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When Project Management faces Innovation

Merging the latest project management practices with the mutable reality of our days

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"There is no magic that creates innovation.

There is no magic wand.

Innovation is hard work.

The success of an innovation initiative is the result of an applied process, of the right combination of tools and techniques, of bringing together a diverse group and giving them a common goal and the bandwidth to execute the projects.

It is also the result of the right leadership support and "air cover[1]".

When all these elements come together, one could argue that magic can happen."

Moises Norena - Global Director of Innovation,

Whirlpool Corporation

[1] the ability, within large, complex, and typically highly-political organizations, to encourage, authorize, license, and support risky project undertakings; those daring, sometimes "crazy" initiatives that more "rational" approval processes would undoubtedly deny, but which, if they work, have the potential to change the world. (http://www.forbes.com/sites/billfischer/2011/08/29/air-cover-innovations-secret-ingredient/)

"Non esiste magia che crei l'innovazione.

Non esiste nessuna bacchetta magica.

L'innovazione è un lavoro duro.

Il successo di un'iniziativa innovativa è il risultato dell'applicazione di un processo,della giusta combinazione di strumenti e tecniche,del mettere insieme un gruppo eterogeneo dandogli un obiettivo comune e un margine di manovra per eseguire i progetti.

E' anche il risultato del giusto supporto ed "air cover"

Quando tutti questi elenti vengono messi insieme,qualcuno potrebbe dire che la magia può avvenire."

Moises Norena – Direttore Mondiale dell'Innovazione,

Whirlpool Corporation

Abstract

Addressing innovation, one of the hot topics of today's business communities, this work aims at providing at a glance the current situation of the market together with a support to managers belonging to any kind of company, for reaching strategic objectives respecting, in the meanwhile, the current market needs.

Surviving in the current mutable market for firms of every size and sector, is continuously becoming more difficult. The trend of innovation involved all sectors of the economy, brings a need of transformation inside companies. The ever increasing level of uncertainty due to the always increasing level of innovation characterizing every sector of the market, needs ad-hoc approaches for guiding projects toward success.

The high level of competition due to the openness of local markets to worldwide competitors has brought firms to increase the levels of quality and performance to be delivered to the market, leveraging on an already known discipline - project management- that has evolved together with these new needs of the market.

One consequence of these events is the increasing level of innovative projects inside firms.

The difference between traditional and innovative projects is considerable and the literature analysis underlines the absence of a user-friendly methodology for supporting managers charged with the development of innovative projects.

I have exploited Actor-Network Theory (ANT) to try to achieve the creation of this missing support, developing a new framework on the base of the open issues found in the literature about this sociological theory.

The final result will hopefully be a quantitative and more effective and efficient version of the traditional qualitative ANT diagram, used to visualize the evolution in time of the human and non-human actors involved in any project.

The first part of the literature analysis allowed me to have a comprehensive knowledge about the basic areas of this research, namely project management and innovation management. This base then also became the main source of a second tool I developed inside the new ANT diagram: a problem-solving database, named the AssistANT.

The potential of this second tool is relevant since it contains more than 40 general problems (together with the related solutions) a manager of any company could face during an innovative project's development. Encouraged by the positive reactions to this tool during the interviews with some managers I developed also an" .exe" application of it.

The keywords of this research reflect the ones characterizing the trends of our days: flexibility, dynamicity, projects, agile approach, sharing, connectivity, transformation, social, innovation, proactivity, network, participation and involvement.

Compendio

Realizzato con l'intenzione di andare ad investigare i temi di maggior rilievo nel panorama manageriale dei nostri giorni, questo lavoro di ricerca punta a fornire un supporto a manager appartenenti a qualsiasi tipo di azienda nel raggiungimento degli obiettivi strategici delle stesse, rispettando al contempo i bisogni del mercato di appartenenza.

Confrontarsi con un mercato in continua evoluzione per le aziende rappresenta una sfida continua, indipendentemente dalla dimensione o dal settore di appartenenza delle stesse. I crescenti livelli di incertezza insieme a quelli di innovazione di qualsiasi settore hanno portato a necessitare di metodologie ad-hoc per guidare i progetti aziendali verso il successo.

La globalizzazione dei mercati ha aumentato il livello di competizione comportando la richiesta di livelli di qualità e performance sempre maggiori, che le aziende hanno cercato di soddisfare facendo leva su metodologie consolidate appartenenti alla disciplina della gestione dei progetti, evolutasi insieme a questi nuovi bisogni e alla trasformazione del mercato.

Il risultato finale caratterizzante la situazione corrente è il numero crescente di progetti innovativi all'interno delle aziende.

La differenza esistente tra progetti "tradizionali" ed innovativi è rilevante e l'analisi della letteratura in merito sottolinea l'assenza di metodologie che consentando ai manager di approcciarsi con questa nuova dimensione innovativa dei progetti.

