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The **Embedded design process** as a way to do *open innovation*

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Abstract | ITA

Le aziende hanno capito che per rimanere competitive in un contesto di cambiamento dai prodotti ai servizi devono fare innovazione aprendosi a collaborazioni con professionisti ed entità esterne, ovvero mettere in atto strategie di Open Innovation. A seguito di questo trend sono nati moltissimi programmi di open innovation, ma su che teorie si basano? Che tipo di rapporto creano tra azienda ed entità esterne? Quali sono le entità esterne coinvolte? E quale programma dovrebbe scegliere un'azienda? Queste sono alcune delle domande a cui si vuole rispondere in una prima fase di ricerca. Viene anche analizzato il caso particolare di Sketchin, un'azienda specializzata in strategia e design, per capire quali programmi di consulenza vengono oggi offerti alle aziende che vogliono fare innovazione. Questo costituisce il contesto in cui nasce il modello Embedded: un programma di innovazione che vede l'inserimento temporaneo di designer e altri giovani professionisti all'interno di un'azienda, per creare prodotti-servizi innovativi ma non solo. Infatti, l'obiettivo di questo programma è anche quello di trasmettere l'approccio design thinking all'azienda, che lo apprende mettendolo in pratica. La tesi si focalizza quindi sull'analisi del modello Embedded, avvenuta

a partire da un'esperienza lavorativa personale ed integrata da alcune conversazioni avvenute con un professore e una ricercatrice dell'Università di Modena e Reggio Emilia. L'obiettivo della tesi è infatti quello di formalizzare e standardizzare il processo di design dell'Embedded in modo tale da costituire una base per ulteriori sviluppi e impieghi dello stesso. Il valore del modello sta principalmente nel fatto di co-creare la soluzione con il cliente e quindi promuovere un cambiamento più ampio di mentalità nell'azienda, che vede la collaborazione di diverse aree. Per i giovani designer che partecipano al progetto il valore sta sicuramente nella libertà di utilizzo dei metodo appresi durante gli studi, dai cui deriva anche una certa responsabilità per il lavoro svolto. Questo elemento costituisce una sfida interessante e formativa per un service designer all'inizio della sua carriera.

Abstract | ENG

Companies have understood that in order to remain competitive in a context of change from products to services, they need to innovate by opening up to collaborations with professionals and external entities, i.e. implementing Open Innovation strategies. Following this trend, many open innovation programs were born, but on which theories are based? What kind of relationship do they create between the company and external entities? Which are these external entities? And which program should a company choose? These are some of the questions that we want to answer in a first phase of research. The particular case of Sketchin, a company specialized in strategy and design, is analyzed to understand which consulting programs are now offered to companies that want to innovate. This constitutes the context in which the Embedded model is born: it is an innovation program that sees the temporary inclusion of designers and other young professionals within a company, to create innovative products and services. The goal of this program is also to convey the design thinking approach to the company, which learns it by practicing it. The thesis focuses on the analysis of the Embedded model, which was conducted

starting from a personal work experience and it was integrated by some conversations with a professor and a researcher from the University of Modena and Reggio Emilia. The objective of the thesis is in fact to formalize and standardize the design process of the Embedded in such a way as to constitute a basis for further developments and uses of the model itself. The value of the model lies mainly in the fact of co-creating the solution with the customer and therefore promoting a wider change of mentality in the company, which sees the collaboration of different areas. For young designers participating in the project the value is certainly in the freedom of use of the methods learned during the studies, from which also a certain responsibility for the work carried out derives. This element constitutes an interesting and formative challenge for a service designer at the beginning of his career.

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Introduction

The idea of this thesis work arises after a formative personal professional experience.
For three months I worked for a large Italian multinational company on a project that gave me the opportunity to see first hand the complexity of an organization of this type and how design thinking can help create value and innovation in a similar context .
The type of project I attended is called Embedded, and it is a young model whose structure has evolved rapidly in recent years and has not yet been completely formalized.
The purpose of my thesis work is precisely to analyze the structure of the Embedded process, abstracting and creating a model from what was my personal experience, in order to lay the foundations for future implementations and applications of the process.

The thesis work is divided into two parts. The first part is aimed at understanding the context in which the Embedded model is created and inserted; while the second part is the analysis of the Embedded model.
Finally, some considerations are made on how the model could evolve in the future and personal conclusions are drawn on the subject.

The first part starts from a research aimed at understanding the context in which the Embedded model was born. In particular, the case in which companies turn to external entities, called Open Innovation, is analyzed.
Following this part, there is a list and description of the various methods of collaboration between companies and external entities and, in particular, case studies are proposed which are more similar to the Embedded model in terms of objective and scenario in which they are inserted.

After the analysis of the context, starts the part that regards the Embedded model. This part see the analysis of the process that, starting from an overview and brief history of its birth, becomes more and more

detailed. It is made also a comparison between the Embedded and the innovation and design models on which it is based: the purpose is to see what it has in common and in what it differs. Finally, it is considered what happen when the project finish, with the aim to see the varius possibility of implementation of the Embedded final solution.

Until this point the intent of the author has been to formalize a model of innovation, but after that there is an analysis of the value of the Embedded process. This part aims at underlining which are the benefit that such a model can bring and in which charachteristics it differs from the other numerous processes of innovation that consultancy firms proposes nowadays.

The final part of this thesis work is dedicated to the conclusions. It is intended as a more personal reflexion about the Embedded program, in which the author considers the personal experience of the application of the model.

First Part

The Context

1.

Open Innovation

In this chapter we want to understand why companies have recently become increasingly design driven. To do this we will briefly explain the link between design thinking and innovation and then we will focus in particular on what open innovation is and why it is so interesting for companies.
This, in fact, constitutes the context in which open innovation programs based on design thinking, such as the Embedded model, are inserted.

Everything that is created with the design process solves a problem, even a complex one, creating a value for someone. The correct and profound understanding of the problem, combined with the consequent creation of a solution with a new and unique value for those who will benefit from it, is what is called innovation. Therefore, mastering Design Thinking means doing innovation.
Martin (2009) explains that the creation of advantages in both innovation and efficiency is the combination that produces the most powerful competitive edge. This is why, as Martin says, *the most successful business in the years to come will balance analytical mastery and intuitive originality in a dynamic interplay that I call Design Thinking*[1].

[1] Martin, R. (2009). *The design of business. Why design thinking is the next competitive advantage.*

Open Innovation

Open Innovation (OI) is one of the big trends in business that charchterizes the recent years, and that is the great context in which the Embedded model is inserted.

Open Innovation is a catalysing process of innovation that relies on collaboration from external organizations (Ades, Figlioli, Sbragia, Porto, Plonski, Celadon, 2013), and therefore concerns the creation and spread of knowledge, both inside and outside the firm, to innovate something new (Nonaka, 2013). The term was coined for the first time by Henry Chesbrough, in his book *Open Innovation: The New Imperative for Creating and Profiting, from Technology*. There he defines the model of OI, which claims that the company commercializes both its internal ideas and external ones from other companies, and search for ways to put their ideas on the market through the development of different routes that are not part of its usual business (Chesbrough, 2003).

The model is in contrast to the most conventional managment theories and business practices, where the knowledge was considered the element that brings value and differentiate the company from others. Therefore such knowledge was kept within the

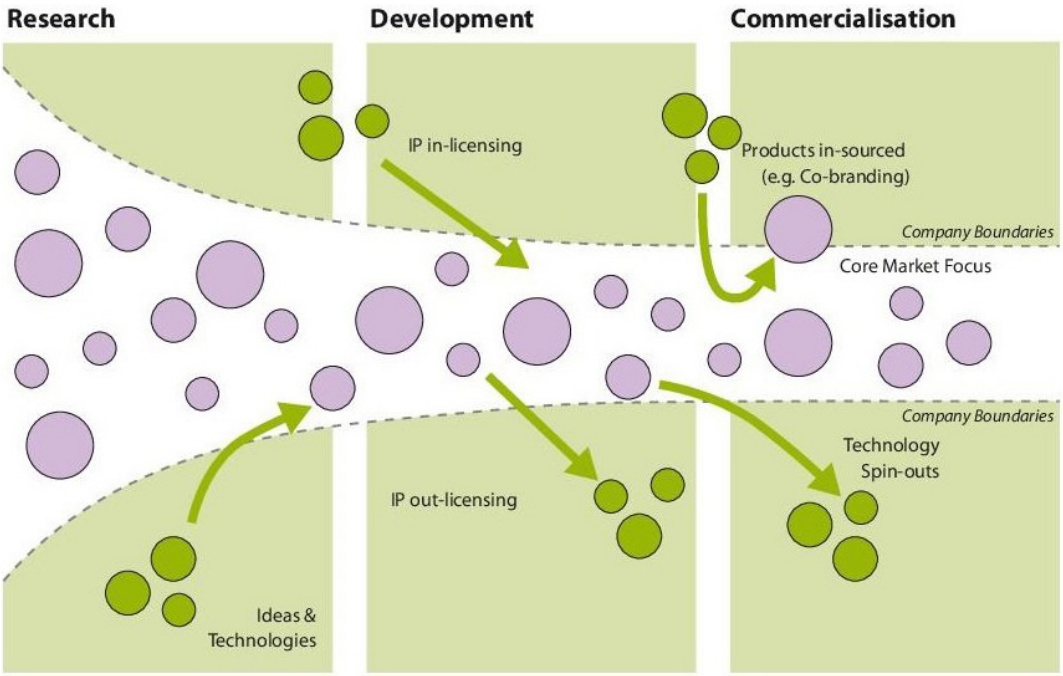


Figure 1.1: Open Innovation model. Source: Mortara (2009)

firm's organizational boundaries, in a closed model of innovation. However times have changed and Nonaka explain the shift from a closed innovation system to an open one as it follows:

> since the 2000s, there has been a shift in innovation from products to services. Businesses bacame more globalized and custumer needs became more complex [...] Products were not enough to meet value propositions; they had to be accompanied by services within a business model. We call this movement a shift from thing-oriented to event-oriented. Therefore firms needed to expand their value chains from vertical to orizontal integration; from a closed and linear system to an open and complex ecosystem; from extraction to inclusion[2].

[2] Nonaka, I. (2013). Introduction of the book *New Frontiers in Open Innovation* (2014).

A more open approach allows companies to obtain advantage from ideas that would not be generated internally, and others that fit perfectly the needs of the company, but were developed outside the company (Ades, *et al.*, 2013).

More than ten years have passed since the birth of the OI model and a lot of literature spread during that time, with a consequent application of the theory to practice by various firms in the world. Therefore, the advantages of OI are well known, but a lot of companies still fear the change. In fact, OI is described as a model that has to be applied inside the organization, changing in part its organization and way of working, but, most of all, a correct application of OI implies a change in the vision and mindset. All of this requires a lot of effort, especially for those firms that has a long history and a consolidated model of management. However, adopting a full open model might not be the right choice for everyone. It is necessary to establish a degree of adoption of the open approach, so that the company can develop its products and services more quickly, but can also stimulate the construction of key competences and the protection of intellectual

property (Enkel, Gassmann and Chesbrough, 2009). Now companies ask themeselves how they should apply the OI model in their organization. In an attempt to find an answer to this question, since the spread of the model, a lot of different programs of OI have arisen. They were born both from the companies, that autonomously found their way to follow the model, and from consultancy firms, that in recent years have specialized in helping companies to take this step. Pisano and Verganti describe well this fervor around the theme in an article on Harvard Business Review from the issue of December 2008:

> Should you open up and share your intellectual property with the community? Should you nurture collaborative relationships with a few carefully selected partners? Should you harness the "wisdom of crowds"? The fervor around open models of collaboration such as crowdsourcing notwithstanding, there is no best approach to leveraging the power of outsiders. Different modes of collaboration involve different strategic trade-offs. Companies that choose the wrong mode risk falling behind in the relentless race to develop new technologies, designs, products, and services. (Pisano, Verganti, 2008)

In the following paragraphs of this thesis work, we are going to see some of the most common models of application of the principles of OI and which are the other theories that constitute the basis for their fromalization. The structure of the model, the advantages it brings and what the specific purpose is will also be highlighted.

