phase based on the human-centered approach. Specifically, we adopt the stages suggested by IDEO to refer them. Annexes 2, 3 and 4 present the definitions of each methods as they are linked to the inspiration, ideation and implementation stages.

Table 1. Methods used in design thinking phases

PHASE	INSPIRATION	IDEATION	IMPLEMENTATION
METHODS	Frame the design challenge	Download the learnings	Live prototyping
	Create a project plan	Share inspiring stories	Roadmap
	Build a team	Top five	Resource assessment
	Recruiting tools	Find themes	Build partnerships
	Secondary research	Create insights statements	Ways to grow framework
	Interview	Explore your hunch	Staff the project
	Group interview	How might we	Funding strategy
	Expert interview	Create frameworks	Pilot
	Define the audience	Brainstorm	Define success
	Conversation starters	Brainstorm rules	Keep iterating
	Extremes and mainstreams	Bundle ideas	Create a pitch
	Immersion	Get visual	Sustainable revenue
	Analogous inspiration	Mash-ups	Monitor and evaluate
	Card sort	Design principles	Keep getting feedback
	Peers observing peers	Create a concept	
	Collage	Co-creation session	
	Guided tour	Gut check	
	Draw it	Determine what to prototype	
	Resource flow	Storyboard	
		Role playing	
		Rapid prototyping	
		Business model canvas	
		Integrate feedback and iterate	

Source: own elaboration based on The field guide to human-centered design, IDEO (2015)

4. CHARACTERISTICS OF DESIGN THINKING

Different works have stressed the characteristics of design thinking. In this section, we present two proposals to examine them. The first one is by Cross (2006) and practitioners (Bootcamp Bootleg, 2010; Brown, 2008; 2009) who analyzes the methods used to observe design thinking in order to identify its main characteristics from the practice point of view.; the second one is by Baeck & Gremett (2011), who analyze the core attributes of design thinking.

According to Cross (2006) and practitioners (Bootcamp Bootleg, 2010; Brown, 2008; 2009), the methods used to observe design thinking are observations, protocol studies, and interviews with designers. These methods are characterized by: (1) exploration and iteration; (2) attention to user needs; (3) observation; and (4) visualization and prototyping.

Exploration and iteration refer to the fact that designers may redefine the initial goals and constraints of the problem-as-given over the course of solution generation, as understanding of the problem and definition of the solution coevolve. This may, in part, reflect the nature of the problems that designers often contend with, since they have been characterized as ill-defined, ill-structured, "wicked" problems (Buchanan, 1992; Cross, 1982). So, designers define the problem in a way that they can change it and offer different solutions depending on the way that the problem evolves. Another characteristic is that designers do not always proceed to put into practice every process or plan they made.

Design thinking places a strong emphasis on doing and on attitude of experimentation (Brown, 2009; Liedtka & Ogilvie, 2011). Both **active learning** and design thinking assume one must interact with a subject to make appropriate meaning of it. There needs to be a process for engaging in a situation and using observation and feedback as a means of learning reflection in action. This entails thinking about, as well as getting a feel for, the situation as one's actions evolve to produce better results. Reflection in action can be seen in many fields of design, including architecture, product design and engineering design, and is relevant to other professions as well. According to these authors, the process of solving a problem is adaptable to the continuous changing environment.

Attention to user needs relates to the fact that, in general, designers tend to assess solutions in terms of better or worse depending on the specific context in which they

are used. In this case, the judge is the customer or user, and the evaluation is based on preferred realities rather than objective truth (Cross, 1982; Owen, 2006). These preferred realities may involve emotionally resonant, as well as functional, considerations (Fulton-Suri & Hendrix, 2010). So the solution of the problems is mainly based on the customers' point of view which in many cases is not very objective depending on their needs, beliefs and culture.

Design thinking has, therefore, been portrayed as a human-centered process incorporating insights and understandings of the needs and problems experienced by users (Brown, 2009; Lawson, 2006; Liedtka & Ogilvie, 2011). The designers' development of empathy for users allows them to shift their point of view to better imagine solutions that meet both expressed and unexpressed needs (Brown, 2008; Fraser, 2007; Junginger, 2007). By doing this, design thinkers can offer a solution more according to the customers' needs.

To understand user needs, design thinking often requires **observation** (Kelley, 2001). Such principles include conducting research in the users' natural setting, spending time with them, seeing the world through their eyes, separating one's own thoughts and assumptions from what one actually observes, and using exact quotes when possible (Beckman & Barry, 2007). This means that in order to offer a solution, design thinkers must put themselves in the customers place and be objective when they analyze the problem that they need to solve. While analysis involves breaking apart the root causes of a problem, observation is opening up to, and synthesizing, multiple levels of the user experience physical, emotional, cognitive, and cultural (brown 2008; 2009). Typically, in design thinking, observation is far more active than passive. It often involves engaging and interacting with the subject, although it may also make some use of reports, surveys and passive monitoring.

DT work is also characterized by **visualization** and **prototyping.** Designers frequently work visually, relying heavily on sketching and other means of transforming information into images that can be seen. This allows more concrete interconnections of signs, things, actions, and thoughts. The sketches, blueprints, flowcharts, graphs, and three-dimensional models serve to overcome limitations of verbal or symbolic propositions (Buchanan, 1992). Initial sketches may be intentionally crude and unfinished, providing both a preliminary conception and invitation for further development (Boland, Collopy, Lyytinen, & Yoo, 2008; Cross, 2006). These observations support the role of intuition in the design process, which has been acknowledged by several observers (Boland et al., 2008; Collopy, 2004; Cross, 2006, 2011; Rowe, 1987). So, by getting visual in the

process of solving a problem, design thinkers can compare and materialize some of the solutions that they can offer. Also by doing this they can go back and forward and analyze the best way to satisfy customers needs.

Generating prototypes also serves a key role in the design process. Sketches, models and prototypes clarify the characteristics of the idea and make it more amenable to critical consideration and feedback. Rapid generation of low-fidelity prototypes deepens the dialogue with potential users, thereby speeding up the learning cycles and further clarifying the nature of the problem to be solved (Mogeridge, 2007). Indeed, the entire design-thinking process is characterized by active learning and experimentation (Brown, 2008, 2009; Leidtka & Ogilvie, 2011). Prototyping is way of involving the user in the early phase of solving the problem and reducing possible errors and costs because a user can try the product and give feedback to design thinkers.

The second perspective is based on the study by Baeck & Gremett (2011), in which the core attributes or characteristics of design thinking are summarized. The attributes he mentions are: (1) ambiguity, (2) collaborative, (3) curiosity, (4) empathy, (5) holistic, (6) iterative, (7) nonjudgmental, (8) open mindset.

Design thinking is characterized by being comfortable when things are **unclear** or when you **don't know** the answer. It means that is suitable for addressing wicked, ill-defined and tricky problems. Also, it is **collaborative** and based in working together across disciplines since people design in interdisciplinary teams. Another characteristic is **curiosity** which means being interested in things you don't understand or perceiving things with fresh eyes. Considerable time and effort is spent on clarifying the requirements. A large part of the problem solving activity, then, consists of problem definition and problem shaping.

Empathy, also a characteristic of design thinking refers to seeing and understanding things from your customers' point of view. This is related to **holistic** attribute which means that design thinking is looking at the bigger context for the customer and attempts to meet user needs and also drive business success. Also, design thinking is **iterative** because is a cyclical process where improvements are made to a solution or idea regardless of the phase. The process is typically non-sequential and may include feedback loops and cycles.