In questo lavoro di tesi l' Actor-Network Theory (ANT) viene identificata come "candidato ideale" sulla cui base cercare di sviluppare uno strumento in grado di colmare questa lacuna. Il focus è stato posto su uno strumento appartenente a questa teoria sociologia, la mappa delle controversie, utilizzato per visuallizzare l'evoluzione nel tempo degli attori umani e non umani conessi in qualche modo con lo sviluppo del progetto innovativo.

L'analisi della letteratura ha evidenziato la presenza di tre probelmi aperti che rendevano la stessa mappa della controversie incompleta e inefficiente.

I problemi aperti sono stati la base dello sviluppo di un nuovo modello quantitativo più efficiente ed efficace di quello tradizionale - di natura puramente qualitativa.

La prima parte della letteratura mira a fornire una conoscenza completa delle aree su cui è stata basata la ricerca: la gestione dei progetti e la gestione dell'innovazione.Questa base di concetti e metodologie

durante il lavoro di ricerca è diventata anche la fonte principale per lo sviluppo di uno strumento secondario non previsto inizialmente e posizionato all'interno del nuovo diagramma : l'AssistANT,una base di dati per la risoluzione di problemi incontrabili durante lo sviluppo di un progetto innovativo.

Il potenziale dell'AssistANT risiede nella flessibilità del supporto offerta, indipendente dal tipo di azienda e dal settore di appartenenza della stessa.

L'impatto positivo risultato dalle interviste aperte effettuate per testare la base di dati con manager di dieci aziende mi ha spronata a svilupparne una versione "exe",ovvero un'applicazione che ne permette l'utilizzo in maniera elettronica.

Le parole-chiavi di questa tesi riflettono le stesse caratterizzanti i trend dei nostri giorni: flessibilità, dinamicità, progetti, approccio agile, condivisione, connettività, trasformazione, sociale, innovazione, proattività, rete, partecipazione e coinvolgimento.

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CHAPTER 1

1 Introduction

"*What strategies can help your business survive the economic downturn? Some experts, including Bill Gates, answer: "Innovation." Innovation means finding new ways to do business in this harsh situation and learning to think differently. It is said that innovation is the ability to see change as an opportunity and not a threat*" (Filev)

Nowadays having a look on firms involved in various different sectors provides a common view in terms of the approach used to direct their business: **a project-based approach**.

The realization of a project is something with which we deal everyday although we don't realize it. From the planning of the daily activities to the accomplishment of a recipe for making a cake, we plan the steps that will conduct us to the final desirable result.

The management of projects is starting to be a source of **competitive advantage** for companies that are realizing the importance to analyze the process that will guide them toward the achievement of their strategic goals.

The first time I heard about this competence was during a seminar of my second year of Bachelor of Management Engineering at "Politecnico di Milano".

I was immediately fascinated by the power of it, thanks also to the enthusiasm that the speaker, a project manager, put into telling us one of the main projects that he guided during his career.

The decision to go deeper into this topic results from a wish to know more about the subject, to better understand what is currently taking place in companies and how the scenario of the work-world is with respect to the one studied on the academic books.

The thesis background is not completed, without also including another area, in some ways opposed to the project management one in terms of basic concepts but, as you will hopefully see in this work of thesis, capable of being merged with it. This second area is well illustrated by the following (now famous) quote:

"Stay hungry, stay foolish"

-Steve Jobs

The citation that the Apple Inc. co-founder, chairman and CEO chose to conclude his commencement speech at Stanford University in 2005 contains the main reason that brought me next to the world of **Innovation**.

The hunger which Steve Jobs was talking about should be related to an **endless desire to know more**, to discover more in order **to make a change,** albeit a little one, that brings you to say "yes" to the following question, part of the same speech of the Apple boss too:

"If today were the last day of my life, would I want to do what I'm about to do today?"

In a world in which everyone continues to run without stopping to think, it is difficult to reflect on this. During both my Bachelor and Master studies, I often dealt with problem like how to decrease the time-to-market of a product, how to provide a faster delivery, how to provide a lower price, how to decide the right level of stocks but never I dealt with concepts like how to provide meaning to a customer through a product or a service.

Yet the aim of innovation is to provide an experience to its users and this new point of view on the fascinated me.

1.1 The thesis' objective

The aim of this work of thesis is to make a contribution to the management of innovative projects.

.Providing an overview of the current situation among the business communities (major companies but also the new-born startups) is only one of the aims with which I realized this thesis. I would like to provide something more, namely a deeper understanding of the impact of innovation and the merging of it with a more traditional discipline, the project management.

Project management is blamed to be **much too rigid** since it was born as a discipline that, through some schemes and methods provides the steps that should bring you to realize your project.