2.

Theories behind Innovation Programs

In this chapter we are going to consider the most popular theories from which many innovation programs were born. This constitute the base for the analysis of the various programs that are addressed to those companies that want to embrace open innovation.
It is interesting to see the main features and vision of these models because later on we will see how each innovation program apply them to its context.

2.1. Design Thinking

Design thinking (DT) is an approach for creative problem solving, based on the assumption that what drives innovation is the process and mindset that designers use when approaching a new project. With this vision everyone could think like a designer, he only have to learn how to do it.
The process that has been proposed by the d.school of Stanford, was originally divided into five phases. However, the d.school added one more final phase recently, as shows the scheme in figure 2.1 at page 27.

Empathize

The first phase is all about understanding people, in the context of the design challenge. The effort is in understanding the way they do things and why, their phisical and emotional needs, how they think about the world and what is meaningful to them. This phase is central in a human-centred approach, as DT is.

Define

The Define phase is about bringing clarity and focus to the design space. The goal is to define the challenge the team is taking on, based on what they have learned in the Empathize phase. It is the moment to synthesize the findings into powerful insights, making sense of the learnings acquired.

Ideate

This phase concentrates on the idea generation. This is the transition from the identification of problems to the creation of solutions for the users. Especially in an early stage of the design process, this is the moment to push for a widest possible range of ideas, which will be selected later. Ideation provides both the fuel and also the source material for building prototypes in the next phase.

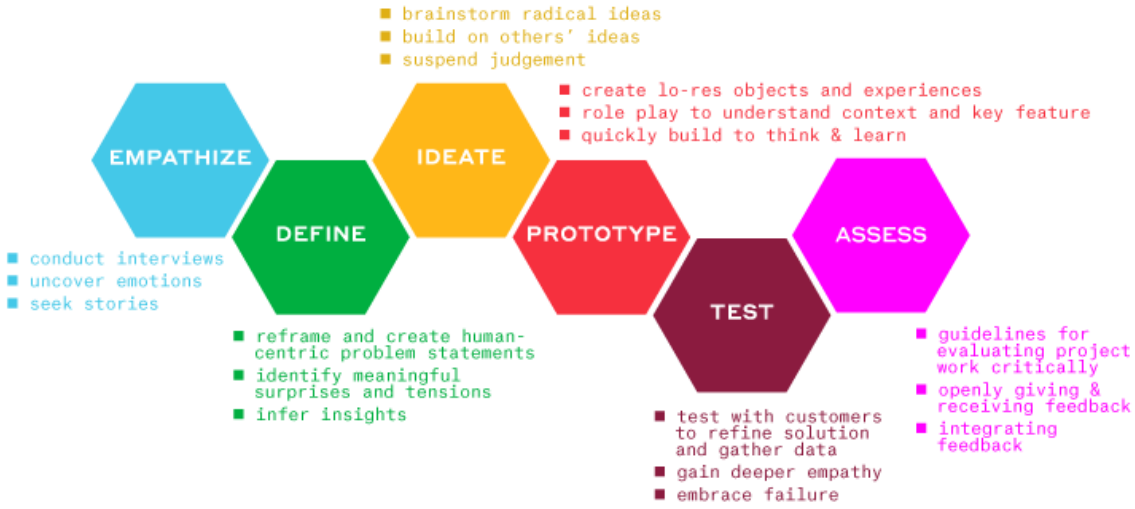


Figure 2.1: Design Thinking process, d.school.
Source: Hasso-Plattner Institute of Design, Stanford University (2019)

Prototype

The prototype mode is the iterative generation of artifacts intended to answer questions that get you closer to the final solution. The focus is on the creation of low-resolution prototypes that are quick and cheap to make but can elicit useful feedback from users and colleagues. In the early stages of a project the assumptions that one want to test may be broad, but with the progress of the project and iteration of the steps, both the prototype and question may get a little more refined.

Test

The test phase consists of soliciting feedback, about the prototypes that have been created, from the users and it is another opportunity to gain empathy for the people one is designing for. Testing is another way to understand the user, when one has done more

framing of the problem. It is important not reduce the testing work to asking wether the users like the solution or not. Instead, one has to continue asking "why?" in order to learn from the users about their problems and the potential solutions[3]. This constitute a chance to refine the solutions and make them better.

Assess

The last phase of the process is about applying all the knowledge acquired and make a point of the project status. The focus is on giving and receiving feedback about the work and integrating this feedback by refining the solution. It is useful to use a series of guidelines to evaluate the project work critically.

The whole structure of the process is not necessarily linear, but it can be applied as needed.

[3] *An introduction to Design Thinking, process guide*. Source: https://dschool.stanford.edu/resources

2.2. Human Centred Design

Human Centred Design (HCD) is a creative approach to problem solving. It is a process that starts with the people you are designing for and ends with new solutions that are tailor made to suit their needs. HDC means believing that the people who face problems every day are the ones who hold the key to their answer[4].

HCD is not a perfectly linear process since every project has its own charachter. However, it consists of three phases through which one have to pass in every project: Inspiration, Ideation and Implementation.

The ***Inspiration*** Phase is focused on understanding the user: you learn directly from the people you are designing for as you immerse yourself in their lives and come to deeply understand their needs. The key activity of this phase is interviewing people you are trying to serve, in order to build deep empathy with them.

The ***Ideation*** Phase is focused on making sense of the learnings acquired, identifying opportunities for design, and prototyping possible solutions. At

[4] IDEO.org (2015). *The Field Guide to Human-Centered Design.*

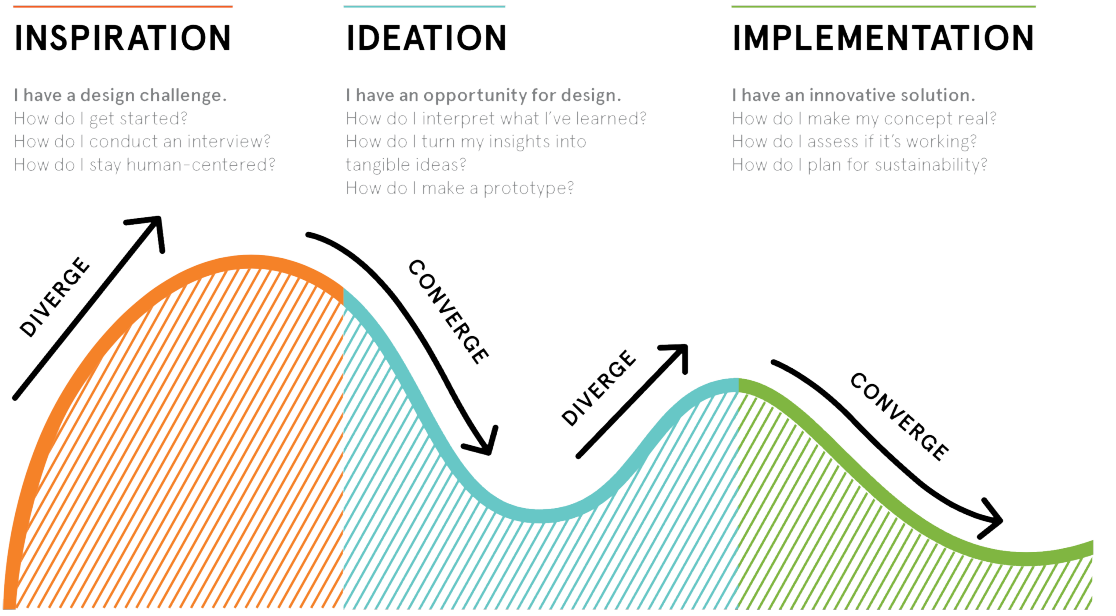


Figure 2.2: Human Centred Design approach. Source: IDEO (2011)

this stage is important to work in teams to maintain creativity and energy.

The ***Implementation*** Phase consists of figuring out how to bring the solution to life, and eventually, to market.
While working through the three phases you move from concrete observations to highly abstract thinking, and then right back again into the modification of the prototype. These alternating moments are diverging and converging phases that charachterize the process.

The key element of HCD is the belief that keeping the very people you are looking to serve at the heart of the process permits to have a successful solution.

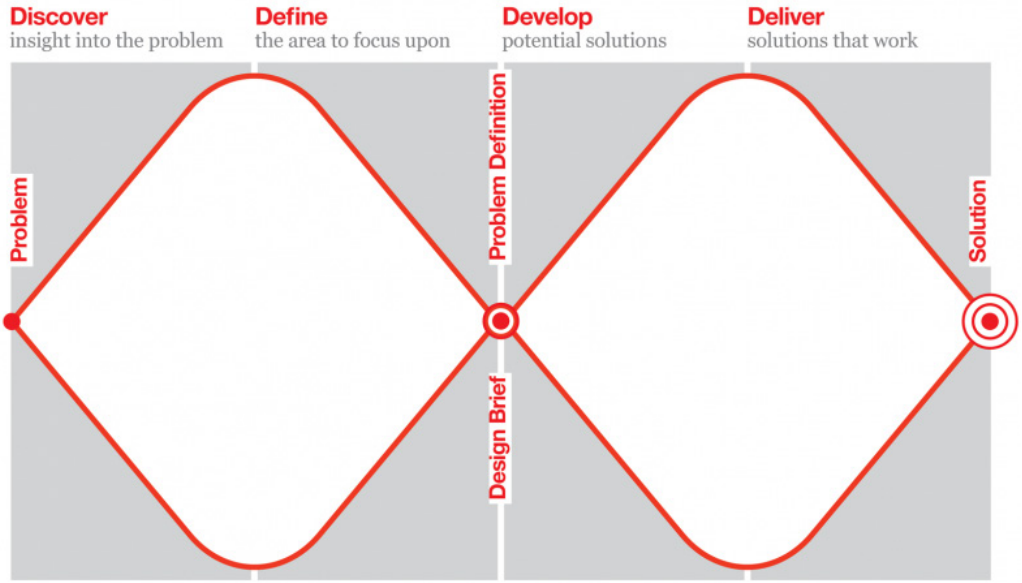


Figure 2.3: Double Diamond process. Source: Deisgn Council (2014).

2.3. Double Diamond

The Double Diamond shows how designers from different disciplines share similar approaches to the creative process. The DD is part of the Design Council's Framework for Innovation, and it is a visual map of the design process. The main charchteristic highlighted by this model is the alternation of divergent phases with convergent phases, that happens twice in a design cycle: the first time to define the problem and the second time to define the solution. The process is also composed by four phases, described by the Design Council as it follows:

> *Discover* – The first quarter of the Double Diamond model covers the start of the project. Designers try to look at the world in a fresh way, notice new things and gather insights.

Define – The second quarter represents the definition stage, in which designers try to make sense of all the possibilities identified in the Discover phase. Which matters most? Which should we act on first? What is feasible? The goal here is to develop a clear creative brief that frames the fundamental design challenge.

Develop – The third quarter marks a period of development where solutions or concepts are created, prototyped, tested and iterated. This process of trial and error helps designers to improve and refine their ideas.

Deliver – The final quarter of the double diamond model is the delivery stage, where the resulting project (a product, service or environment, for example) is finalised, produced and launched[5].

Even if it is not showed in the visual scheme, this process is iterative. That means that, in order to find the best solutions, ideas are developed, tested and refined a number of times. This cycle is considered an essential part to achieve a good design.

[5] The Design Process: What is the Double Diamond? (2015, March 17). Source: https://www.designcouncil.org.uk/news-opinion/design-process-what-double-diamond

2.4. Agile

The term Agile, referring to the field of Information Technology (IT), is coined with the drafting of the Agile Manifesto. The Manifesto for Agile Software Development was born from the meeting of some software developers, which took place in 2001, with the desire to find common ground and the need for an alternative to documentation driven, heavyweight software development processes (Highsmith, 2001). This manifesto defines 4 key values:

> We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:
>
> **Individuals and interactions** over processes and tools
> **Working software** over comprehensive documentation
> **Customer collaboration** over contract negotiation
> **Responding to change** over following a plan
>
> That is, while there is value in the items on the right, we value the items on the left more[6].