The last two characteristics are also related. Designs thinking require a **nonjudgmental** point of view that is creating ideas with no judgment toward the idea

creator or the idea, and an open mind set by embracing design thinking as an approach for any problem regardless of industry or scope. This method encourages "**outside the box thinking**"; it defies the obvious and embraces a more experimental approach. Baech and Gremmett (2011) agree that design thinking is not only a combination of these attributes but also a cyclical progression of activities.

In Table 2 we compare the two perspectives in order to see what aspects they have in common:

Table 2. Characteristics of design thinking

PERSPECTIVE	CROSS (2006)	BAECK & GREMETT (2011)
CHARACTERISTICS	Exploration and itineration	Ambiguity
	Attention to user needs	Collaborative
	Observation	Constructive
	Visualization and prototyping	Curiosity
		Empathy
		Holistic
		Iterative
		Nonjudgmental
		Open mindset

Source: own compilation based on Cross (2006) and practitioners (Bootcamp Bootleg, 2010; Brown, 2008; 2009), Baeck & Gremett (2011)

By comparing these perspectives, we can observe that the main characteristics of design thinking is exploration, observation, visualization, prototyping, empathy with the users and needs, itineration and experimentation and active learning.

The characteristics of design thinking cannot be fully understood without analyzing the characteristics of design thinkers as well. Design thinkers have always stood out for their creativity and this can be applied to the whole innovative process using an orderly and inclusive methodology.

According to Brown (2008) and Owen (2007), design thinkers have in common that they are human and environmentally centered; also, by being emphatics, they use and integrative think analyzing and visualizing the customers' needs; they are optimistic,

dominate different disciplines in order to offer different solution and also experiment and know how to work and communicate with others in order to combine different choices to come with the best possible solution.

With regard to being **human- and environment- centered** concerned and **empathy**, by taking a "people first" approach, design thinkers can imagine solutions that are inherently desirables and meet explicit or latent needs. Great design thinkers observe the world in minute detail. They notice things that others do not and use their insights to inspire innovation. Designers must continually consider how what is being created will respond to human needs

Design thinkers develop **integrative thinking**. They not only rely on analytical processes but also exhibit the ability to see all of the salient- and sometimes contradictory- aspects of a confounding problem and create novel solutions that go beyond and dramatically improve on existing alternatives.

Systemic vision is also a characteristic of design thinkers because they have to treat problems as systemic solutions involving different procedures and concepts to create a holistic solution. Designers should look at different/multiple solutions to a problem and keep the big picture of the problem in mind while focusing on its specifics

They have **optimism** as they assume that no matter how challenging the constraints of a given problem, at least one potential solution are better than the existing alternatives.

Experimentalism is another significant aspect due to the fact that significant innovations don't come from incremental tweaks. Design thinkers pose questions and explore constraints in creative ways that proceed in entirely new directions.

Collaboration is at the same time necessary due to the increasing complexity of products, services, and experiences has replaced the myth of the lone creative genius with the reality of the enthusiastic interdisciplinary collaborator. The best design thinkers don't simply work alongside other disciplines; many of them have significant experiences in more than one.

Table 3. Characteristics of design thinkers

AUTHOR	BROWN (2008)	OWEN (2007)
CHARACTERISTICS	Empathy	Human and environment centered concern
	Integrative thinking	Ability to visualize and Systemic vision
	Optimism	Predisposition toward multifunctionality
	Experimentalism	Affinity to teamwork
	Collaboration	Ability to use language as a tool
		Avoiding the necessity of choice

Source: own elaboration based on Brown (2008) and Owen (2007)

It is necessary to mention that the business model or business design is the mechanism by which a business seeks to obtain both short-term and long-term benefits. The design of a business is the one in which a company plans and delivers value to the clients and implies both the concept of strategy and implementation.

5. DESIGN THINKING PROBLEMS

It is important to clarify that design thinking is not a linear process. Sometimes, it is possible to become untidy and repetitive while perfecting the ideas. The process promotes the experimentation and the exploration of the ambiguity as way of personal growth and innovation. Though it is possible that some areas of the design thinking manage to be easier than others, the important thing is to include the mentality of growth in the core of the process and this involves the fact that is necessary to study and to understand that design thinking has problems like any other process.

The wicked problems approach was formulated by Horst Rittel in 1960s. The author argued that most of the problems addressed by designers are wicked problems which are a class a social system problems which are ill-formulated, where the information is confusing, where there are many clients and decisions markers with conflicting values, and where the ramifications in the whole system are thoroughly confusing (Rittel, 1960). The ten properties of wicked problems that Rittel indentified were:

1. Wicked problems have no definitive formulation, but every formulation of wicked problem corresponds to the formulation of a solution
2. Wicked problems have no stopping rules
3. Solutions to wicked problems cannot be true or false, only god or bad
4. In solving wicked problems there is no exhaustive list of admissible operations
5. For every wicked problems there is always more than one possible explanation, with explanations depending on the designer
6. Every wicked problem is a symptom of another, "higher level" problem
7. No formulation and solution of wicked problem has a definitive test
8. Solving a wicked problem is a "one shot" operation, with no room for trial and error
9. Every wicked problem is unique
10. The wicked problem solver has no right to be wrong-they are fully responsible for their actions

Design problems are "indeterminate" and "wicked" because design has no special subject matter of its own apart from what a designer conceives it to be. The subject matter of design is potentially universal in scope, because design thinking may be applied to any area of human experience. But in the process of application, the designer must discover or invent a particular subject out of the problems and issues of

special circumstances. This sharply contrast with the disciplines of science, which are concerned with understanding the principles , laws, rules, or structures that are necessarily embodies in existing subject matters. Such object matters are undeterminated or under- terminated, requiring further investigation to make them more fully determinate (Buchanan, 1992).

Kolko (2014) explained that design thinking is part of a response to the increasing complexity of modern technology and modern business. Design thinking, first used to make physical objects, is increasingly being applied to complex, intangible issues, such as how a customer experiences a service. Regardless of the context, design thinkers tend to use physical models to explore, define, and communicate. He also explains that the challenges of design thinking are mainly three: accepting more ambiguity, embracing risk and resetting expectations (Figure 3).

Accepting more ambiguity refers to the fact that design thinking doesn't conform easily to estimates. It's difficult if not impossible to understand how much value will be delivered through a better experience or to calculate the return on an investment in creativity.

Embracing the risk is observed when the company does transformative innovation and is inherently risky. It involves inferences and leaps of faith; if something hasn't been done before, there's no way to guarantee its outcome. Leaders need to create a culture that allows people to take chances and move forward without a complete, logical understanding of a problem.

Also as corporate leaders become aware of the power of design, many view design thinking as a solution to all their woes. Designers, enjoying their new level of strategic influence, often reinforce that impression. But design doesn't solve all problems. It helps people and organizations cut through complexity. It's great for innovation. It works extremely well for imagining the future. But it's not the right set of tools for optimizing, streamlining, or otherwise operating a stable business. Additionally, even if **expectations** are set appropriately, they must be aligned around a realistic timeline because culture changes slowly in large organizations.