When we deal with **innovative projects**, the level of methodological **flexibility** required is higher (than for "classic" projects) due to the characteristics of such projects - not the least of which is the high level of uncertainty.

During the last years several methodologies and models have been created to manage the development of innovations properly among which is Latour's **Actor-Network Theory (ANT) diagram**. This is a map of the actors involved in the project that provides a description of the **evolution in time of the project in terms of programme and antiprogramme actors** (human and non-human actors that are respectively in favor or against the project's development).The characteristics of this theory brought me to analyze and improve it, building a new ANT diagram that could better support those who managers innovative projects.

1.2 Research Focus

The research is focused on the **management of innovative projects.**

Dealing with this main topic meant dealing with three sub-focuses that at the end of the work will be **merged through the development of the new framework.**

The main focus belongs to an overlapping area between Project Management (PM) and Innovation Management (IM). The literature analysis of these two disciplines constitutes the starting point of the research and highlights the **absence of a user-friendly, "plausible" tool for supporting the development of innovative projects.**

The other topic is a diagram belonging to a sociological theory, the **Actor-Network Theory**.

Exploiting the ANT I succeed in merging PM and the IM.

The literature about ANT and, mainly, about the mentioned traditional ANT diagram, brought me to identify in this theory the best candidate on which to work for developing the new framework. The application of the literature's ANT-diagram to management of innovative projects was impossible due to three main open issues (which are identified to below in Chapter 3) that made the tool incomplete and inefficient.

The new framework proposed here aims at overcoming these open issues by creating a supporting tool for managers of companies of any size and sector.

1.3 Research Questions

How do firms actually deal with the management of innovative projects?
Which objectives are being attempted to be achieved when Actor-Network theory (and mainly the related diagram) is exploited in managing innovative projects?
How could managers exploit the new framework for reaching these objectives in an efficiently and an effectively way?

1.4 Structure of the thesis

The structure of the thesis aims at guiding the reader toward the proposal of new model developed, providing all the knowledge needed to fully understand it.

Chapter 1: The introductory chapter provides an overview of the research driving questions, the structure of the thesis and its objectives

Chapter 2. The first two sections contain the main concepts of the current project management and innovation management disciplines which are explained in order to provide a complete picture of the basic but also – and mainly- of the latest trends developed. The third section explains the core theory exploited in this research: Actor-Network Theory. The chapter will provide a picture of the state of the art.

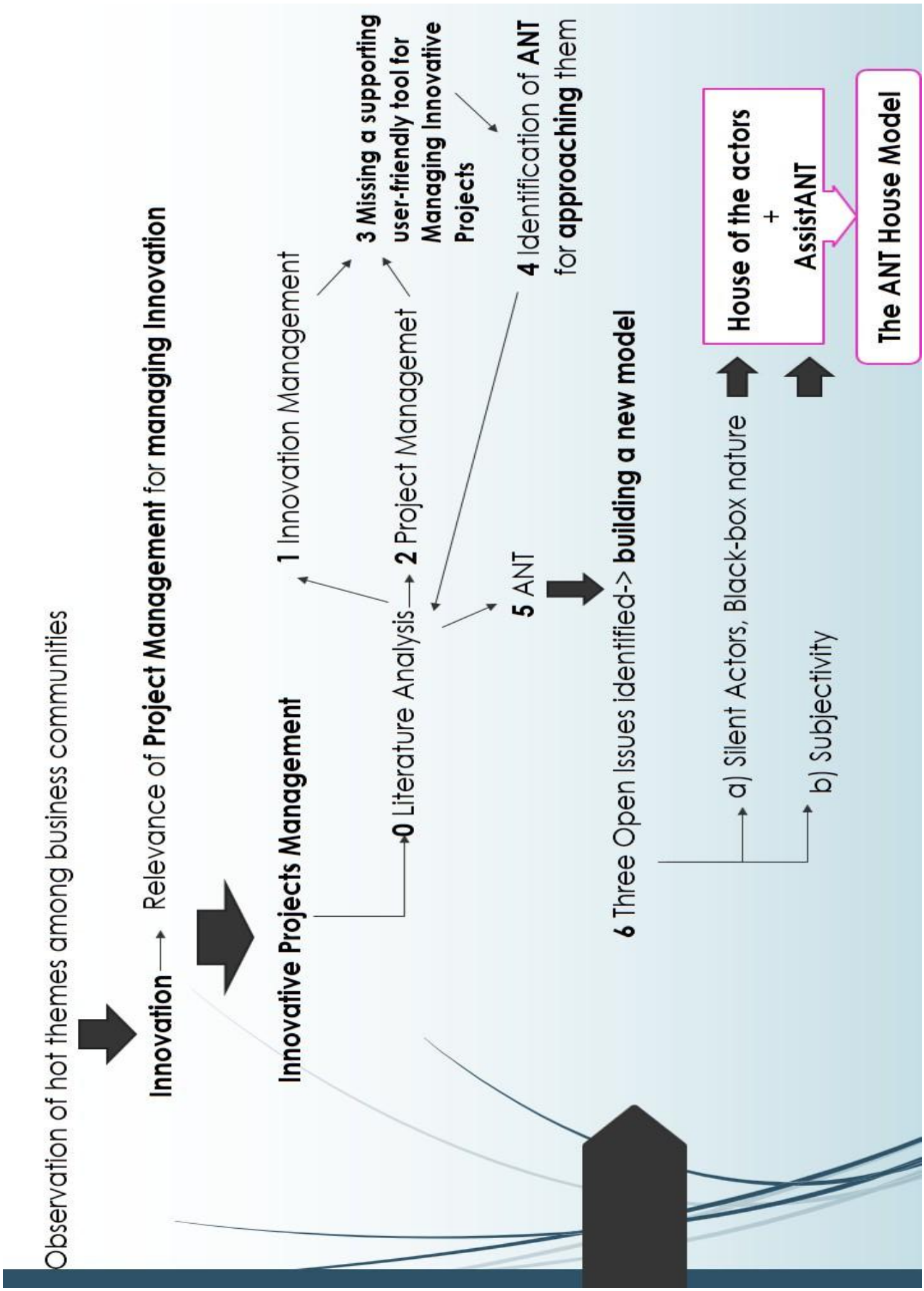
Chapter 3 The analysis of the literature about ANT highlighted three main open issues. This chapter will explain also these gaps found in the literature and the new framework developed in order to overcome them, adapting the ANT to the management of innovative projects. On the base of the open issues individuated, the chapter introduces the new model created for overcoming the detected gap(s). The outcome is a quantitative version of the traditional qualitative ANT diagram that will include a problem-solving database exploitable also as a standalone tool. The usability of the dataset outside the ANT context is promoted by the development of an *alfa* electronic version of the database, an ".exe" application based on Microsoft Access.