In the manifesto, in addition to these 4 values, 12 basic principles are also described. From this we can understand how Agile is not a methodology or a process, as it is often confused, but rather a set of values and principles that encourages a certain

[6] Agile Manifesto (2001). Various authors. Source: https://agilemanifesto.org/

type of behavior (Tomasini, Kearns, 2012). It would be incorrect to define Agile as a methodology also because one of the characteristics of agile is precisely that of opposing to the abundance of structures, which generates rigidity. In fact, this would not allow the presence of chaos, which is considered fundamental for achieving innovation. Highsmith reminds us of this concept in his book *Agile Project Management* (2009):

> Complexity theory tells us that innovation - creating something new in ways that we can't fully anticipate - occurs most readily at the balance point between chaos and order, between flexibility and stability

Agility can therefore be defined more correctly as a project framework and working mind-set that facilitates the creation of innovative outputs, fostering change while adapting to changing requirements[7]. It is easy to understand from this description, why Agile has become so well known to companies in recent times, and has therefore moved from its birth in the field of software development to other fields, becoming a framework applicable in general to complex projects .

[7] Comparison between Highsmith (2009) and the Association for Project Management. Source: https://www.apm.org.uk/resources/find-a-resource/agile-project-management/

The Agile framework focus on customer value by delivering what is needed with a high level of quality and fast. Rapidity in the delivery of a working solution is one of the basic principles of Agile, and it is related to another principle: the welcoming of changes in the project, that has to be adaptable. In fact, this rapid changes are possible only by a confrontation between people working on the project and the customer, talking face-to-face. Through customer collaboration it is possible to achieve higher level of customer satisfaction as well as higher productivity.
Agile encourages the formation of empowered, self-organizing teams who are allowed - and expected - to identify what is required to achieve success. In fact, one of the Agile principle is that teams should be self-organized and find moments, al regular intervals, to take stock of the situation and see how to improve, then adjusting the behavior[8].

[8] Comparison between Tomasini, Kearns (2012) and the Agile Manifesto (2001)

Agility could be - and should be - also applied to entire organizations. In fact, the organizational structure of the project and that of the company are connected

and influence each other. If an organizations embrace the values of agility, it can more easily support agile teams and their way of working. For this reason we talk about an agile transition and many consulting companies have started to create programs that help companies to make this change.

3.

Examples of Innovation Programs

In this chapter we are going to see what are the main programs that are used nowadays as ways to practice open innovation. The aim is to see how companies are opening up outside to foster innovation, what kind of relationship they establish with the outside and who are these external entities with which they collaborate. Moreover we will see in which cases it is better to adopt a program rather than another and what is the specific objective for which each has been thought.

3.1. Hackathon

A hackathon is a co-creation event with an element of competition, where participants work in teams over a set and short period of time to ideate, collaborate, design, rapidly prototype, test, iterate and pitch their solutions to a determined challenge. The word Hackathon is composed of two parts: *hack* and *marathon*. The word *hack* refers to the creative problem-solving and tackling of the challenge, while the word *marathon* indicates the intensity of the event.

At the beginning hackathons were industry-specific coding sprints, but they recently overtook the world of entrepreneurs, startups and, lately, large corporations (Flores, M. *et al.,* 2018). This is because this kind of events provide a means to accelerate innovation, thanks to the methdology used, rapidity and the presence of heterogeneous teams.
Hackathons are an example of full open innovation: usually anyone can participate to these events. In fact, the presence of professionals from various fields provides a variety of points of view and therefore of ideas. The purpose of these events is precisely to get as many innovative ideas as possible, the quantity of ideas is more important than quality. In fact, hackathons best fit the earliest stages of the lean innovation process, where the market is unknown or not yet well-defined, and many ideas are welcome to be tested using user-centric and Lean Startup concepts (Flores, M. *et al.,* 2018).

The duration of a Hackathon can vary from 8 to 48 hours of intense work, where, starting from the initial challenge, teams go through various design phases to get to the last day where they present the work in

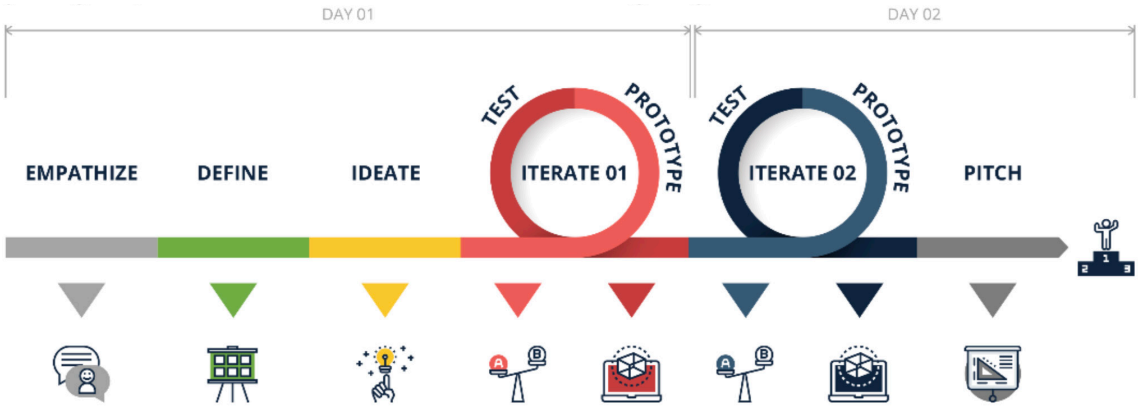


Figure 3.1: Design thinking processes proposed for a two-day hackathon event (Lean Analytics Association, 2018).

a pitch. In figure 3.1 we can see an example of the process of a two-day workshop. At the end of the event the best idea, selected by a jury, is rewarded with a prize. This could have the form of a monetary or non-monetary (e.g.: access to online or offline courses, incubation or acceleration programs, technological gadgets) reward (Uffreduzzi, 2017). Usually, also for this reason, students or young professionals participate, benefiting from work even as a way of practicing and test their skills.

In conclusion, this is a way for companies to do open innovation without changing their internal organization and with a great returnment on investment. For these reasons this can be one of the first approaches of a company to open innovation, as a spark of what design thinking can do, but is not always the best choice. In fact a Hackathon is a finite event, that has to be supported by a good a good definition of the initial challenge and a plan about what to do with the result.

3.2. Design Sprint

Banfield, Lombardo and Wax (2016) define Design Sprint as a flexible product design framework that serves to maximise the chances of making something people want. It is an intense effort conducted by a small team where the results will set the direction for a product or service. It takes elements from the design process, the scientific method, and wraps them with an agile philosophy. In fact, the word Sprint comes from the world of Agile, and it describes a short period of time, typically 1–4 weeks, set aside to accomplish a focused goal. The same is for the design sprint, with the difference that Design Sprints last 5 days.

This approach was born inside Google Ventures (GV), the venture capital arm of Alphabet, Inc. and the term Design Sprint was first used by Jake Knapp, a designer and ex partner of GV, that brought this framework to a broader audience. In fact, the process was created for startups, that were in need of product design advice to align their teams. To help with this GV used to send a designer to work with each startup for one week's time. These processes had five phases, one for each day of the week. From the application and proved results of this model the design sprint was born.

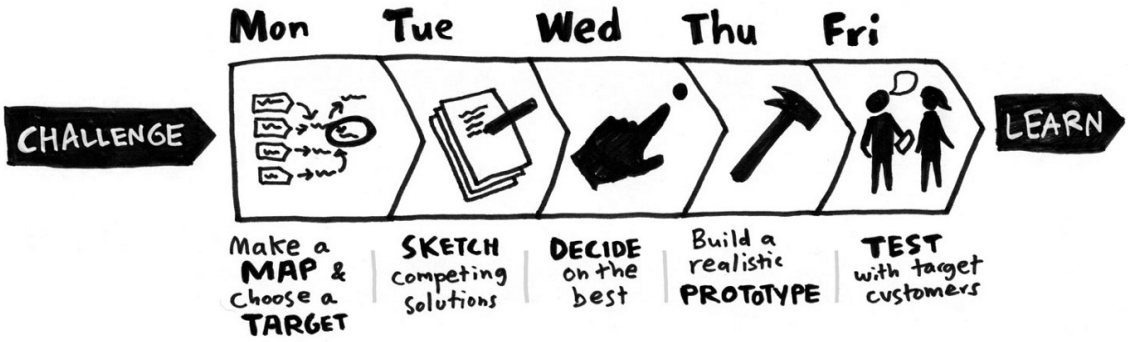


Figure 3.2: The Design Sprint process.
Source: https://uxplanet.org/whats-a-design-sprint-and-why-is-it-important-f7b826651e09

The 5 phases of the Design Sprint are:

1. **Understand** (review background and user insights)
2. **Diverge** (brainstorm what's possible)
3. **Converge** (rank solutions, pick one)
4. **Prototype** (create a minimum viable concept)
5. **Test** (observe what's effective for users)

At the end, iterate to another design sprint, or a Lean and Agile build process such as Scrum or Continuous Delivery/Extreme Programming.
The process is very flexible and can adapt to different teams and needs, in fact Design Sprint can be used in many ways. If we look at which stage of development of a project, it can be used:

- At the beginning of a project

Exploring opportunities with the goal of coming up with original concepts that ultimately will be tested in the real world

- In the middle of a project

To start a new cycle of updates, expanding on an existing concept or exploring new ways to use an existing product.

- For a mature project

To test a single feature or subcomponent of a product.

Figure 3.3: Evaluating sketches mid-sprint, Explore the Future of Files Go,a case study of a Google's Design Sprint.
Source: https://designsprintkit.withgoogle.com/introduction/case-studies/files-go

In any of these cases Design Sprint can brings clarity to the road map to kickstart and obtain initial validation for new product design–related works.

The benefits of the process are various, from speed and efficiency to more engaged people that are involved in the design process to co-create new products, and including the people who will be tasked with execution and understanding the implementation challenges. Moreover, compared to Design Thinking projects, which can last for months, those of Design Sprint, having a duration of only 5 days, lead to reducing uncertainty by actually testing the product with users, thus being able to understand the pros and cons of the solution and learning from it without letting the team fall in love with the fully developed solution[9].

[9] Dell'Era, C., Magistretti S. (2017, September 18). *Design Thinking vs Design Sprint: Quali sono le similitudini e le differenze?* Source: https://www.digital4.biz/executive/design-thinking-vs-design-sprint-quali-sono-le-similitudini-e-le-differenze/

Even if the program was created for startups, also enterprises can benefit from it. For them sprint design can be a way to accelerate product design and development, working more like a startup, and reducing the amount of resource investment for exploration of product ideas and concepts. Moreover, validating or invalidating any aspect of the product within days can prevent from failure and be another way to save resources.

3.3. Designer in Residence

The concept of designer in residence originated primarly in the world of the arts and crafts. An artist, writer, architect or designer in residence is a person who stays for a period of time in the environment of a company or association to work on a project. It is not a universally defined program, a residency program can vary a lot both for the duration and for the purpose or the type of professionals involved.

There are residency programs that are specifically thought for students or young professionals, where the associations that organize them give participants a period of time and a space to work away from their day-to-day lives. They bring together creatives working in various disciplines from all over the world, creating an environment where each individual is pushed to expand their own practice in a relatively short amount of time[10]. These kind of Residency programs, that are held by universities, museums or cultural associations, usually have a duration that vary from two or more weeks to two months and are held every year.

A designer-in-residence could also be a professional with years of experience that is called by a company to work on a project. He caould even work in contact with other employees, sometimes being almost a teacher for them. In these cases the professional has a certain freedom in the work he does while the company, which usually calls him because they have no internal designers, benefits from his creativity.