An organizational focus on design offers unique opportunities for humanizing technology and for developing emotionally resonant products and services. Adopting the design thinking perspective isn't easy. But doing so helps create a workplace where people want to be, one that responds quickly to changing business dynamics and

empowers individual contributors. And because design thinking is emphatic, it implicitly drives a more thoughtful, human approach to business**.**

Figure 3. Design thinking challenges
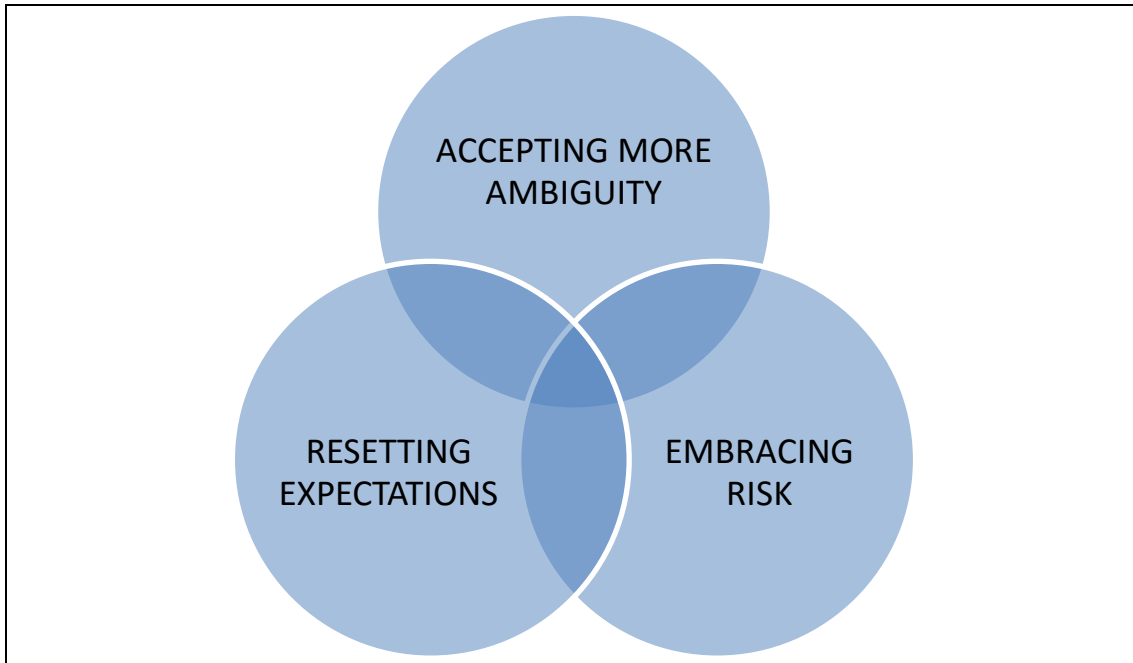
Source: own elaboration based on Kolko (2014)

PART 2. CASE STUDY

6. METHODOLOGY

For this part of the work, we used the case study research, through reports of past studies which allows the exploration and understanding of complex issues. Case study method enables a researcher to closely examine the data within a specific context. In most cases, a case study method selects a small geographical area or a very limited number of individuals as the subjects of study. Case studies, in their true essence, explore and investigate contemporary real-life phenomenon through detailed contextual analysis of a limited number of events or conditions, and their relationships. Yin (1984:23) defines the case study research method "as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used." The case can be a company, or institution, a person or group of people, a program, an event, various materials and even documents, always defined in a time and place (Fondevila and Del Olmo, 2013)

Our empirical research has been conducted on Cuatroochenta Company, a firm from Science and Technology Park of Castellon: ESPAITEC. The study was conducted during the month of May 2017. The project is called Sefici.

To obtain the information from the company, a questionnaire was developed and sent via e-mail to the company so that the director of the project Alfredo R. Cebrián could answer it. This methodology allowed speeding up the process of fieldwork. In order to find out more exact details of the development process of the product and how the three phases have evolved, we did an interview with the project lieder Alejandro Vidal which he answer phase by phase what they did. During the research we also were facilitated the Business Plan of the product, which is a secondary source of information used in the case study.

7. THE COMPANY: SOLUCIONES 480

Soluciones Cuatroochenta is an innovative company of the Science and Technology Park of Jaume I University, Espaitec. Ii is specialized in comprehensive App development for smartphone and tablets, and in customized advanced programming for working process improvements. The company specializes in smartphone application development, bringing together specialists from several fields such as programming, development, graphic design, marketing and communication. It has a creative and multidisciplinary team with professionals in the field of planning, development, graphic design, marketing and communication.

Cuatroochenta creates each one of its projects with a real cooperation and a high commitment methodology. Its working methodology is based on Comprehensive development and basically consists of:

- Application concept creation: client goals research, user features and provides advice on the application's functionality and structure based on the client's business model or goals and on the App's usability. Help with goals definition in order to develop viable and effective applications.
- Interface design and App user experience: Obtaining the maximum performance offered by the various platforms in order to develop friendly interfaces that provide an optimum user experience.
- Implementation and development of mobile applications and backend: Transformation of the ideas into reality by testing and guaranteeing an optimum functioning before its release.
- App release, promotion and exploitation: Release and promotion of the application through the most appropriate channels according to the client's strategy and objectives, and to the possibilities offered by the various platforms (App Store, Google Play, Window Market Place).

8. THE PRODUCT: SEFICI

Seficy is an App that allows to safely using an already spread habit in the professional environment: the use of instant messaging to report incidences or different types of cases within the company. This contribution made by Sefici, a Cuatroochenta project designed for the easy and efficient facility and equipment maintenance management, both from mobile devices and from web administrators, with which users can create projects and process all the reports.

Together with the insufficient offer, the need of the market becomes clear in a moment in which the sector of the mobile applications of productivity grows in numbers of three digits and in which the demand of managerial applications based on the model SaaS is that of major growth and adoption inside the managerial software.

All this leads them to develop a simple solution without requirements of learning and based on technologies of the most widespread use: app, web, interface and use similar to the apps of instantaneous messenger company, and covering all the deficiencies in the professional area of management of incidents.

Following the "software as a service" (SAAS) model, Sefici is a free to download App (both on Google Play and the App Store) and can be used for free by the first four users of a project. It has affordable rates which are inversely proportional to the volume of employees. The company complements the functionalities of the application with a market place of modules also under model Saas. The model includes an option freemium for companies with less than 5 users, in fulfillment of the companies' goal to put Sefici within reach of any organization. The modules of its market place rely on a period of free test of one month for the clients.

With this model the company has achieved that Sefici could be in use in any type of organization and by any team. This fact also has a high impact on the potential market segment.