Chapter 4. The chapter addresses the methodology of the empirical research done for testing the model created. Face-to-face and electronic interviews were exploited testing the model through two separated interviews: one for the diagram building and layout and another one for the database since it could be also used outside the ANT framework. The way in which the empirical research results were analyzed and exploited together with that outcome conclude this chapter.

Chapter 5. This is the last chapter of this work that contains the conclusion of the whole thesis. It will analyze the achievement of the thesis objective and if the work succeed in answering to the research questions provided at the beginning. Moreover, it includes also the limitations of the model developed in this thesis and suggestions for further researches that could complete and improve it.

Chapter 6,7,8 The chapters contain the appendices with some useful extra-information for supporting the contents not available in the literature analyzed, a glossary of the main innovation concepts and a case study.

Chapter 9,10 Bibliography and Biography



Picture 1 Scheme of the Thesis' development

CHAPTER 2

2 Literature Review

The core of this chapter is the analysis of the literature on which I developed the thesis' research.

In the following paragraphs I would like to provide the main concepts that guided me toward this work, dealing with two main fields on which I decided to develop my final project: **Project Management and Innovation Management.**

The main research question I asked myself at the starting point was if these two areas, both parts of the hot topics in the business communities of our days, could be **analyzed in a unique research** by finding an **overlapping point still not well treated by the management world**.

The **order** of the literature analysis follows the way in which I did this research.

The last section results from the analysis of the first and second ones related to:

1) Project Management overview: I provided the main concepts and methodologies exploited in this discipline getting a solid understanding about how to manage projects and everyone and everything around its development.

2) Innovation Overview: this section offers a picture of the world of innovation management in terms of definitions, techniques and key-concepts

The next step was to **combine the two areas**, going for the identification of a methodology in project management that allows to deal with innovative projects.

The literature brought me to identify in the **Actor-Network Theory** a candidate to exploit in order to **develop a new framework for managers increasingly involved in these kind of projects**.

This identification led to the last literature analysis section:

1) Actor-Network Theory: in this section I propose a picture of the state of art of this theory, underlying the main open issues found in the literature on which I will base the new framework explained in the Chapter 3.

The main journals and books exploited during this research are gathered in the following table. The journals represented a key source for innovation and project management research while Latour's books provided me with a whole understanding of Actor-Network Theory. The main criticism related to the ANT diagram came out mainly from articles and essays found on the web (available in the bibliography).