[10] Web article on www.artsy.net by Alexa, A. August 3, 2017.

Figure 3.4: Final works at the exhibition of the Designers in Residence program, Design Museum of London, year 2015.
Source: https://www.dezeen.com/2015/09/11/designers-in-residence-design-museum-london-migration-hefin-jones-stephanie-hornig-chris-green-alexa-pollmann/

Designers-in-residence started to became popular also among venture capital firms and incubators. This is because of the scarcity of product / user experience design talent in startups teams. As we have seen in chapter 2, Design Thinking methodologies can give an advantage in term fo value created and rapidity, one of the thing that startups value the most. In fact even the birth of the Design Sprint process took place

There is no common process in residency programs and, unlike other OI programs that are based on team work, here the importance is given on the experience and formation od a single person.

3.4. Scrum

Scrum is defined by its creators, Schwaber and Sutherland (2017), as a framework within which people can address complex adaptive problems, while productively and creatively delivering products of the highest possible value.
The Scrum framework has been used since the early 1990s to manage software development projects, but it turned out to be applicable to any complex project because of its simplicity but also effectiveness. In fact, Scrum is not a process, technique, or definitive method. Rather, it is a framework within which various processes and techniques can be employed.

The Scrum framework consists of Scrum Teams and their associated roles: a Product Owner, the Development Team, and a Scrum Master. The small teams are self-organizing and cross-functional. Self-organizing teams choose how best to accomplish their work, rather than being directed by others outside the team. This empowerment of the team is crucial in Scrum, because it saves a good amount of time. Moreover, a cross-functional team have all competencies needed to accomplish the work without depending on others not part of the team.

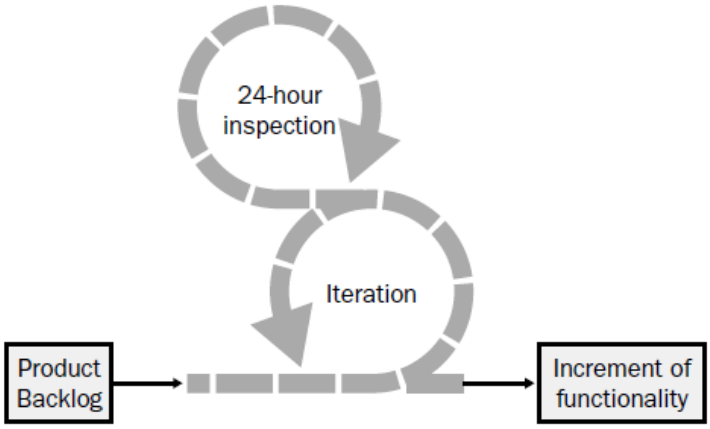


Figure 3.5: Scrum skeleton (Schwaber, 2004).

Scrum Teams deliver products iteratively and incrementally, following 30-days learning cycles, called *Sprints*, that prove complete business concepts. Iteration is another key factor of the framework. Scrum is founded on empiricism, a theory that asserts that knowledge comes from experience and making decisions based on what is known. This is why Scrum forces to test and integrate the solution, and release it on the market in one cycle, so that the team can see the business value and eventually iterate the process, incorporating the learnings acqired.
The three pillars of the framework are:

- **Transparency**

Significant aspects of the process, defined by a common standard, must be visible to those responsible for the outcome.

- **Inspection**

Scrum users must frequently inspect Scrum artifacts and progress to detect undesirable variances.

- **Adaptation**

If an inspector determines that one or more aspects of a process deviate outside acceptable limits, and that the resulting product will be unacceptable, the process or the material being processed must be adjusted[11].

[11] Schwaber, K., Sutherland J. (2017). *The Scrum Guide. The Definitive Guide to Scrum: The Rules of the Game.*

Scrum and Agile are closely interconnected, in fact the Agile manifesto of which we spoke in chapter 2.4. was born precisely following the meeting of representatives of various software development methodologies alternative to traditional waterfall processes, including Scrum. The Agile manifesto is born precisely following the implementation of Scrum and other similar frameworks, for this, Scrum is an Agile framework.

Scrum, unlike the other models presented in this chapter, is not a model of open innovation but is more a model of innovation strongly linked to the world of information technology (IT). Nevertheless it is important to consider it for the relevance it is having in recent years, even among companies that do not deal strictly with IT. In fact, this spread of the Scrum framework is due to the digital transformation that many companies are implementing and, more generally, it can be inserted in the context of the shift in innovation from products to services, that we mentioned in chapter 1. The creation of services is often related to the use of technology and software development, and here stays the link with Scrum framework.

4.

A Case Study of Consultancy Programs: Sketchin

So far, in chapters 2 and 3, we have seen the main theories behind innovation programs and how they are applied in recent times, thanks to the analysis of some examples of innovation models.
We now want to provide a case study of a consultancy design firm, Sketchin, to see specifically which programs can be offered to companies that want to do open innovation.

Although the Embedded is born as a program linked to the University of Modena and Reggio Emilia, the author has found it interesting to take the program offered by an independent consultancy firm as a case study, since the thesis objective is to formalize the Embedded model and make it possibly applicable also in other areas unrelated to the university one.

4.1. Offering and Approach

Sketchin is a strategic and design firm born in Switzerland, that now operates in various counties around the world. They design product-service experiences and guide organizations through digital tranformation.

They offer various programs to the companies, which can be divided into three categories: *experiences*, *strategy* and *next-to be*. Under the first category go all the programs that concern the creation of a product-service system, including the design of brand experience. Under the second category go programs that refer to strategy design, which aim is to facilitate the evolution of the organization through a change in its internal organization. The last category refers to technology pushed design, the focus is on the application of the latest technologies. However, the output of the last category is similar to the first one, since it is still a product or a service. For this reason we will take in consideration only two specific program that Sketchin offers to companies, one belonging to the *experiences* category and one that goes under the *strategy* category.

Approach

Sketchin combines Agile methology with Design Thinking. They embrace the Agile principles in their organization, using some practices such as morning stand up and planning of the activities, while following the Design Thinking methology. The Sketchin approach on design is focused on the experience that a user has when she comes in contact with the service. They are also focused on the application of the latest technologies and the realization of a digital tranformation inside companies.

The programs offered by Sketchin that we are going to considere are:

- Organizational Design and Agile Transformation - *Strategy*
- Design Studio Injection - *Strategy*
- Innovation Rooms - *Experiences*

4.2. Organizational Design and Agile Transition

The program is powered by 42Agile: a company specialized in teaching Agile methodology and that train people to become certified staff of Agile methodology.
This kind of program is not done by the design teams of Sketchin, instead it is held by strategists that works for Sketchin and that has the certification to teach Agile.

4.3. Design Studio Injection

The project is for those companies that decide to set up an internal design area, but they do not know exactly how to do it. In this case, Sketchin offer its expertise to guide the company through the constitution of the design studio.
The duration vary a lot from a case to another, but it is longer than other design programs, we are talking

in term of some months. During this time, a team of designers will stay in the company and spend an amount of time understanding the needs of the client. The purpose of a initial phase of the training project is to understand the reason why the client want to set up a design department and how the actual orgranization of the company works. After this, the team will teach to the company the various types of designers and what they do. Together with the client the team will later define which type of designers will be useful to hire for the specific needs of the company[12].
This kind of project is focused on strategy.

4.4. Innovation Rooms

This program sees the inclusion of a group of designers within a company to work on a project with a defined duration. Usually companies that require this type of service do not have a design department and are not willing to develop it, but they temporarily need a team of designers in order to realize an idea or implement an existing one.

[12] Contents learned from an interview with Federica Ranieri, service designer at Sketchin.

The room name derives from the fact that a room is temporarily dedicated inside the company to carry out the project. The duration of the project is variable but it can be said that it goes from six weeks to two months. Various figures of the company that constitutes the client participate in the project.
At the beginning there is a meeting between Sketchin consultants and the decision-making figures of the company for which they will work. In this meeting the brief is discussed and it may be that other company figures, promoters of the project, will also participate. The owners of the project are those who will then also participate in other phases, especially in the decision-making phases where, after the research, the time comes to choose in which way to continue. Sometimes companies that require this program already have designers inside. In this case they will eventually work alongside the Sketchin team. The Sketchin team that works on this type of project is formed by interaction, service and visual designers.

Second Part

The Embedded Model

5.

How the Embedded came to be

«Embedded design thinking helps organizations learning innovation by doing it.»

5.1. Story and Evolution

The Embedded program was born in 2010 within the *Design Thinking Unimore* project, which aims to bring the Design Thinking approach of Stanford University within the University of Modena and Reggio Emilia. To achieve this goal, the group of researchers and designers who gave life to this project has developed over time various programs to promote a new way of innovating through qualitative research, co-design and rapid prototyping. Some of these programs, such as *CBI* and *Sugar* are purely referred to students of the University of Modena and Reggio Emilia coming from different fields of study. These programs want to be an extracurricular training activity whose timing takes into account the university commitments. The Embedded model was born after the experimentation of these first programs and it is for those students who are finishing their university studies and want or have to do an internship to graduate, but It is also for those students who have recently graduated (i.e. maximum two years post-graduate).

At the beginning there was only the idea of inserting a small group of students into a company to work on a temporary project, then gradually the program started to take shape and around 2014 they started to

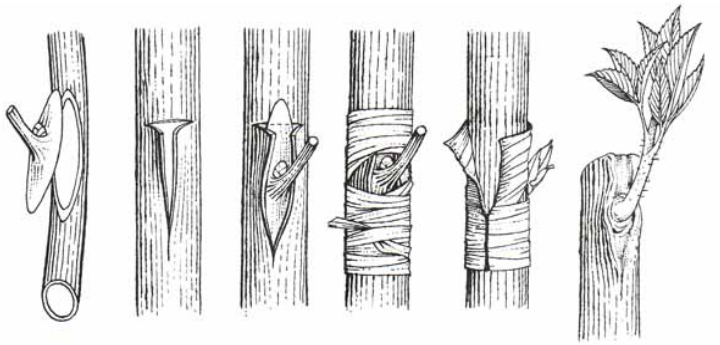


Figure 5.1: drawing of a graft, representing the Embedded metaphor

define the values and to represent it with a metaphor, in this way they started selling it to companies. It was a period of great experimentation where they learned a lot thanks to a trial-and-error method and they also saw in detail what worked best, thus giving the possibility of defining standards for the working method. Since 2016 the Embedded model has been structured with the various phases that characterize it and the internal activities of each phase have been systematized, reaching an almost final structure, that is the current one.

Right now they are focusing more on the communication of the program, trying to unify and organize all the materials that aim to communicate the aspects of the program to companies that are willing to buy it, but also regarding presentations that aim to align those who participate in the project in first person on the objectives and expected activities of the program[13].

[13] Contents learned from an interview with Clio Dosi, researcher at the University of Modena e Reggio Emilia.

5.2. Aim

The Embedded could be defined through the metaphor of the graft.
In agriculture, the grafting practice is used to improve an old plant by grafting into it a branch of a young plant, that will transmit some of its charachteristics to the old plant. When this happens, a new kind of fruit will ripen from this plant. Just as happens in nature, in the business world companies with a consolidated system tend to always give the same fruits, but with the contamination of young elements they can bear new fruits.
This is how the Embedded program wants to help companies in doing innovation: by embedding into the organization a team of young professionals that will work for a period of time on a given challenge, giving their unique and fresh point of view.
The aim of the program is not only to deliver an innovative solution to a challenge set by the company but more widely, to help organizations learning how to innovate through design thinking. The idea is well expressed by this famous phrase by Benjamin Franklin:

"Tell me and I forget, teach me and I may remember, involve me and I learn."