9. ANALYSIS

The analysis is based on the comparison of the stages of the design thinking project with the process followed by the company during the development of Sefici. As previously referred, we draw on information obtained using the questionnaire sent to the company, on the Business Plan of the product, and on the interview with the project leader Alejandro Vidal which he answer phase by phase what they did.
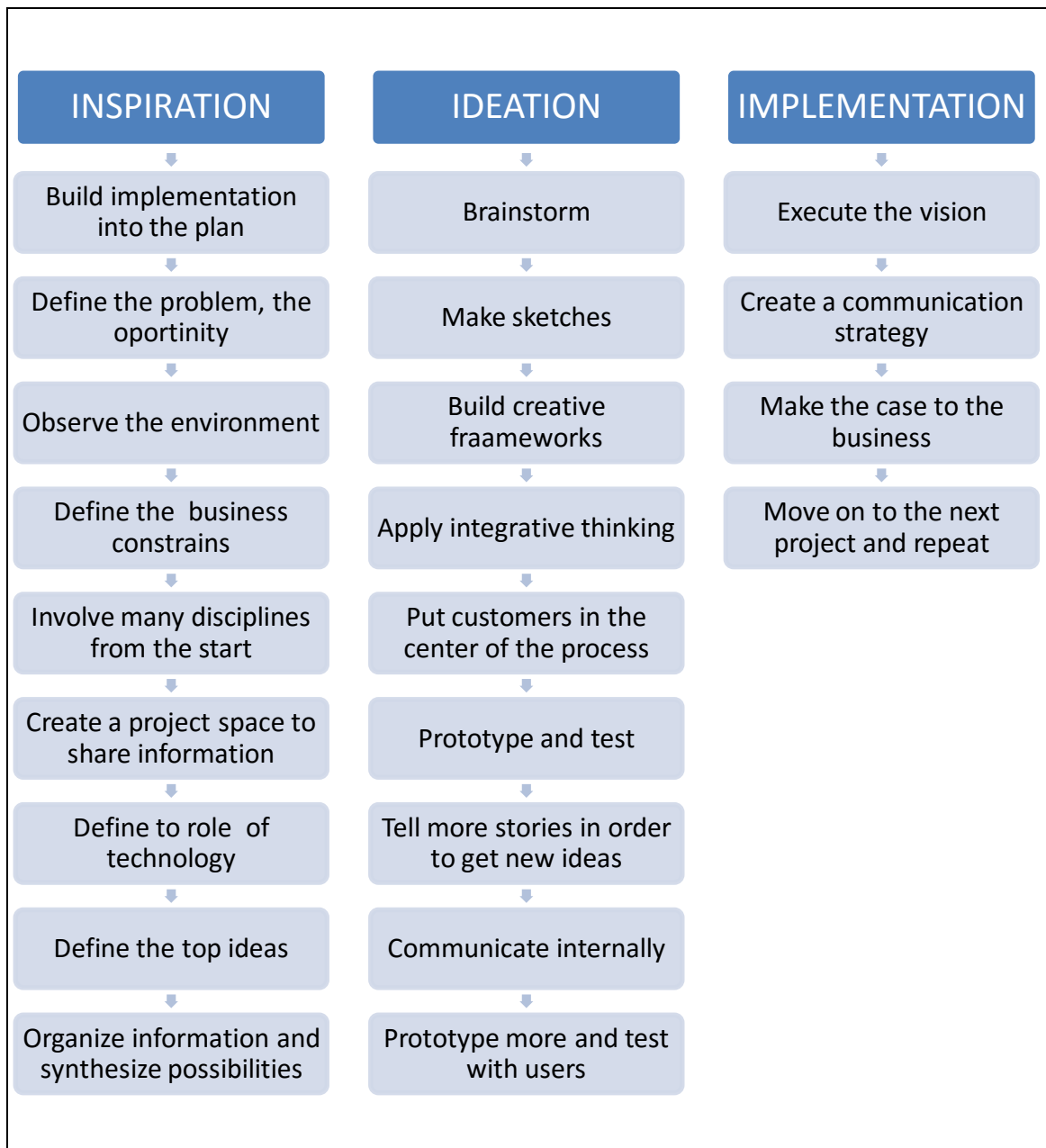
9.1. The phases of design thinking according to IDEO

To facilitate the analysis and discussion of results, first we briefly recall the three phases of design thinking according to IDEO, which were described in section 4: (1) inspiration, (2) ideation and (3) implementation. Figure 3 shows the details of the stages involved in each one.

The process is best thought of as a system of overlapping spaces rather than a sequence of orderly steps: inspiration, ideation, and implementation. Inspiration is the initial problem or opportunity that leads you to the finding of the solution; ideation is the core of the development process where the idea is better defined; and implementation is the final step where the solution comes in contact with the outer world.

Projects may loop back through inspiration, ideation, and implementation more than once as the team refines its ideas and explores new directions. These phases also demarcate different sort of related activities that together form the continuum of innovation. Design thinking can fell chaotic to those experiencing it for the first time but in time the process makes sense and achieves results, even that the process differs from the linear process typical in many business. (Brown 2008)

Figure 4. Detailed phases of design thinking process (IDEO)

INSPIRATION	IDEATION	IMPLEMENTATION
Build implementation into the plan	Brainstorm	Execute the vision
Define the problem, the oportinity	Make sketches	Create a communication strategy
Observe the environment	Build creative fraameworks	Make the case to the business
Define the business constrains	Apply integrative thinking	Move on to the next project and repeat
Involve many disciplines from the start	Put customers in the center of the process	
Create a project space to share information	Prototype and test	
Define to role of technology	Tell more stories in order to get new ideas	
Define the top ideas	Communicate internally	
Organize information and synthesize possibilities	Prototype more and test with users	

Source: own elaboration based on Brown (2008)

In each phase there are a set of methods that facilitate the design thinking process. The methods are based on the Human-centered design. They are a step-by-step guide to unleash creativity, putting the people at the center of the design process to come up with new answers to difficult problems (Brown, 2008).

9.2. Design thinking phases during the development of Sefici

Inspiration

The development of the initial tool of which Sefici is a spin-off started in 2014 with the aim of responding to a real need of several Cuatroochenta clients: managing incidences in a way that is fast and easy to use anywhere by any employee, highly customizable and low-cost. Sefici was born as a mobile solution to respond to incident management in geographically and physically broad environments, as well as dispersed groups.

The creation of Sefici is based on two strategic principles. The first one is the specialization in the management of the 21st century which facilitates and optimizes communication and incident management based on a technology that is in the hands of every field employee: mobile technology. And the second is advanced information processing starting with a common task such as incident management generates a large amount of information relevant to the organization's decision-making. Sefici is a system for monitoring data and presenting information available to the company.

The company has also taken into account the **new needs of customers** as the opportunities offered by the technological changes in the market which some of them were not satisfied promptly by any product.

Beginning with the idea of the product the company **created a team** in order to develop the product (Figure 5). The profiles of the involved persons are very different. In an initial phase Alfredo R. Cebrián graduated in Advertising and RRPP was the director of the team of development of business, Alejandro Vidal an Industrial engineer with specialization in Industrial Organization is the project lider, Sergio Aguado, IT Engineer the technical director and intervened many programmers of Cuatroochenta team.

 They also create Blast of partners which is a platform of impulse of technological projects. The platform is a guarantee for future investors because of the labor of follow-up and control that they are doing and due to the fact that the platform also provides contacts and the know-how part of the business. Partners recognized Sefici's potential, and they were involved from the beginning intervening in the business model.

Figure 5. Sefici development team
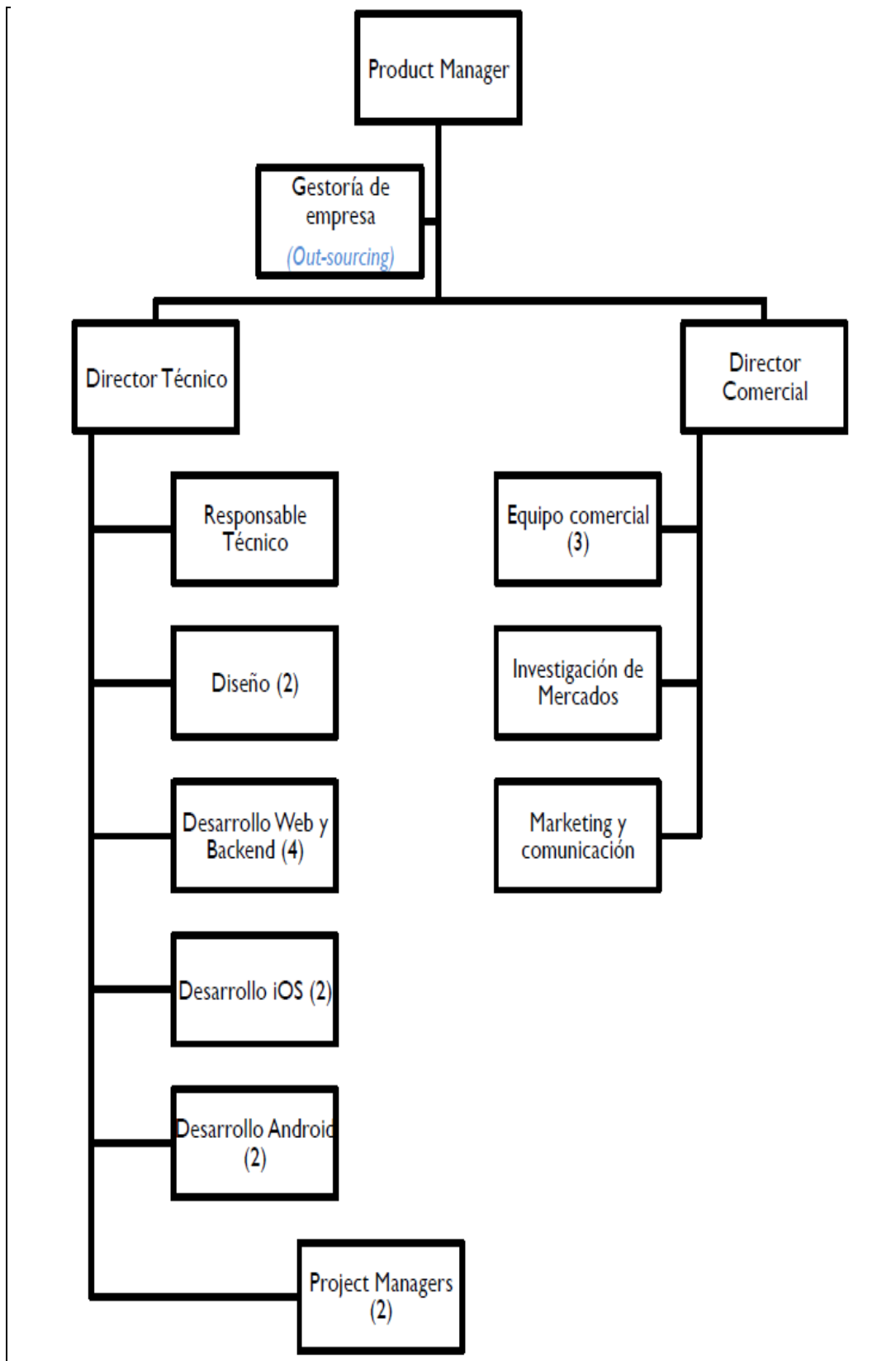
Source: Sefici Business Plan, pag. 40