Table 1 Main Sources

Field of research	Journal/Book Name
Project Management	• International Journal of Project Management • Journal of Management • PMI Conferences • PMBOK 5th Edition • Harvard Business Review • "Scrum guide" edition 2013 • Project Management Journal;
Innovation Management	• The Journal of Product Innovation Management • Harvard Business Review • Forbes • Technology Innovation Management Review • Innovation Management Community for Practitioners
Actor-Network Theory	BOOKS: • "Science in Action", "What is Actor-Network Theory?", "Reassembling the Social", "The pasteurization of France", "Aramis, or the Love of Technology" by Bruno Latour • "Technoscience: The Politics of Interventions " by Kristin Asdal, Brita Brenna and Ingunn Moser (eds.) JOURNALS AND ARTICLES • "ANT and after" by John Law • Journal of MOTIS Master (ESIEE Management) • International Journal Of Project Management • Scandinavian Journal of Management • "International Seminar On Network Theory: Network Multidimensionality In The Digital Age"19th February 2010, B. Latour- Los Angeles • Public Understanding of Science

2.1 Project management: Evolution, key-concepts and methodologies

The section below provides an overview of the main PM methodologies and practices which will be useful when reading the later (research) chapters.

The concept of "project" changed a lot during the last century. The following quotes include the main change I'm talking about:

"*A project is an organization unit dedicated to the attainment of a goal – generally the successful completion of a developmental product on time, within budget, and in conformance with predetermined performance specifications*"

- P. Gaddis, HBR, 1959

"*A project is a highly disorganised environment where management becomes a question of stumbling forward and success the outcome of a balancing act on the edge of chaos*"

-M. Gustafsson

PBI, Abo Akademi 1999

The evolution of the projects is continuing also during the last years, where the presence of "Innovative projects" is increasing, substituting the "traditional" ones.

During this work of thesis I came out with a definition of innovative project that is the following:

An innovative project is defined as a project realized as an answer to an unmet and unarticulated market need. The answer will be developed in an "open environment" built for the innovation made by networks of interacting human and non-human actors.

The final result will be the learning came from the path of development in a form of discovery not only for the market but also for the actors involved in the project development.

The latent need will be treated as a "problem" and the process toward which the team will identify and realize a "suitable solution" will be iterative, following the feedbacks provided by the external world.

Network, Iteration, Openness, Learning and Uncertainty are the keywords of a project that can be defined "innovative".

According to the literature, moreover, the innovative project can be defined as the one that, respect to "traditional projects":

• tends to start with **loosely defined**, sometimes even ambiguous **objectives t**hat become clearer as the project proceeds. The **processes** used are more **experimental** and exploratory and seldom follow strict linear guidelines.

• needs **teams** that are more **diverse** and have a higher level of **trust** as they explore new territory where failure is a possibility.

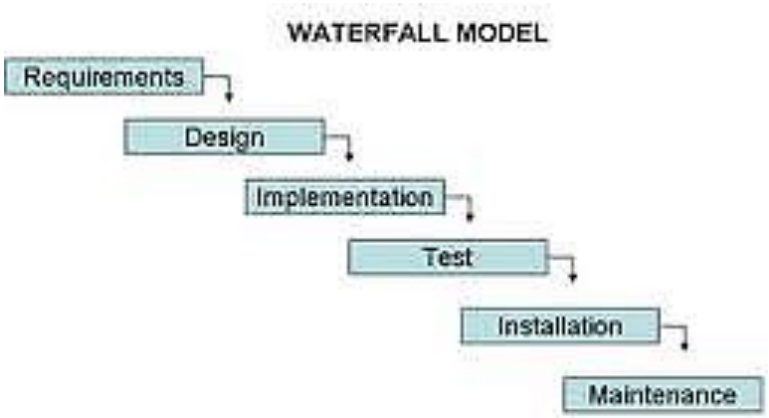
• considers **failure as a built-in possibility**, so innovation teams are more actively involved with risk management and need to learn to fail fast and fail smart in order to move on to more attractive options.

• needs to be sold to project sponsors and funding committees, a responsibility usually not required from normal project teams.

The change of the definition of the term "project" and also the difference between innovative and traditional projects are the mirror of the evolution occurred in the project management.

The exploitation of the IT infrastructure allowed to develop a new way to deal with the management of projects, reaching methodologies that resulted more dynamic, flexible and reactive.(Agile methodologies, see later). Due to this new "IT trend" in PM, I did part of my researches on the latest current methodologies "software based".

The traditional approach to project management used to look at the projects in terms of an orderly sequence of subsequent steps managed by disciplined and careful control methods. Known as the "**waterfall model**" (picture 2), the project' life cycle resulting from this approach leads to consider the project as a series of not-overlapping tasks that must be accomplished one after another, assuming that they won't be revisited.



Picture 2: The Waterfall Project Life Cycle Model

The development of a project, traditionally, passes through four main phases that, altogether constitute the life-cycle of the project itself.
These phases – Initiation, Planning, Execution and Closure- are not independent from each other and so the possibility of overlapping can occur. The requirements of the organization determines to establish the duration of these phases.