In fact, the Embedded model allows the company members to understand the design thinking methology by experiencing it firsthand and then apply some of the learnings acquired in the everyday work. Since the project was born from the willing of designers and researchers of the University of Modena and Reggio Emilia, the purpose is also to give the possibility to students and young professionals to put into practice what they have learned and experience how it works when designing for a real client and with the objective to give a solution that could reach the market in the future.

5.3. To Whom it is Addressed

Every company that wants to discover the design thinking approach to bring innovation into its organization, and therefore remain competitive on the market, can host an Embedded program. In fact, the program can be adapted to medium to big companies and to those that have never done innovation or

design, and to those who have long being making innovation.
However, the Embedded program is the best for those companies that have a quiete complex and vertical organization, divided in silos, since one of the main objective of the program is to disrupt the classic hierarchical organization and to break boundaries, promoting collaboration between different areas. Even those companies that do not have a design department, and therefore designers hired permanently within the company, can greatly benefit from this kind of program: they can take advantange of the designer's skills and practice only when they need it.

5.4. Types of projects

Projects that start with the Embedded program can be very varied but generally they are exploratory and research projects. However, the initial theme may be more or less broad.

The projects can also be divided into product and service projects. Even if often it happens to have a product-service system as the output of the project, the type of company that hosts the project usually has a defined direction towards services or products. For example, when the project is held in a B2B company that works in the field of logistic, the type of project on which the team will work is typically a service project. Instead, when the Embedded is held in a B2C company that works in the food sector, the project is typically product oriented. These two types of project categories are the most common, but sometimes it happens that the project is more strategic oriented. More often, the project start as a product and/or service project and it ends to be a strategy. This is because of the exploratory and innovative nature of the model and orientation of the program.

Sometimes the company wants to investigate an area where it has glimpsed opportunities, but which is an area almost unknown to her and in which up to now she has not moved. In this case, the Embedded model is used to understand what kind of opportunities there are.

6.

The Approach

The Embedded model stems from the desire to bring design thinking into a company, the following approach therefore takes many elements from this methodology. However, there are in particular some of these aspects that the Embedded makes its own and re-elaborates, contextualizing them to its reference sphere. Furthermore, there are also aspects that make it unique.

5 characterizing elements that we will see in this chapter have been highlighted:

- Human Centered
- Experimentation Driven
- Hands-on
- Structured Ambiguity
- Disruptive Participation

6.1. Human Centered

The Embedded design process is focused on empathizing with people to understand their needs. The potential users are involved in the design of the solution at all stages of the project. It is given a lot of importance to qualitative research, in opposition to quantitative approaches, typical of classical marketing.

6.2. Hands-on

The idea of learning by doing is one of the most important pillar of the Embedded and it is stressed by the creation of countless prototypes, that are really far from the idea of what a prototype is that a company has in general. In fact, the creation of something tangible enables conversations with users, permits to communicate an idea and to test if it works.

6.3. Experimentation Driven

The results of the project derive from direct experience, and from the continuous testing of solutions with users. The design is based on testing the assumptions and reworking the situation from here.

6.4. Structured Ambiguity

During the process the team will find itself in moments of ambiguity, where you seem not to know where you are going. These moments are actually part of the process, remaining open to the various possibilities without prejudice is a fundamental part of the design process. The ambiguity therefore exists but is actually controlled and circumscribed within a defined perimeter and implemented at specific times.

6.5. Disruptive Participation

Caracteristic approach of the embedded that is based on the value of the multiplicity of the points of view and the collaboration across disciplines. Thanks to the participation in the project of experts from the various areas of the company with young professionals from various sectors and designers, and sometimes with company suppliers, the views of all the people involved are incorporated into the project. This stimulates innovation and the creation of a valuable solution for all.

7.

The Model

In this chapter we are going to see the model of the Embedded progam.
First of all we analyze the organization of it's general structure, the duration of the program and it's main features. After that we want to discuss what this structure has in common with the theories from which it takes inspiration and which are the characteristics that differentiate it. Finally, we see which are the stakeholders and their roles.

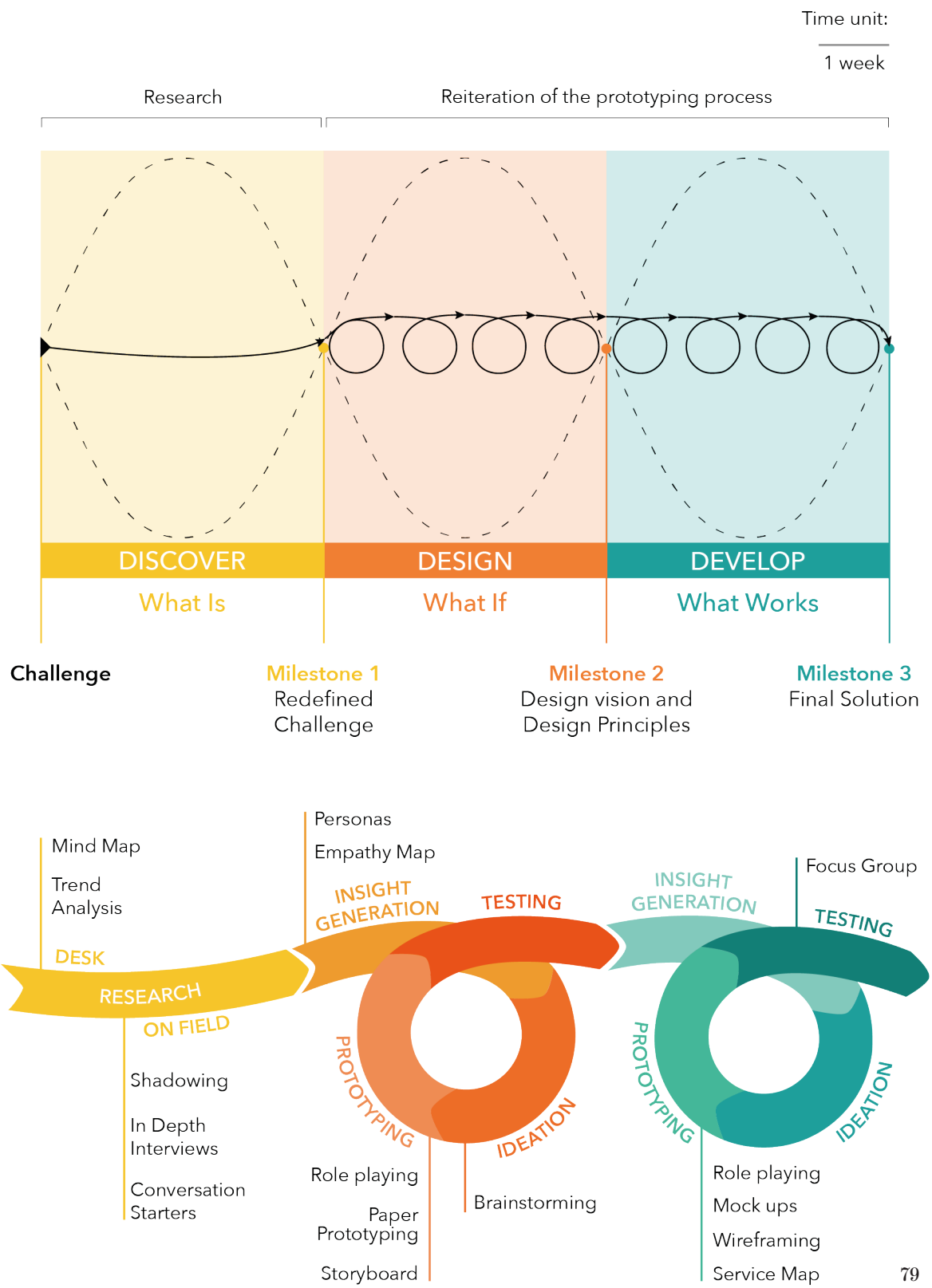
7.1. Structure

The Embedded program has a total duration of 14 weeks, of which one is actually dedicated to drawing up a report of the work done, to be left to the company once the project is completed. Therefore, the real duration of the program is 13 weeks. This is a very short time compared to the typical duration of projects taking place in a company. This is precisely because one of the principles on which it is based is that of lean design, experimentation and rapid prototyping according to the "fail early to succed sooner"

Figures 7.1 and 7.2, next page: scheme of the Embedded process and detail of the reiteration of the prototyping process, with list of the main tools used in each phase. Own elaboration

IDEO's principle. The period of about three months is therefore marked by tight deadlines to arrive at a product or service concept or even a strategy, starting from a challenge and therefore the exploration of a more or less broad theme.

The process consits of three main phases, that correspond to 3 design moments, and which see the alternation of divergent moments and convergent moments.
The first phase is ***Discover***: the brief is discussed and the theme is investigated. They do desk and on field research to become familiar with the topic and investigate the perceptions and needs of users. In a second moment , in a convergent phase, the most interesting discoveries are highlighted. The expected output from this first phase is the redefinition of the initial challenge.
The second phase is ***Design***: all possible solutions to user problems are explored, reiterating the ideation-prototyping-test-feedback process. At a later time, in a convergent phase, the most important insights that emerged from the tests are chosen and from these are derived design principles, or guidelines to keep


Time unit:
1 week
Research
Reiteration of the prototyping process
DISCOVER
What Is
DESIGN
What If
DEVELOP
What Works
Challenge
Milestone 1
Redefined
Challenge
Milestone 2
Design vision and
Design Principles
Milestone 3
Final Solution
Mind Map
Trend
Analysis
DESK
RESEARCH
ON FIELD
Shadowing
In Depth
Interviews
Conversation
Starters
Personas
Empathy Map
INSIGHT
GENERATION
TESTING
PROTOTYPING
IDEATION
Role playing
Paper
Prototyping
Storyboard
Brainstorming
INSIGHT
GENERATION
Focus Group
TESTING
PROTOTYPING
IDEATION
Role playing
Mock ups
Wireframing
Service Map

in mind for the design of the solution. Furthermore, the vision around which the project will develop is indicated.
The third and last phase is ***Develop***: around the design principles proof-of-concept prototypes are designed also taking into account the feasibility of a solution. These are more detailed prototypes. At a later time, in a convergent phase, the best solution is chosen from the last tested prototypes and It's refined. The final output is a concept of product/service or even a strategy.

Although each phase lasts about one month, the time dedicated can vary from a project to another. This is because some projects may need more exploration of the theme, and therefore a more extended Discover phase; while some others may start from a more focused challenge and then they may need a longer Design or Develop phase. While the order of the three phases and the amount of time per project is fixed, the duration of the single phases is adaptable.
At the end of each phase there is a presentation in plenary which summarizes the work done. This serves both to align all the people involved and interested in

the company on the results achieved and to the team to define the path that is intended to be followed. These presentations are called *Milestone* and conclude a convergent phase of the Embedded system. Through these presentations, the team communicates the highlights of their innovation efforts and demonstrate the best of their prototyping. The company and its management are therefore engaged in a co-design session to ensure that the project accounts for all the interests and perspectives.

Each of the 3 phases is divided into weeks. In fact, the team working on the project meets once a week with a team of people working in the company in different areas to discuss the work done that week and design together. It is a sort of co-design session where who works in the company can make his contribution to the project thanks to the greater experience related to the specific theme that they are dealing with. The weekly co-design meeting also sees the presence of the project coach who is the referent figure of the consulting company that promotes the embedded model and is therefore an expert on the method. In this occasion, the coach presents the structure of the method to the project team and the company

employees and aligns all of them with the expected objectives in that specific phase of the project.
The project takes place within the structure of the company that is the client. Larger companies that have been hosting these projects for a long time usually have an area dedicated to carrying out the project. Other companies instead, offer a temporary space for this work. The choice of the space in which the project will take place is not arbitrary. In fact, also the positioning of the project area has a meaning and a scope for the best outome of the process. This is related to the capacity of the process to involve the most people possible creating a climate of collaboration and a spark of curiosity in the company's employees. It is important that space selected for the project work is located in an area through which many people pass, from different offices, and can see the people on work[14]. They have to know that they are free to contribute, or only to ask question and look at the work. The purpose is to foster collaboration and spread the innovation mindest inside the company like a virus, creating a virtuous circle.