From the beginning **different studies** were made. Sefici was created as a solution to Cuatroochenta clients, but from there the team has realized different studies to define the size of domestic and international market, studies of the competition and vertical studies in order to define to build a strategy.

In the first stages the team realized a **desk research**, which was complemented by the direct contact with potential clients, something that helped them to identify the segments of major potential. To define the size of the national market the team use data from the National Institute of Statistics, from Eurostat's (European Communities Statistics Office's) on the European level and worldwide its analogous ones in the respective countries and regions: Statistics Canada, National Institute of Estadistica and Geografia de Mexico, United States, Census Bureau, CEPAL.

To analyze the use, evolution and forecasts of the software SaaS B2B that they intended to use for the product the team gathered information from different reports and studies made by diverse entities: Gartner, Statistic Brain, Statista, Techcruch, Cisco Systems, Eurostat (European Communities Statistics Office), GSMA. By doing this they define the role of **technology**.

The competitive benchmark was carried out using the initial product in some cases, besides obtaining information of different companies using SABI and Hoovers.

Table 4 shows the set of methods used in this stage by the company. We can observe that during the inspiration phase, Sefici's teams used most of the methods proposed and by doing this they capture learnings; they define the problem and the challenge they had to resolve.

Table 4. Methods used during the inspiration phase of Sefici

PHASE	INSPIRATION	SEFICI
METHODS	Frame the design challenge	They chose this option as a suitable solution to their clients' needs
	Create a project plan	A project plan was made from the
	Build a team	They create a multidisciplinary team
	Recruiting tools	They analyze and recruit people from different sectors
	Secondary research	Desk research, market research, clients research
	Interview	Interview with current clients and possible clients
	Group interview	Group reunion in the company
	Expert interview	They ask company's experts from different sectors
	Define the audience	They did a market analysis
	Conversation starters	x
	Extremes and mainstreams	x
	Immersion	They try themselves the solution
	Analogous inspiration	They get inspiration from different technological fields
	Card sort	x
	Peers observing peers	They observe others groups within the organization
	Collage	x
	Guided tour	x
	Draw it	They prepare the application frame by frame
	Resource flow	Consumers studies

Source: own elaboration based on the interview with Sefici's product manager Alejandro Vidal

Ideation

During the second phase the team **defines the produc**t using the "software as a service" (SAAS) model. This decision was based on a study made by the company whit its clients using a Typeform questionnaire.

The team started **creating a prototype** by transmitting to the design team the needs and they start creating it screen by screen. Once validated by all the members involved they begin the development. The prototyping took more than 8 months until they create the first version of the product. The beta version was tested by a potential client for a few months. After the trial the client gave feedback to the company and with it they started improving the product. Sefici was created as a mobile application composed by two parts: servant and client.

In the begging, the team defined their **potential clients** as small and medium businesses: property administrators, hotels, maintenance companies, car parks, casinos, industrial factories, amusements parks, and technical support, manage marinas, supermarkets, hospitals, leasing, insurance, security and transport.

The team has also established the **possible demand** of the product. By doing that they found out that the size of Sefici's market is very wide and the demand is not limited to a concrete sector. The demand was defined based on its five primary dimensions: opportunity, need, temporality, destination and capacity of acquisition.

Sefici is designed after **detecting the opportunity** to cover a need of the market that up to that moment is deficiently covered. Cuatroochenta's real experience in the development of ad hoc solutions to improve processes of work in the managerial environment has made clear the need of many companies from diverse sectors to cover the management of incidents and simultaneously look for a solution simple and adaptive to the budget of a company. The necessity dimension came from by the increasing information of turnover of the sector SaaS in general and in the managerial area and from the increasing demand of mobile applications of productivity. Sefici's use make sense if the product is used daily, the demand remains constant in the time during long periods, without showing cyclical or seasonal behaviors, a fact that reinforces their bet for the model SaaS. Sefici is a product directed to the final user and is prepared for its "immediate" use. On the global market the investment in services SaaS and cloud computing is one of the most important for the persons in charge of technological investment in the companies.

Table 5 shows that during the ideation phase Sefici's team made sense of everything they learned and herd, they generate ideas, identify opportunities for design and test and refine the solution they proposed.

Table 5. Methods used during the ideation phase of Sefici

| PHASE	IDEATION	SEFICI
METHODS	Download the learnings	Constant communication between team members
	Share inspiring stories	It is used to find what a client wants
	Top five	It is used to define exactly clients needs
	Find themes	Constant communication between team members regarding product improvements
	Create insights statements	x
	Explore your hunch	Intuition is a necessary characteristic for the team members
	How might we	x
	Brainstorm	x
	Brainstorm rules	x
	Bundle ideas	x
	Get visual	Constantly using schemes, maps, graphics to define the workflow
	Mash-ups	x
	Design principles	x
	Create a concept	The concept was clear from the beginning
	Co-creation session	It is used as an external point of view to understand the solution
	Gut check	x
	Determine what to prototype	They define the product and the characteristics from the beginning
	Storyboard	x
	Role playing	x
	Rapid prototyping	A Beta Version was created and try out by a ceramic company
	Business model canvas	A project plan was created
	Integrate feedback and iterate	A typefrom was sent to possible clients

Source: own elaboration based on the interview with Sefici's product manager Alejandro Vidal

Implementation

During this phase the **competition** was defined. They agree that the can divided it into three main groups: 1) mobile applications for the management of incidents, 2) Software of management of incidents with app version, 3) messaging apps.

Sefici is created as a simple app so that any type of organization can use it. In order to **make it accessible** they have realized a micro-segmentation of the price depending on the number of users. The team **segmented the target** in 4 different groups depending on the size in order to apply different strategies for each of them.