1 Project Initiation

The starting point of a project is the focalization on the need/objective of the project that can be identified as a business problem or an opportunity. The evaluation of the feasibility is essential in order to understand if it is possible and/or necessary to take the project. The approval from the feasibility study leads to the start of the team's creation.

2 Project Planning

The following phase sees the delineation of all the steps with the relative underlying strategy that is created at the same time. The pool of resources needed together with the expected costs is also figured out to create a project budget, assessing the possible threats to the achievement of the objective..
The result of this phase is a plan that includes all the activities that must be carried out to reach the main objective with the relative timeframe and budget.

After the end of these main activities is possible to start creating:

• A communication plan to define the way to deal with the stakeholders involved

• A quality plan focused of customer needs with the definition of acceptable criteria and the way to ensure the achievement of them putting some milestones targets.

3 Project Execution

The execution of the project generally is the most time-consuming phase. The project starts to work and control over it is essential in order to detect every variance from plan. The variances are the result of external and internal variables that can affect the project. Understanding the nature of that variables allows to define the corrective actions that must be taken to put the project back on the right track. In case of impossibility to do it, the team should record the variation and modify the plan updating the stakeholders. The delivery of the project must respect the acceptable criteria established in order to respect the customer requirements.

4 Project Closure

Once the solution is accepted by the customer, it possible to go toward the closure of the project that consists of conclude all the contracts, freeing the resources used and delivering the final project to the customer. Each project will bring, at the end, a source of knowledge and the analyses of what was good and what failed will spread that knowledge through the whole firm. The main activity in this case is the planning one and, the main assumptions are the predictability of the events and the easiness to understand the project's requirements.

The clarity of the steps and the related tools and activities required are not in themselves sufficient to consider this as a good approach to managing projects.

The incapacity to define the volatile, elusive and mutable project requirements, together with the current mutating landscape make traditional project management inadequate for answering the current needs of the market.

"*Today, business processes are more complex, interconnected, interdependent and interrelated than ever before. Additionally, they reject traditional organizational structures in order to create complex communities comprised of alliances with strategic suppliers, outsourcing vendors, networks of customers and partnerships with key political groups, regulatory entities, and even competitors. Through these alliances, organizations are able to address the pressures of unprecedented change,*

global competition, time-to-market compression, rapidly changing technologies and increasing complexity at every turn. Because of this multifaceted nature of businesses, projects that implement new business systems are also more complex.
An alternative approach, Agile Project Management (APM), is emerging in the industry. APM is a highly iterative and incremental process, where developers and project stakeholders actively work together to understand the domain, identify what needs to be built, and prioritize functionality." (Hass)

2.1.1 Agile Project Management

The origin of the term "agile" is the result of a meeting of a group of people which took place in 2001 with the aim "*to discuss how lightweight approaches to software development could challenge the traditional thinking of the time. The output from this meeting was the signing of the Agile Manifesto which embraced methods such as Scrum, DSDM and XP*." (http://agilekrc.com/agile-training-knowledge-hub/)

Agile project management proposes an **iterative** approach to plan and guide the processe of a project.It is based on **period scheduling of "iterations",**small sections during which the project will be completed.

Adaptation, collaboration with the customer and **emergence-reactions** characterize agile planning activity. The project manager changes his role, "*acting as a servant to the team, removing their impediments, reinforcing the project vision through words and actions, battling organizational dysfunctionality, and doing everything possible to ensure the success of the team. The agile project manager is a true coach and friend to the project teams.[…] The* ***results of this "inspect-and-adapt"*** *approach to development greatly* ***reduce both development costs and time to market****. Because teams can develop software at the same time they're gathering requirements, the phenomenon known as "****analysis paralysis****" is less likely to impede a team from making progress. And because a team's work cycle is limited to two weeks, it gives stakeholders recurring opportunities to calibrate releases for success in the real world.* ***Agile development methodology helps companies build the right product.*** *Instead of committing to market a piece of software that hasn't even been written yet,* ***agile empowers*** *teams to continuously replan their release* ***to optimize its value throughout development****, allowing them to be as competitive as possible in the marketplace. Development using an agile methodology preserves a product's critical market relevance and ensures a team's work doesn't wind up on a shelf, never released.*" (Agile Methodology, s.d.)

The 12 Principles related to "what is agile" are in the "Agile Manifesto", written in February 2001 during a summit of 17 practitioners of different program methods. The table contains the original version of the agile principles.

1- *Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.*
2- *Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage*
3- *Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale*
4- *Business people and developers must work together daily throughout the project*
5- *Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done*
6- *The most efficient and effective method of conveying information to and within a development team is face-to-face conversation*
7- *Working software is the primary measure of progress*
8- *Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely*
9- *Continuous attention to technical excellence and good design enhances agility*
10- *Simplicity--the art of maximizing the amount of work not done--is essential*
11- *The best architectures, requirements, and designs emerge from self-organizing teams*
12- *At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly*

Table 2 The agile principles (Principles, 2001)

The main agile methodologies applied by companies are explained in the following four paragraphs in order to provide a better understanding of this new approach.