[14] Contents learned from an interview with Francesco D'Onghia, head of the Open Innovation Unit of Almacube srl.

7.2. Comparison with other design models

We can see from the structure of the design models at page 87 that the design process is always anticipated by a phase of preparation for the work that will be carried out in the process, and followed by a phase of implementation of the design solution. The design process is in turn divided into a first moment dedicated to research and exploration and a second moment dedicated to ideation and design. These elements are shared by every design process to be defined as such, but we are going to see some specific chachteristics that the Embedded model takes from the other design models on which it is based.

There is a shared vision of the importance of the user, who gets involved in the design process. The *Empathize* phase of DT stresses this concept as HCD does. Another similarity among these processes is the organization of the process in phases that have a starting point and an end, and each of them has different purposes. The design process could theoretically go on forever, since there is always room for improvement, but focusing on one aspect at a time permits to achieve results in a small amount of time. With this mode there is still space for improvement, by

iterating the process as many times as needed.
The iteration of the process indeed is another important element of the design process. In the three design processes taken into consideration for comparison, iteration means that of the entire design process. The Embedded model, on the other hand, in addition to being in any case completely repeatable, highlights the reiteration of the prototyping process within the Design and Develop phases.

One of the main charachteristics that the Embedded model embrace in its process is the alternation of divergent with convergent phases. This aspect comes from the Double Diamond model of the British Design Council that we analyzed in chapter 2. In fact, the Embedded process, as in that highlighted by DD, moments of exploration (i.e. divergent phases) alternate with moments of synthesis of the acquired knowledge (i.e. convergent phases). At the end of each converging moment there is a result that will no longer be questioned during the work and will be the starting point for the next work phase. The difference, compared to Double Diamond, is that in the Embedded model, 3 divergent moments alternate

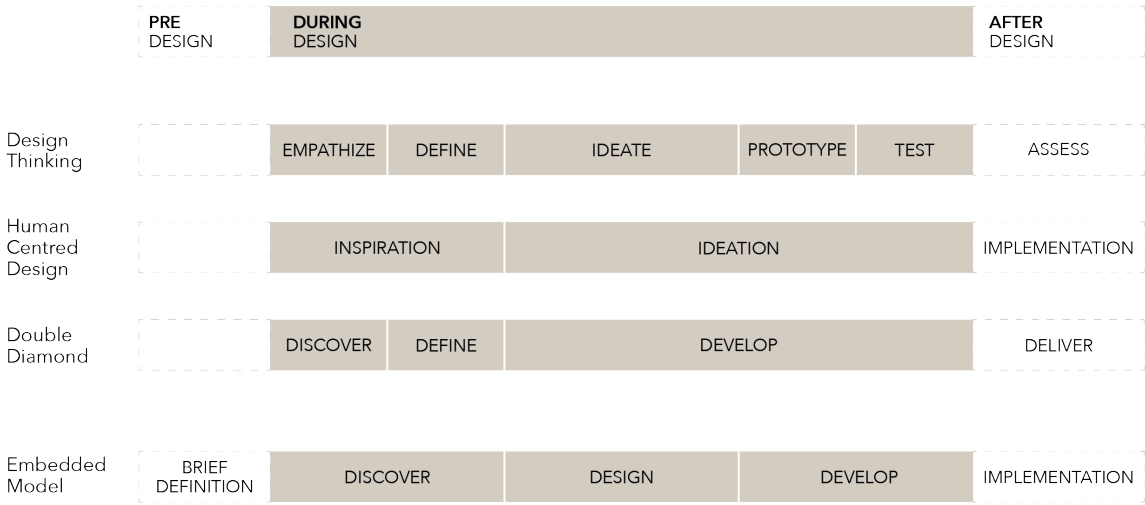


Figure 7.3: scheme of the Embedded process, compared with other design models. Own elaboration

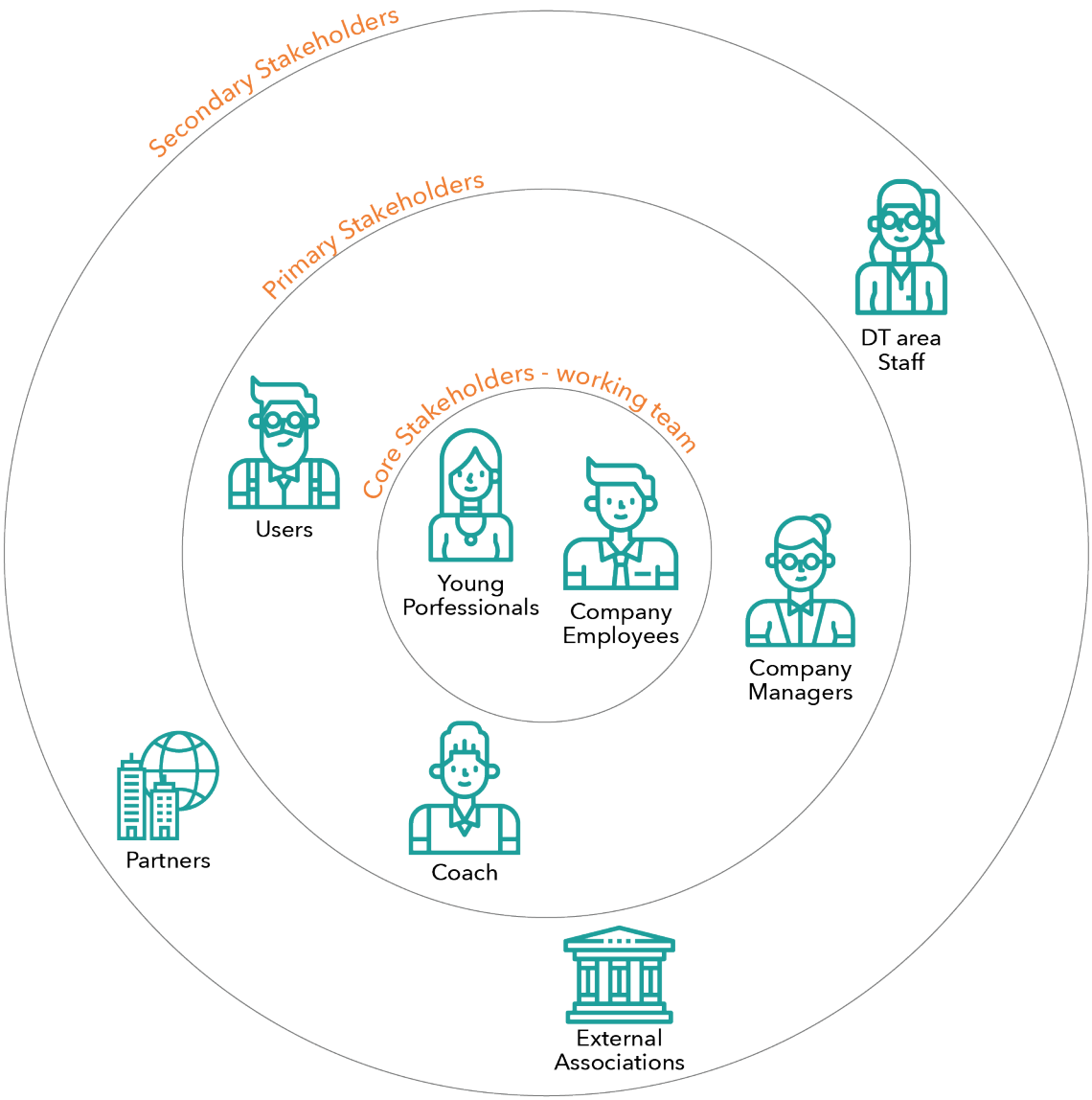
with 3 converging moments, forming a sort of triple diamond instead of double diamond. Moreover, while in the Double diamond there are 4 phases, 2 of which are divergent and 2 convergent, in the Embedded model each of the 3 phases consists of a divergent moment followed by a convergent one. This feature is linked to the presence of 3 Milestone as a moment of synthesis and discussion of the work done up to that point.

7.3. Stakeholders

Now we are going to see the various actors involved in the project, which allow their realization in all aspects, from the organizational to the operational. We will consider both the primary stakeholders, i.e. those without whom the project could not exist, and the secondary stakeholders, i.e. those that are usually involved in the Embedded project but whose presence can vary greatly depending on the current project.

The team that works full time on the 3-months project is formed by four **young professionals** that are graduating or have recently graduated from university, or have some years of working experience. The team is heterogeneous in term of people background, gender, hard and soft skills in order to have a greater diversity of ideas, that can born from the multiplicity of points of view. However there are some features that are essentials, like a good knowledge and practice of Design Thinking methodology and tools.
When forming a team it is also taken in consideration the type of project that will be treated. For some projects is quiete clear from the beginning that the output will be a product and for others a service.

Figure 7.4: stakeholder map. Own elaboration



Moreover, depending on the company, the team will work in a specific sector like food, health, mobility ecc. All these factors can influence the choice of one professional over another. Usually it's good to have in a team at least one service or user experience designer and one professional from the same area in which the company operates.

The working team is also composed by a group of **company employees** that participates to the project with co-working sessions with the team of young professionals and a coach. «Internal professionals guarantee the alignment of the project with the vision of the company. They bring the culture and the know-how from different departments.» The number of company employees that participates to the project vary from a minimum of 4-5 people to a maximum of 10 people: it has to be a reasonable number so that they can all give a contribute to the work and if in some moments of the process few people are missing (for example because of an increasing workload inside the company) there is still a fair number of people to replace them. Here again the company team is as much heterogeneous as possible. The business areas

that are involved are possibly very different in order to create connections and the break down the silos structure that often characterizes the company. This heterogeneity is also useful for having different points of view and wide knowledge of the theme.
The areas that are usually involved in the Embedded project are Research and Development and Marketing since the aim of the project is innovation. However, the areas involved can vary a lot from a company to another because of the difference in term of dimension of the company and the business to which it is dedicated.

The figure that coordinates the working team is the **coach**. For each project there is one coach that take care of aligning the working team on the objectives expected and the type of work they will do in a specific phase of the project. This happens in the weekly meetings of the working team, where the coach makes an introduction and shows some examples of previous Embedded projects. The coach is also the intermediary between all the stakeholders and he is the representative of the consultancy that sells the Embedded project to the company. The coach attends the weekly meetings of the working team and

is always available for clarifications about the job to do and to give suggestions to the young professionals. Another important task of the coach is to motivate the team and help with the team building: since the process is very fast and the young professionals that works on it don't usually know each other is important to get acquainted.

Since the Embedded model is based on the theory of User Centred Design, during the process the ideal **user** of the product/service is involved in many different occasions. In fact, the young professionals make the first interviews to their ideal users since the discovering phase and they continue to deal with them by testing prototypes of the product/service since the very final phase of development. The types of users involved are infinite and also the quantity is huge, considering that for each testing session there is an average of 12 users and the testing sessions per month are 4 ca. Depending on the initial challenge there could be a defined target for the project since the first phase or a very diversified target, that will be defined with tests and choices made in the second and third phase of the project.

When the team of professionals shows the job done during the month through the presentation called Milestone, the audience is composed by everyone in the company who is interested in the project. This is also an occasion for the **company managers** that have chosen to launch the challenge to the team, to see how is it going and make questions and considerations, useful for the continuation of the project. Since company managers are usually busy, following a lot of projects, having a sum up of the situation once a month is feasible. However the final Milestone is the one that sees the presence of all the important figures of the company.

As we said, in some companies there is a dedicated area for the embedded projects. In such companies there is a figure that works in the Design Thinking area and take care of providing all the materials needed by the working team, introduce them to the company and guide through it with tours of the company areas. The **person in charge of the DT area** also helps the working team to arrange meetings with other company staff and use of structures and machines that normally aren't open to the public, if it's needed for

the project. This figure, even if It's not present in all the companies, is important because he/she knows well both the company and the Embedded model and can give valuable advices.