Figure 6. Market target of Sefici
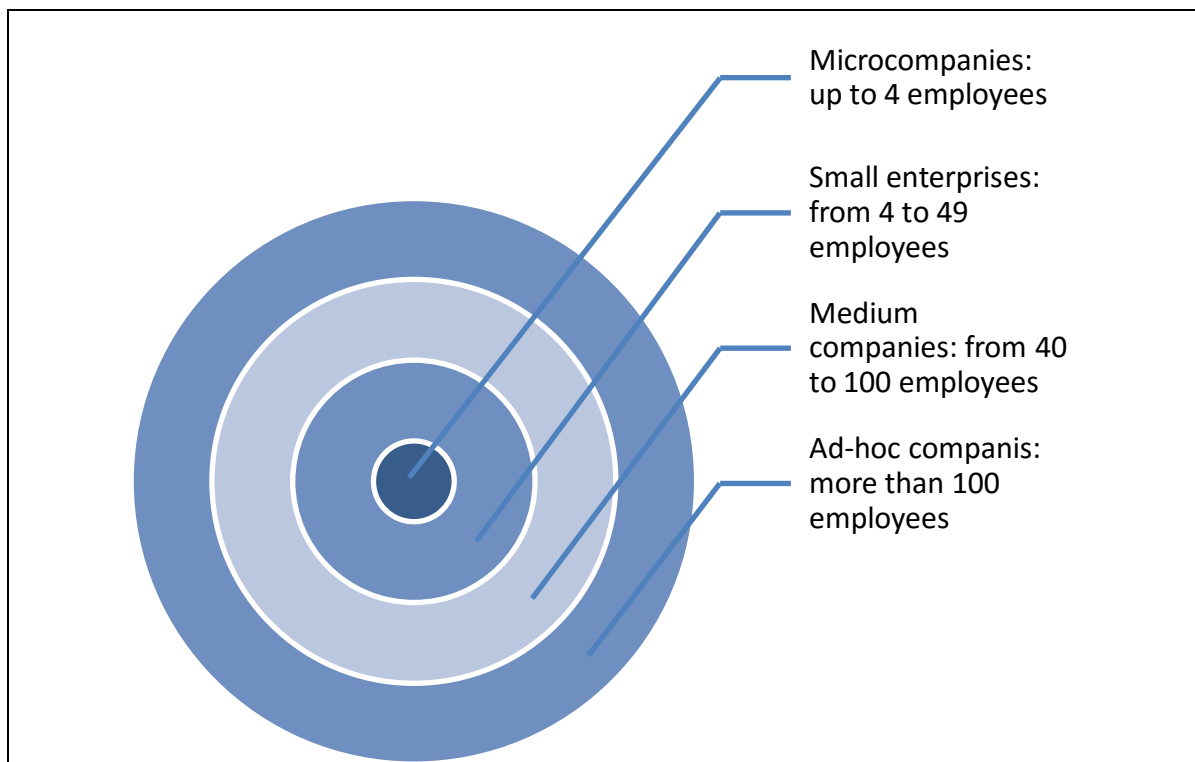
Source: own elaboration from the Sefici Business Plan, p.29

They defined the product and look out for the weaknesses, strengths, opportunities and threats. The SWOT analysis done (Table 6) is strongly related with the advantages and futures that the product presents from a practice point of view: it's easy and intuitive to use, incidents can be filtered according to priority, is based on the number of users and not on the amount of projects, presents a large number of functionalities and it is adaptable to the needs of the client.

By doing this they could define the **competitive strategy** of the product. The hybrid strategy chosen is one of the most difficult to manage because at the same time offers a competitive price with regard to the competition- achieved on the basis of a structure of internal minor costs - and an added value to the client.
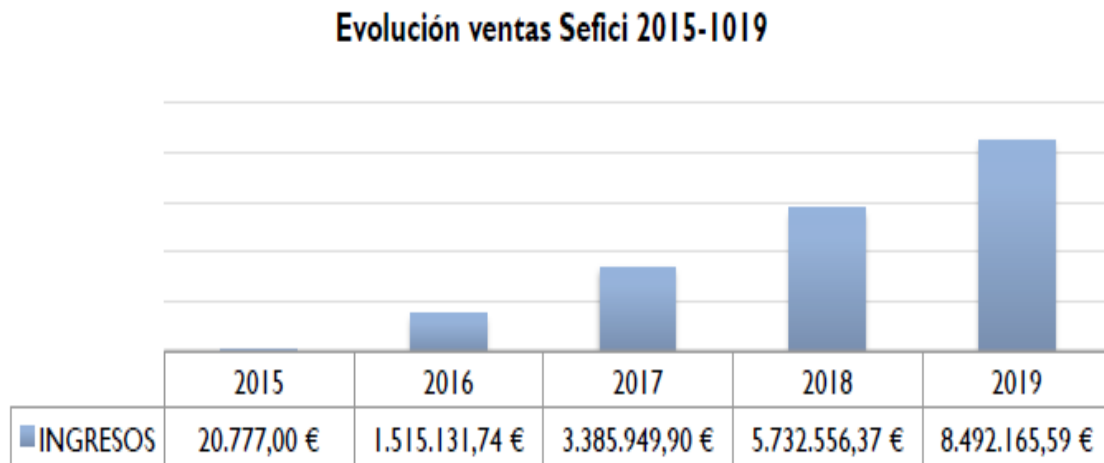
Table 6. SWOT analysis of Sefici

WEAKNESSES	• Sefici is a brand of new creation that needs certain investment in recognition of the brand and in promotion • Scanty equipment for technical support • Limited resources • Novel product • Partners red
THREATS	• In some niches the solution can be disruptive • Low access barriers • Rapid changing in technology
STRENGTHS	• Experience in the sector • Multidisciplinary team: experts in development of app and software, marketing investigators, marketing, communication, marketing online, process optimization • The adaptive price • Innovative profile of the service • Costs
OPPORTUNITIES	• Niche market not covered by the competition • Increase of the investment and confidence in SaaS • Market state • Learning economy

Source: own elaboration from the Sefici Business Plan (2016)

The team also made a **business plan** where they get very visual with the short and long term plans.

Figure 7. Sales evolution of Sefici

Evolución ventas Sefici 2015-1019

	2015	2016	2017	2018	2019
INGRESOS	20.777,00 €	1.515.131,74 €	3.385.949,90 €	5.732.556,37 €	8.492.165,59 €

Source: Sefici Business Plan (2016), p33

In table 7 we can observe the process of implementing the product. The team brings the solution to life and prepares and analyzes the environment in order to get Sefici to market and to maximize its impact in the world. Also they added a **time dimension** to the project in order to be able to follow the changes done to Sefici (table 8).