2.1.1.1 Scrum

SCRUM is an agile approach to manage team collaboration on complex projects.

This approach provides a framework inside which people can employ various processes and techniques to deal with the difficulties resulted from the complexity of the product, following easy steps and rules.

The Scrum framework is composed by

- The scrum team
- The related roles, artefacts and events
- The team's rules

"Scrum is founded on **empirical process control theory**, or empiricism. Empiricism asserts that **knowledge comes from experience** and **making decisions based on what is known.** Scrum employs an iterative, incremental approach to optimize predictability and control risk."

The empirical approach is based on three principles (Scrum guide , 2013):

-**Transparency**, in terms of defining process' aspects using common standards understandable by any observers;

-**Inspection**, in terms of verifying the presence of undesirable variables through inspections done by experts with a right frequency;

-**Adaptation**, in terms of bringing the process back on the right track in case of "process' aspect/s outside the control limit" as soon as possible.

The Scrum process consists of three phases.

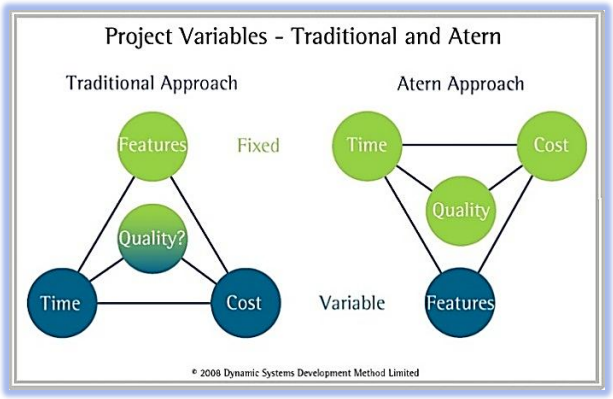
1) Planning→ The project is planned and the high-level design decisions are taken
2) Sprint cycle→the product is the result of one to four week iterations, or sprints, of which the features are before set during a dedicated meeting. Another meeting is held to demonstrate that the progress made in the last iteration occurred. At that point, after a review, if necessary, some adjustments to the project are made. The cycle iteration ends when the development of the product ends and so the variables of time, quality, competition, and cost are balanced.
3) Closing→the development of the product achieves the end and the product is delivered.

The main aim of Scrum is to overcome the misalignment between the time of project realization and the product delivery to the market, the base of the main causes of failures during a development process.

2.1.1.2 Atern-DSDM

Launched in 2007, DSDM Atern is the latest version of the DSDM- acronym of Dynamic systems development method. DSDM was released in 1994 as a software development method but later became a generic iterative and incremental approach to project management.

The aim of this approach is to face problems such as the delivery of products out of specifications, with delays and cost overruns by providing an agile environment in which the project management is flexible but still aligned with the deadlines and the required levels of quality. In few words: deliver the right solution at the right time!



Picture 3 Traditonal Vs. Atern approach

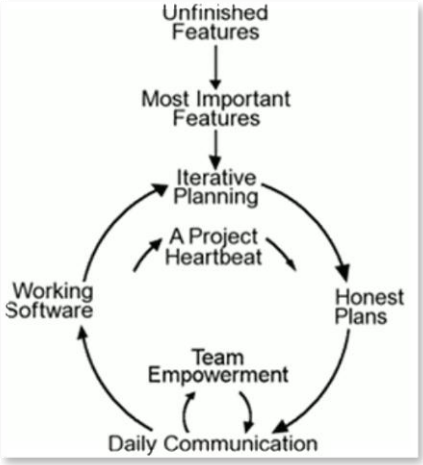
(http://aterny.wordpress.com/2011/06/08/atern-principle-8-%E2%80%93-demonstrate-control/, 2008)

Atern DSDM is based on the following 8 principles:

1. Focus on the business need
2. Deliver on time
3. Collaborate
4. Never compromise quality
5. Build incrementally from firm foundations
6. Develop iteratively
7. Communicate continuously and clearly
8. Demonstrate control

It's important to underline the necessity to accomplish each of these principle at the same time in order to achieve a consistent delivery and so a successful project end.

2.1.1.3 XP



Picture 4 XP Activities Flowchart (Wells, 2013)

XP, the acronym of Extreme Programming, is one of the several popular agile methods aim at delivering software. The main feature of XP is the focus on the customer needs allowing the provision of an effective product, an answer to the changing requirements that can involve modifications also in the last stages of the product life cycle. The aim of the method is to improve the software project and this happens thanks to its simplicity, its communication with customers, the provision of feedback during the life cycle, the respect for each team member's contribution and the courage with which it faces the continuously changing requirements.