Sometimes the professionals working on the project may need a space to test prototypes, recruiting testers or arrange a focus group. In those cases they could contact an **external association** that provides the space and/or the people needed. This is not mandatory but, depending on the kind of project that the team is facing, it could be a good way to involve and engage the user. We must remember that the external association usually doesn't receive any remuneration for the goods offered to the team, so this association is often part of the personal network of a team member or coach.

We have seen how company employees and young professionals collaborate on the project in co-design sessions. In some cases there are projects that are also shared with company partners, such as suppliers or retailers. In this occasion the working team is composed both by the company employees and the

partners' employees. This is the case, for example, of a collaboration between a food company that makes a project with its retailer, or the case of a company, whose business consists of providing cleaning services, that collaborates for a hospital that is one of its clients, on a common project .

7.4. Tools and Goals for each phase

In this chapter we will see in depth the three main phases of the Embedded model. We will discuss the objectives and the output attended for each phase and the tools that are proposed in order to address these goals.

We have to make a small premise about the tools used in the process. For every phase the coach shows and propose some tools that the team can use to do their job, but It's not mandatory to use them. The team itself can choose what kind of tool fits better for a particular task they have to achieve. The aim of proposing some tools is to provide some examples of how a goal can be achieved and It's also a good way to help the team in the first phases in which the team members still have to know each other's strengths and weaknesses. In fact, the guidance of the coach in this sense will be more close to the team in the first phase and It will be less and less as the time goes by.

Phase 1: Discover

The project starts with the meeting of the external young professionals with the company employees, the coach and the Design Thinking area staff (if present), at the company headquarters where they will work for the following three months. The first part of the meeting as simply the purpose of introducing yourself and getting to know each other and the place. The coach usually gives the young professionals a tour of the company. In the second part of the meeting the company employees will present the challenge to the young professionals and they could ask questions and discuss in group in order to understand the theme they will have to work on. The aim is also to have much informations as possible to start from a good point with the research about the theme and take advantage of the experience that company employees have. From this moment the group of young professionals start working full time on the project.

This first phase is mainly dedicated to research, both on desk and on field. The group have to become familiar with the topic, knowing the vocabulary related to that (e.g. food, health, cleaning services) and what happens on the market, what already exist. To know

all these things the group can do an online market research and ask further questions to specific areas of the company. When doing such a job is important to go for quantity more than for quality: it's a phase of exploration. The mindset has to be naive and curious and It's important to empathize with users.

The first encounters with users happens in this first phase of the project. It's important to know which knowledge users have of the topic and what are the feelings, sensations and thoughts about it. For this purpose some tools as surveys, in depth interviews, shadowing and Day-in-the-life-of could be useful. Interviews are done with few users but going in deep with questions, the average time for such interviews is 30 minutes. The interviews are often done by two people in order to have one of them that can ask questions and make the user feel comfortable while one other person can take notes and observe, for example body language.

Shadowing and Day-in-the-life-of are tools that aim at discovering all that things that people don't say because they don't pay attention on what they do

Figure 7.5: Tools and Mindset of the Discover phase. Own elaboration

or they are ashamed of something and other many reasons. They are useful to see people's habits and to see which are the problems that they encounter while doing a job (e.g. buying food for the family, visit a parent at the hospital, eat lunch), but also how they try to fix those problems and all the interactions that they have.

Once the informations have been collected It's time to give an order to them and analyze them seeing what is more interesting. For this phase of synthesis there are some tools that can help like Mind maps. This tool gives the possibility to arrange all the informations around a main topic and divide them into clusters, keeping at the same time the connections that could interest different informations.

Milestone

At the end of the Discover phase the team of young professionals have to present

the result of the work done in the first month to all the employees of the company that are interested in the project.
Usually the starting point of an Embedded project is a quiete wide theme, so the work that is done in the discover phase leads to a redefinition of the boundaries in which the following researches will take place. It's about identifying starting points to work on in the second Design phase and discard the less interesting ways to go. The findings resulting from the research that are presented are considered above all as hypotheses that need validation in the second phase.

As for the contents of the presentation, the team use photographic material produced during the interviews and shadowing accompanied by many users' quotes that are significant in expressing a concept.
The challenge is then redefined, which is the main output of this first phase and starting point of the second phase.

Phase 2: Design

The second phase of the project is dedicated to test the discoveries made in the first phase, applying all the knowledge acquired. At this stage there's a shift from a problem setting mindset to a problem solving mindset. The team starts to brainstorm around the defined problem, in order to find all the possible ways to solve it, test them with users and start again with new findings: the reiteration process of prototyping begins.

The team starts to test all the assumptions that they have made recruiting potential users and interact with them with the help of a pretotype that is specifically designed for the purpose. A pretotype is an even rougher version of a prototype. It distinguish from a prototype because the aim is not to test a possibile final solution but it's to see which is the reaction of the users to some features of the product/service. The pretotypes are usually very different between them and also compared to the final solution.

After testing the pretotype, the team collects all the informations that have obtained and generates other assumptions that are the starting point for the

ideation of a new pretotype or the improvement of a previous one. This process is repeated every week: new prototypes and insights about the users are showed and discussed in the weekly meeting of the professionals with the company employees. This process is repeated also in the Develop Phase of the Embedded project, where the difference is that we don't have pretotypes anymore, but we can talk about prototype, closer to the final solution.
The phases that alternates in order are Ideation, Prototyping, Testing and Insight generation. Through iterative prototyping, broad project statements are refined into concrete concepts, which are demonstrated through the final, fully functional proof-of-concept prototype.
"Fail often in order to succeed sooner" is the IDEO's motto that is the principle that guides the elevate number of iterations of this process.

As we can see from the scheme in the following page, the main tools used have the purpose to communicate and give form to an idea, and they could be paper prototyping, role playing and mock ups. Prototypes are useful for the team to research and explore,

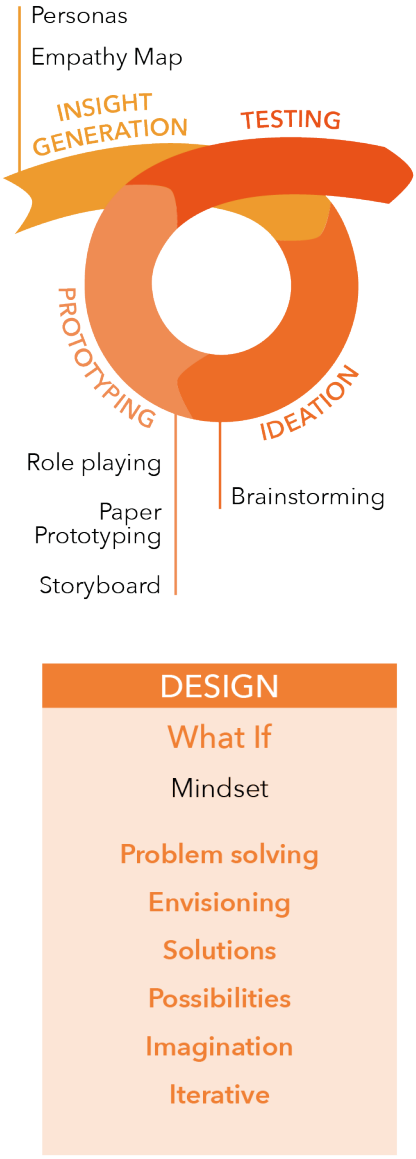


Figure 7.6: Scheme of the reiteration process of prototyping with tools and mindset, Design phase. Own elaboration

to better understand the context and empathise with users. However, they are also important for the communication of an idea to other people, like company employees and the support circle (people that attend the milestone presentations) and to discuss and test co-design possible solutions with various actors.

Other important tools used in this phase are personas, empathy maps and storyboards. This kind of tools helps to better understand and communicate who are the users.

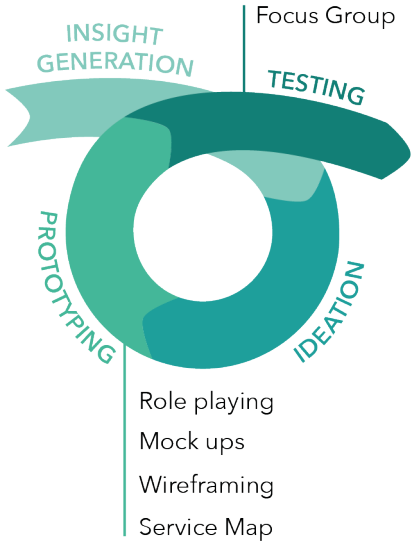
Milestone

The output of this phase is a design vision and the definition of design principles. The team shows the iteration process that they used and how they came to design principles from the first insights that they found. This usually involve an exhibition of the most interesting prototypes, that are not the most promising but they are the ones that led to the best discoveries.

It's important to explain what users really think and feel about a problem, and how this was translated into design principles, so a lot of quotes and photos from the testing phase are showed.
After this, the team explain which direction they are taking, the most promising path they choose to follow from all the possibilities that they could have. This is the design vision, that is the starting point for the last phase of the project.

Phase 3: Develop

In the last phase of the process the team develops prototypes around the design vision statement and considering all the design principles. The reiteration process of prototyping continue but the nature of this kind of prototypes is different from the previous one. This can be finally called prototypes instead of pretotypes, because they are all possible final solutions. In some cases the team start from an idea and refine it and in other cases the test of different final solutions is necessary.



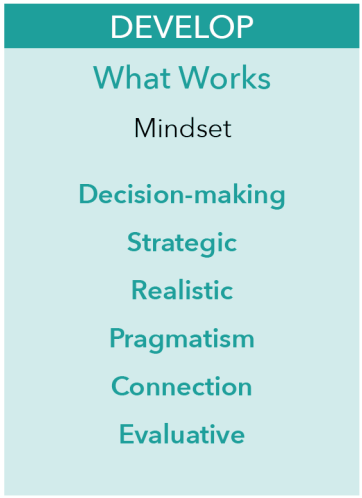


Figure 7.7: Scheme of the reiteration process of prototyping with tools and mindset, Develop phase.
Own elaboration

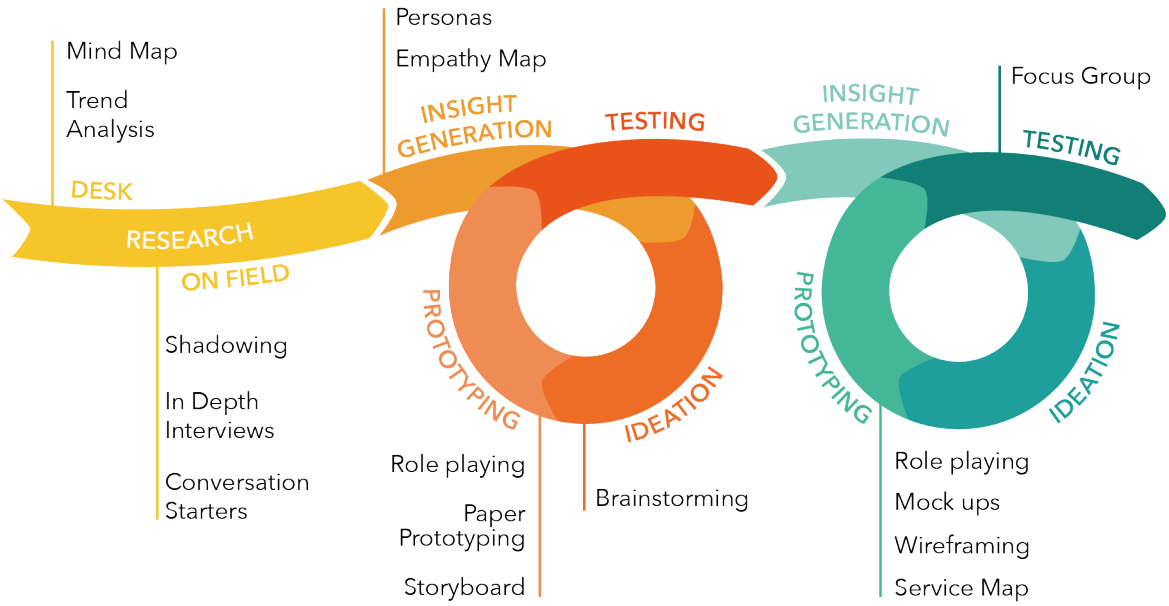
What happens in this phases and the tools used actually vary a lot from a project to another, since the level of detail is high and the way of designing a product, a service or a strategy are quiete different. In this phase the team knows itself well, so they may also want to ideate some personal tools and way of working. One thing that is always present is the physical prototype or service map that represent the final solution.