Table 7. Methods used during the implementation phase of Sefici

PHASE	IMPLEMENTATION	SEFICI
METHODS	Live prototyping	A ceramic company has used a beta version of the product for a few moths
	Roadmap	The roadmap is divided in two phases an its followed
	Resource assessment	They create a tool were each worker adds: working hours for improvements or for correcting product hours
	Build partnerships	Blast Off's participation Partners
	Ways to grow framework	Always stayed in touch with the clients
	Staff the project	x
	Funding strategy	New partnerships in order to grow the market segment
	Pilot	The first version was tried by a final client
	Define success	The goal is to increase the number of users and companies
	Keep iterating	Constantly feedback from the clients in order to improve the product
	Create a pitch	A business plan shared with founders, partners
	Sustainable revenue	Maintain the actual strategy, and business plan
	Monitor and evaluate	Constantly analyzing the market, users
	Keep getting feedback	Feedback from the users using a phone interview

Source: own elaboration based on the interview with Sefici's product manager Alejandro Vidal

Table 8. Time dimension of Sefici

YEAR	EVOLUTION OF THE PROCESS
2015 SEED	• Development of mobile application for iOS and Android. • Development of web administrator Business Plan's production • Company Constitution • Project Manager's contracting • Blast Off's participation Partners • The first round of private investment FFF • Agreements with the first partners: Spain and Panama or Test deprived with the first clients • Capture of privet capital • Product lunch • First income
2016 START UP	• Extension of the partners network internationally • Intensive communication • Extension sales force • Contracting online specialist • Contracting technical attention. • Extension of the market place • Consolidation of the functionality and usability • The second round of financing
2017 GROW UP	• Popularization of the product • Team for exclusive development • Intensification sales team and marketing team • Elaboration of the internationalization plan to Pacific Asia • The first appearances of direct competition • Relation with Federations of related applications
2018 GROW UP AND CONSOLIDATION	• Improvement of product to face its life cycle. • Execution of the internationalization plan to Pacific Asia. • Extension of human resources • Third round of financing
2019 CONSOLIDATION	• Strategy redefinition

Source: own elaboration based on Sefici Business Plan, p. 56-57

10. CONCLUSION

Design thinking is appropriate in uncertain, complex situations particularly those in which people are the key evaluators of the "goodness" of the solution. Design thinking's process and methods facilitate rapid learning and understanding of the situation and people involved, while allowing for iterative generation and testing of possible solutions. Facing conditions in which problems or opportunities involve many unknowns, where past data is unlikely to be of much use, and where human beings are enmeshed in the problem and solution, decision makers may find that design thinking provides a much-needed path forward (Brown, 2009; Liedtka, Ogilvie, & Brozenske, 2014).

Also, when related to innovation management, design thinking can play an important role, since, as it has been stressed, innovation management does not only consist of planning new products, services, brand expansions or technological inventions but it is also a new way to imagine, organize, mobilize and look for new way of competing in a continuous changing market.

By using design thinking the company creates a product, Sefici which is a SaaS of productivity in a sector that is growing exponentially in the last years. They define they goal to put within reach of any company advanced software of quality. They create an innovative app that reduces costs in the management of incidents, with a minor initial investment and a minor risk, which guarantees a rapid technical support, flexibility, immediate updates and major data protection. In this case, design thinking minimizes the uncertainty and risk of innovation by engaging customers or users through a series of prototypes to learn, to test and refine concepts. The team that was involved in the development process relies on users insights gained from real-world experiments, not just historical data or market research. We can observe that in this case human-centered innovation begins with developing an understanding of customers' or users' unmet or unarticulated needs. According to Liedtka (2015) the most secure source of new ideas that have true competitive advantage, and hence, higher margins, is customers' unarticulated needs and a deep knowledge of customers and their problems helps to uncover those needs.

Regarding the company, we suggest to take into account a well known practitioner, Tim Brown (2008) who mentioned that a company in order to use design thinking as a way to innovate they must follow different steps.

The company should involve design thinkers from the beginning of the innovation process. They need to take a human-centered approach due to the fact that innovation need to take into account beside the business and technology part, the human behavior, needs and preferences. They should try early and often and start creating a prototype from the beginning and measure the progress during the process. If the process does not work how it should they need to seek outside help because the innovation system needs new opportunities to co-create with customers and consumer.

Also another important aspect is to blend big and small projects. Innovation portfolio must include short-term and long-term projects in order to drive and fund incremental innovation and at the same time to initiate revolutionary innovation. The company needs to rethink funding approach as the projects are evolving find talent anyway they can by hiring people from interdisciplinary programs. The design process must be defined as a cycle which means that the company must plan the assignments so that design thinkers go from the inspiration to ideation to implementation.

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APPENDICES

Appendix 1. Sefici questionnaire

1. **¿Cómo surgió la idea de la aplicación?**

La idea surgió por una detección real de la necesidad del mercado trasladada por clientes de 480.

2. **¿Se ha elegido el proyecto entre diferentes ideas?**

Este proyecto se inició para cubrir una necesidad de forma que no hubo selección de proyecto en sí. Lo que si que se hizo entre gente del equipo es ver cuál sería la usabilidad de la aplicación. Aquí se decidió hacerlo más estilo chat que estilo aplicación de formularios al uso

3. **¿Qué personas estuvieron involucradas en el proyecto y por qué? ¿Qué perfiles tienen? ¿Hay mucha diversidad en los perfiles de los clientes?**

Los perfiles de las personas involucradas son muy distintos. En una fase inicial Alfredo R. Cebrián licenciado en Publicidad y RRPP fue el director del equipo de desarrollo de negocio), Sergio Aguado, Ingeniero Informático director técnico (intervinieron muchos programadores del equipo de 480 en los inicios).

Con respecto a los perfiles de los clientes, efectivamente hay una gran variedad, desde administradores de fincas hasta casinos, pasando por hoteles y empresas de informática.

4. **¿Se creó un equipo especialmente para este proyecto? ¿Qué rol tiene cada miembro del equipo?**

Actualmente sí. Alfredo R. Cebrián Socio director, Sergio Aguado Socio y director técnico, Alejandro Vidal Product Manager, Marc Sabater Marketing Manager e Irene Roures Programadora informática. A nivel de programación de las apps, nos apoyamos en los recursos de Cuatroochenta, (Iván Sorribes para el desarrollo de la versión Android y Sergio Aguado como programador iOS.

5. **¿Los miembros del equipo han participado con nuevas ideas? ¿Cómo fue el proceso?**

EL proyecto estaba desde el principio muy definido a nivel de negocio con lo que en una primera fase no era necesaria su modificación. Se ha ido mejorando a nivel técnico y en la fase actual se está valorando el cambio de una parte de dicho modelo por demanda de mercado.

6. **¿Qué estudios de mercado se realizaron?**

Como punto de partida se detecto la necesidad real trasladada por clientes de 480. A partir de ahí se han realizado estudios de tamaño de mercado nacional e internacional, estudios de la competencia y estudios por verticales.

7. **¿Qué fuentes de información se han utilizado en las primeras etapas de desarrollo del producto para averiguar los potenciales clientes, competencia, etc.?**

En las primeras etapas se realizó una fuerte labor de desk research, que también fue complementada con el contacto directo con potenciales clientes, algo que nos ayudó a identificar los segmentos de mayor potencial. Tamaño de mercado a nivel nacional utilizamos las fuentes de datos del Instituto Nacional de Estadística, a nivel europeo de Eurostat y a nivel global sus análogos en los respectivos países y regiones: Statistics Canada, Instituto Nacional de Estadística y Geografía de México, United States, Census Bureau, CEPAL.

Sobre el uso, evolución y pronósticos de software SaaS B2B se utilizaron distintos informes y estudios realizados por diversas entidades: Gartner, Statistic Brain, Statista, Techcruch, Cisco Systems, Eurostat, GSMA…

El benchmark competitivo se realizó usando el propio producto en algunos casos, además de obtener datos de las empresas a través de SABI y Hoovers, y sobre todo bajo un exhaustivo trabajo de desk research.

8. **¿Cómo han conseguido la información es decir cómo han averiguado las necesidades de los clientes, los aspectos que valorar?**

Con el contacto directo con el cliente, ellos mejor que nadie saben las necesidades que tienen.

9. ¿En este proceso se ha utilizado alguna herramienta concreta, más allá de preguntar informalmente?

Sí hemos usado Typeform para realizar encuetas para conocer un poco más en detalle a las empresas sus necesidades e intereses a nivel organizativo.

10. ¿A quién se dirigía el producto? ¿Y por qué?

A Gerentes de empresas, Gerentes de mantenimiento personal de mando ya que ellos son lo que tienen el poder de decisión y la necesidad real de estar informado.