When talking about a project focused on a product the team may have the possibility to make the final prototypes in the company laboratory, so it can be more detailed and realistic, using the technologies available in the company. This kind of prototype can be tested in a different way from the others, called Focus Group. In the focus group the las few prototypes of possible solutions are showed to a group of users. This group autonomously examine the prototypes and everyone can choose his favorite,

then a conversation starts around the choices and the people are divided into groups that support a prototype of a product or another. At the end of the discussion there is a winner: the prototype that had the most votes. This kind of test is usually held in a different place from the company: the team can get in contact with an association that wants to host the Focus Group. All the team of young professionals participate at this test because of the high number of users present. The members of the team can have different tasks like taking pictures, taking notes, moderate the discussions and take care of timing.

Milestone

The output of this phase is the final solution: a concept of a product, service or strategy. This final presentation is the most important and even the participants will be more in term of number and also company manager attend it. For this reason it's important to show all the work done, making a summary of the previous milestones and concentrating on the discoveries made in the last phase and the final solution. The physical or digital prototype of the final solution is showed to the audience and all the feature are explained, referring to



DISCOVER	DESIGN	DEVELOP
What Is	What If	What Works
Mindset	Mindset	Mindset
Problem setting	Problem solving	Decision-making
Naive & Curious	Envisioning	Strategic
Exploratory	Solutions	Realistic
Questions	Possibilities	Pragmatism
Discovery	Imagination	Connection
Empathize	Iterative	Evaluative

Figure 7.8: Summary scheme of the three Embedded phases, with tools and mindest for each phase. Own elaboration

the design principles that resulted from the research. Here again is important to show the journey: how the working team came to that specific solution.

7.5. After the Project

With the final presentation of the result of the project, the third Milestone, the project ends. The client has the total ownership of the solution and the material produced in the process, so they will autonomously decide what to do with the final solution.
As we already said, the final solution is always a concept that vary from a case to another in term of definition, but that can not be considered ready for the market. Therefore, if the company wants to go on with the project they will have to pass through an implementation phase to prepare the product-service for the placement on the market.
There are various possibilities to do that and it is not our intention to analyze each of them, but it is interesting to see the most frequent developments.

One option is to implement the product-service inside the company, with the methologies that are usually applied also for other projects that born inside the company. This is probably the case of a solution that has a high level of detail or that the company find particularly interesting for the market in that moment. It has also to be something feasible with the technologies that the company already owns.

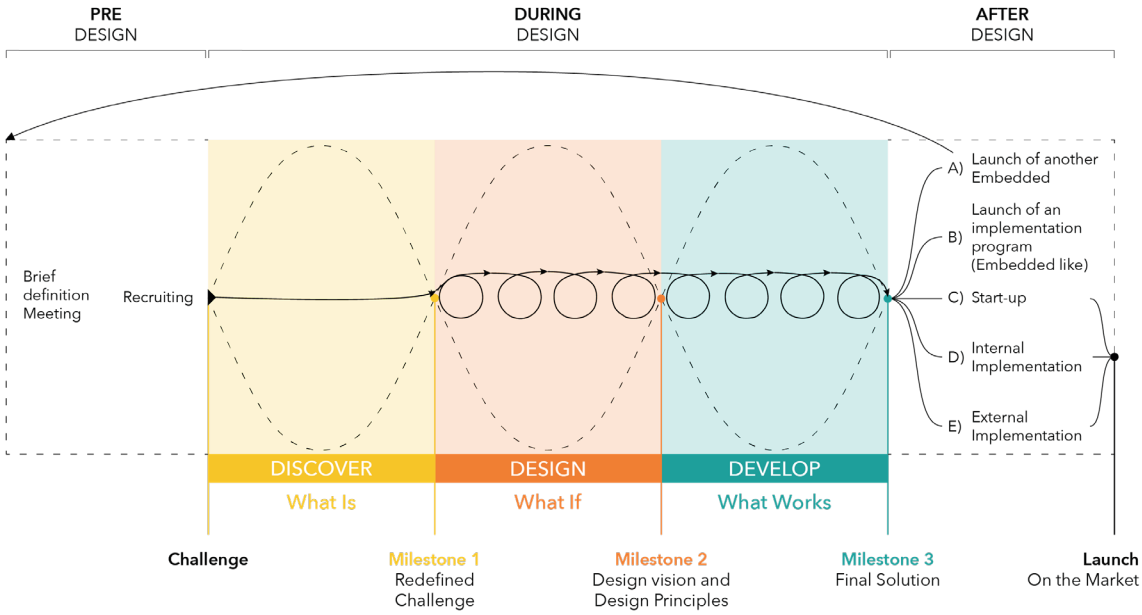


Figure 7.9: scheme of the Embedded process, extended. Own elaboration

A second possibility is to do the implementation of the product-service outside the company. This means to collaborate with an external entity that provides the right technology to create a solution that, at the end of the process, will be ready for the launch on the market.

Another path that the company could decide to follow is to build a stat-up around the project concept. This can happen when the solution that comes out of the Embedded is quiete radical and can not be placed on the market under the current brands.

All these possibilities at the end lead to the placing of a new product on the market, but there also other ways to implement the solution.

In some cases can happen that the final output of an Embedded project is a concept that is not enough defined to be considered ready for the types of implementation that we have seen until now. This does not mean that the concept is not valid, but more probably that means the solution is still open to different possibilities of development. This could be the case of a solution that resulted from an initial challenge more broad and explorative than others. In this situation the company could decide to start another Embedded project that has as starting point the final solution of a previous Embedded. This is a rare case, since the phases of the Embedded process are intended to generate a defined concept in a short amount of time.

Finally, one possibility for the company is to start another program of implementation, similar to the Embedded for the approach, but faster and thought for this purpose. This kind of program is something on which the designers and researchers of Design Thinking Unimore are working on. They saw that in some cases the starting point of a project was already defined in its goals and there was not a necessity of

a long exploration of the theme. For this reason, they are thinking about a program that lasts eight weeks and starts from a concept. Then the purpose is to test and define the product-service in all its details to test the assumption made with the concept definition.

8.

The Value

We have analyzed the structure of the Embedded model and we have seen which are the theories behind it, in this chapter we will see what is the value offered and what are the features of this model that are unique and give an added value compared to other models of innovation. The aim is to see what are the advantages of adopting this model instead of other models that have the same purpose: generating innovative solutions.

The Embedded It's a co-design project that develop within the company, It's not done by others and delivered to the company. This means:

- Certainty that the work follows the vision of the company and embodies its values.
- Possibility to monitor the progress of the project and give feedback at any stage, not only at the end.
- Sense of belonging. The project is also the result of the company's work. The ownership is not only in legal terms but also in emotional terms.

- Collaboration between company's areas.
- Introduction of a new mindset and a new way of doing innovation inside the company. This knowledge can be applied to daily work, even when the project is finished, when needed.
- Guidance for the adoption of a method that makes people able to promote innovation steadily within the organization.
- It's not a pre-packaged solution, it is designed with the customer.
- Providing the corporate partners with a valuable body of knowledge from which to extend the team efforts into new innovation projects.

The presence of external young professionals means:

- Fresh and present approach
- New points of view
- Freedom from company's mindset and way of working
- Possibility to engage the user without bias

The presence of a coach, an expert of the method, means:

- Alignment on the work, for everyone involved.
- Constant control of timing and application of the method that permits the working team to concentrate on the project.

Another important feature that characterizes the Embedded model is the fast reiteration of the prototyping process that really puts into practice the hands-on principle. This means:

- A safe place to test the possible solutions, without spending so much money
- More consistent feedbacks from users
- A solution that is ready for technical implementation and a reduced time to reach the market

We can summarise that the Embedded model is a new way of consulting that differs from the others mainly due to the intention of bringing a new approach to

innovation in the company, and transmit it to them. In addition to the single fruit of the project, the concept for a new product / service, the added value is given by the transmission of the design method. It is almost a training program for companies with the aim of guiding them towards a new way of doing innovation that companies can embrace and integrate into their system. The fact that the company can do this without entirely changing the organization of its structure is also a differentiating element. This is the opposite of other consultancy systems that do not share the details of the method used, as a strategic choice to be able to sell other consultancy packages to companies. They create a relationship of dependence of the company from them.

In this perspective, we can speak of a circular system of knowledge transmission in which external professionals and companies are both mentors and apprentices. The roles are exchanged and at the end of the process both take advantage of it. This system is in opposition to the more academic / classical one in which a professional passes it's knowledge to another person in a cascade system from above.

Conclusions

We have seen what the value of the Embedded is from the point of view of the companies for which it is designed. The author now wants to make a more personal reflection considering his own point of view, based on the work experience, and thus showing the value that the Embedded can have for the designers who participate in the role of young professionals.

Embedded allows the graduate student, or recently graduated, to fully immerse themselves in a new world, the work one and the fact of doing it working directly for a medium-large company brings some advantages compared to those of working for a design studio. First of all, the large size of these companies makes it possible to understand the complex organization mechanisms that constitute them and the roles that the various employees have.
The fact of being able to work in a small, heterogeneous team in a fairly free manner, being autonomous of the decisions to be taken regarding the project, is also an opportunity for empowerment and awareness of how the choices made influence the reality of a company.
When entering the work world a designer could find himself doing secondary and very technical jobs,

perhaps only dealing with one aspect or phase of a project. In an Embedded project you are empowered and responsible for your work. This constitute a real challenge for the designer and consequently the motivation and the engagement is high and results in a job done better. Furthermore, overcoming such a challenge leads to learning a lot in a relatively short time. There are various **elements of challenge** along the way. One of these is the fact of dealing closely with the customer, which for example may not happen for a young designer who works in a design studio. In addition, the presentations that the team has to make are also directed at managers who ask questions during the milestones, and that will decide what to do with the project.

Another element that is noteworthy is the fact that, in some cases, it is possible to use a **laboratory** inside the company to produce the most detailed prototypes of the last phase of the process. In universities, projects are usually carried out on the most varied topics but the technologies available are the same for each one, that is due to the technologies present in the university structure.

The fact of working on a project in a specific area and then having the opportunity to prototype your own solution, directly with the most suitable technologies for that type of product and which will then probably be those used to make it become a product ready to be launched on the market , it is very stimolant. This also allows the designer to see beyond his own project, and understand it in its entirety. Moreover, in this way it is also easier for the designer to understand which are the technical production limits and therefore eventually to adjust the solution also taking this factor into account.

The fact of working closely with the company's employees, who have experience, allows young professionals to learn many things and always feel somehow guided even if in reality they are actually the designers who teach a method to employees.
Furthermore, I was able to perceive how, even beyond the gain in terms of knowledge, there is a positive psychological and social impact.
The climate of collaboration that is created is real and above all it is perceptible how people who have been working for years in a company can find themselves

in an environment with little incentive in the long run. The insertion of external people for a certain time actually arouses curiosity and also a sense of greater freedom, as if really in this type of project we could do things out of the ordinary, make mistakes and try again.

A final element that is significant is certainly also that of the role that the designer has in this type of project, which goes beyond creating a solution to a problem and somehow becomes a mentor, a teacher of the method, a very current role indeed.

In the end we can say that the exchange is mutual and circular, the beauty of this type of program is that all the people involved can learn something important for their profession.

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