11. ¿Se ha establecido un público objetivo? ¿Por qué se ha escogido ese público objetivo?

A particulares y a empresa fundamentalmente. En un fase inicial nos enfocamos a las PYMES pero actualmente el mercado nos ha indicado que la necesidad es latente también las grandes empresas.

12. ¿Se ha creado un concepto del producto? Explicar brevemente el concepto.

A qué te refieres exactamente?

13. ¿Se ha realizado un plan del proyecto? Explicar brevemente el proyecto.

Sí disponemos de un Business Plan que también te adjunto donde hay mucha información que puede serte útil.

14. ¿Se ha creado un modelo de negocio? Explicar brevemente el modelo de negocio

Actualmente es un sistema Freemium hasta 4 usuarios es gratuito y está basado en un sistema SaaS en el que solo se paga por lo contratado.

15. ¿Se ha creado un prototipo básico de la aplicación en un principio?

Sí se creó una versión base que se usó para ir perfeccionándola hasta alcanzar una altísima estabilidad y una increíble facilidad de uso.

16. ¿El prototipo ha sido probado por un potencial cliente?

Efectivamente, nuestra versión Beta fue probada por un cliente potencial.

17. ¿Se ha recibido feedback del cliente?

Por supuesto y en base a ese Feedback fuimos mejorando Sefici.

18. ¿Cómo fue el proceso de prototipado?

El que solemos hacer siempre en Cuatroochenta. Se transmite al equipo de diseño (Arancha) las necesidades y ella iba haciendo pantalla por pantalla y se la íbamos validando. Una vez aceptado por nuestra parte el diseño de la aplicación empezamos el desarrollo.

19. ¿Cuánto se tardo en conseguir un prototipo?

Costó varios meses (diría que 8) la primera versión pues íbamos sacando tiempo de donde se podía.

20. ¿Cuántas versiones hicieron hasta dar por bueno un prototipo?

Ha costado más de 2 años dar con una versión que consideramos decente que es la que tenemos ahora. No sabría indicarte el número de versiones.

21. ¿Creen que es mejor perfeccionarlo al máximo antes de sacar el primer prototipo?

Si. Que la versión beta sea muy estable es importante, siempre se podrá mejorar pero el primer paso es que estemos seguros de que funciona correctamente ya que de lo contrario, los clientes que accedan a probarla al poco tiempo la abandonarían.

22. ¿Prefieren lanzar varias versiones a partir de múltiples iteraciones?

Sí para sacar nueva versión hay que testear y corregir hasta dar con la versión libre de errores, a partir de ahí se sube dicha versión y se continua mejorando a partir de más pruebas y corrección de los errores detectados, para que el usuario perciba que es una app viva.

23. ¿Se han hecho mejoras al producto?

El producto se encuentra en una mejora constante. Actualmente se ha mejorado la recepción de notificaciones, el diseño, se han añadido nuevas funcionalidades, mejoras de estabilidad…

24. ¿Las mejoras han sido propuestas por el cliente o por un miembro del equipo?

Por las dos vías. Tanto las que recibimos por parte de los clientes como las que se proponen internamente, se estudian para determinar si son mejoras que pueden ser útiles a muchos usuarios, si es así, se genera un roadmap para planificar la ejecución de dichas mejoras.

Appendix 2. Methods used for inspiration

Methods	Description
Frame the design challenge	Properly framing the design challenge is critical to your success
Create a project plan	Get organized, understand the strength, and start identifying the team that will need to come up with innovative solutions
Build a team	An interdisciplinary mix of thinkers, makers, and doers is just the right combination to tackle any design challenge
Recruiting tools	Talking to the right people in order to build a strategy now so that the interviews really count
Secondary research	Getting up to speed on the challenge is crucial to the success in the field
Interview	Talking directing to people will help understand their hopes, desires and aspirations
Group interview	Obtain a quick understanding of community's life, dynamics and needs
Expert interview	Experts can fill quickly on a topic and give key insights into a relevant history, context and innovations
Define the audience	Consider the broad spectrum of people who will be the solution for
Conversation starters	Put ideas in front of a person and seek their reaction
Extremes and mainstreams	Designing a solution that will work for everybody means talking to both extreme users and those squarely in the middle of the targeted audience
Immersion	Understanding people by immersing yourself in their lives and communities
Analogous inspiration	To order to get a fresh perspective on the research is necessary to shift the focus to a new context
Card sort	The exercise helps identify what's most important to the customers
Peers observing peers	Get a glimpse into the customers' community by seeing how they document their lives.
Collage	Making and explaining a collage can help understand customers values and thought process
Guided tour	Taking a guided tour through the home or workplace of the customers can reveal their habits and values
Draw it	Is useful to learn about the customers and to put the thought and ideas in a visual order.
Resource flow	By organizing and visualizing how a person or family spends money, how it comes in, how it goes out, you can find new opportunities for more efficiency in the system

Appendix 3. Methods used for ideation

Method	Description
Download the learnings	Share all the learning with the teamwork
Share inspiring stories	Share the best of the learnings with the teammates
Top five	It's a synthesis tool which can help prioritize, communicate, and strategize with the team
Find themes	As you share learnings with your team you must spot patterns and themes and make sense of them
Create insights statements	Plucking the insights that will drive the design out of the huge body of information gathered before
Explore your hunch	Chase and explore a felling you get about something
How might we	Translate the insight statements into opportunities for design by reframing them as "how might we" questions
Create frameworks	A framework is a visual representation of a system and a great way to make sense of data and use them too highlight key relationships and develop a strategy
Brainstorm	Energize the team and drum up staggering amount of innovative ideas
Brainstorm rules	Use the seven rules that unlock the creative power of a brainstorming sessions
Bundle ideas	Combine the ideas into robust solutions
Get visual	Incorporating drawing, sculpting, and building can unlock different innovative solutions
Mash-ups	Mash up to existing brands or concepts to explore new ideas
Design principles	Recognize certain unifying elements that start guiding the design
Create a concept	Move from the ideas to a fully-fledged concept, one that must be refined and push forward
Co-creation session	Incorporate into the design process the customers
Gut check	Look at the ides in a critical way and figure out what to pursue, what to evolve, and what to discard
Determine what to prototype	There are many ways to prototype an ideas but is necessary to isolate what to test by making simple, scrappy prototypes
Storyboard	It's a quick, low-resolution prototype that can help visualize the concept from start to finish
Role playing	A quick and tangible way to test an idea and to experience
Rapid prototyping	Build the prototype quickly, share them immediately and keep on learning
Business model canvas	The handy worksheet can help think through some key aspects of a social enterprise, service or business
Integrate feedback and iterate	Let the feedback of the customers guide the next iteration of the solution

Appendix 4. Methods used for implementation

Method	Description
Live prototyping	Is a chance to run the solution for a couple of weeks out in the real world
Roadmap	Is necessary a timeline and a plan of action to get the idea out in the world and keep it on time and on target
Resource assessment	Understand the feasibility of the solution
Build partnerships	Build partnerships that will help getting the concept to market
Ways to grow framework	The chart will help understand whom the design solution is for and what the implementation will look like
Staff the project	Build the team that can take the concept to completion
Funding strategy	A coherent strategy will help distribute the money that is necessary to get the design solution off the ground
Pilot	Is a long-term test of the solution and a critical step before going to market
Define success	Sit down with the team and map out what success looks like by setting key milestones that will keep the process on course
Keep iterating	Testing, getting feedback, and iterating will help get a great solution to market and let know where to push it
Create a pitch	Communicate the idea to funders, partners and consumers
Sustainable revenue	Is necessary a long term revenue strategy to have the maximum impact
Monitor and evaluate	Design the ways, measure and grow them into the solution
Keep getting feedback	Continually getting new input of the consumers