The simple rules that constitute the base on which the method is built, are another characteristic of it. In the flowchart (picture 4), they are combined together defining an environment that promotes the collaboration among members. "Customers enjoy being partners in the software process, developers actively contribute regardless of experience level, and managers concentrate on communication and relationships. Unproductive activities have been trimmed to reduce costs and frustration of everyone involved." (Wells, 2013)

2.1.2 Project Management 2.0

The evolution of social media allowed people to use new tools as wiki, social networks etc;, thereby opening a new horizon to the world of project management. The way to manage projects till now saw the Project manager to be concerned only with "project-related communication". The communication is became the main issue and the main effect is the help provided to the management of distributed teams but also to regular routine operations.

The role of the project manager changed, he becomes the main communication element. There isn't any more space for top-down approaches; the key word now is the involvement and the participation exploiting innovative tools that characterize the Enterprise 2.0[2]. The innovations originated by the Enterprise 2.0 go under the name of Project Managemtn2.0.

The high impact of the technology is the result of some factors:

- Allowing easy-communication;
- Exploiting "collective intelligence"
- Dealing with collaborative tools→ "Project management 2.0 tools allow you to start from a structure with one item and evolve it into a model that perfectly suits the project. This helps to make bottom-up planning possible, and that is crucial for unleashing the power of collective intelligence in project management. Empowered by emergent structures and collective intelligence, project managers can combine field knowledge coming bottom-up with the guidance coming top-down. There is also a significant benefit for top managers: emerging structures allow you to get complete visibility that bridges the gap between strategic corporate plans and daily to-do lists of employees.[…]" (Wrike)
- Having the whole picture helps to make a better choice for allocating internal resources when there is a need to react properly to the changes in the business environment. Emergent structures and many-to-many hierarchies are the best way to compose this picture, so project management 2.0 tools are naturally able to provide this "big picture" view. (Project Management 2.0 –The Ultimate Benefits of the NewApproach to Project Management)
- Faster and more productive communication.

The main tools (Project Management 2.0 –The Ultimate Benefits of the NewApproach to Project Management) of PM 2.0 are:

Blogs→the major benefit of internal blogging is that it gives the opportunity to facilitate direct communication between various layers of an organization. Blogs allow team members who otherwise would not have been aware of or invited to participate in a discussion to contribute their expertise. External blogging helps to encourage the strongest community goodwill, and this goodwill, in turn, promote significant marketing and sales gains.

[2] Term created by the Professor McAffee to describe the use of new social software platforms within companies, or between companies and their customers-internal and external

Wiki→Wiki is another technology that can be successfully applied to managing projects. Its basic advantage is that it lets users to create, edit and link Web pages easily.

Wikis and blogs are good generic tools that can help to share knowledge much effectively than e-mails. To get a visibility and control over operations, companies also need to empower their managers and employees with a collaborative planning solution.

Collaborative Planning→Collaboration planning tools bridge the gap between employees' to-do lists, project plans and strategic goals. With the help of these tools, a project manager gains complete visibility of all the projects he is responsible for.

2.1.3 Project Dashboard

Picture 5 Project Dashboard-Example[1]

The accomplishment of a project can be really complex and, often, the provision of too many details, does not allow having a clear picture of the project status in terms of budget, main milestones and resources involved. Tracking the progress of a project is essential for a project manager since the potential success of it depends on the ability of the PM to deal efficiently with unexpected problems that can arise during the path. However, from the other side, this creates a potential source of complexity for the project itself bringing the team involved to feel lost among all that data gathered.

The essential Key Performance Indicators related to the critical success factors of a firm's strategy should be directly achievable and visible in order to maintain the focus on the strategic goals keeping the project development on the right track. The Dashboard tool was created to provide, in a user-friendly format, an at-a-glance project status. The user-friendly way of displaying allows the understanding of the tool also by non-experts however thanks to the virtual possibility to store multiple types and layouts of dashboards, it's possible to create different dashboards to target different audience types.

2.1.4 Project Portfolio Management

Project Portfolio Management (PPM) is a gathering of methodologies a strategies to guide effectively multiple projects. PPM's aim is to figure out the optimal resource mix for delivering and to organizing activities in order to achieve the organization's strategic goals respecting all the possible constraints present.

"Achieving success on a single, tactical project is difficult at best without a solid foundation of tools and techniques. Yet, many organizations attempt to execute a portfolio of projects without a robust framework from which to operate. This gap — the lack of a broader discipline — highlights the need for PPM. Closing this gap can help address the complex challenges that every organization faces each time a new project is initiated.[…] Although PPM is a natural evolution of PM, there are important differences between them that the PMI included in the following table (Project Portfolio Management (PPM): The Natural Evolution of Project Management, 2011)

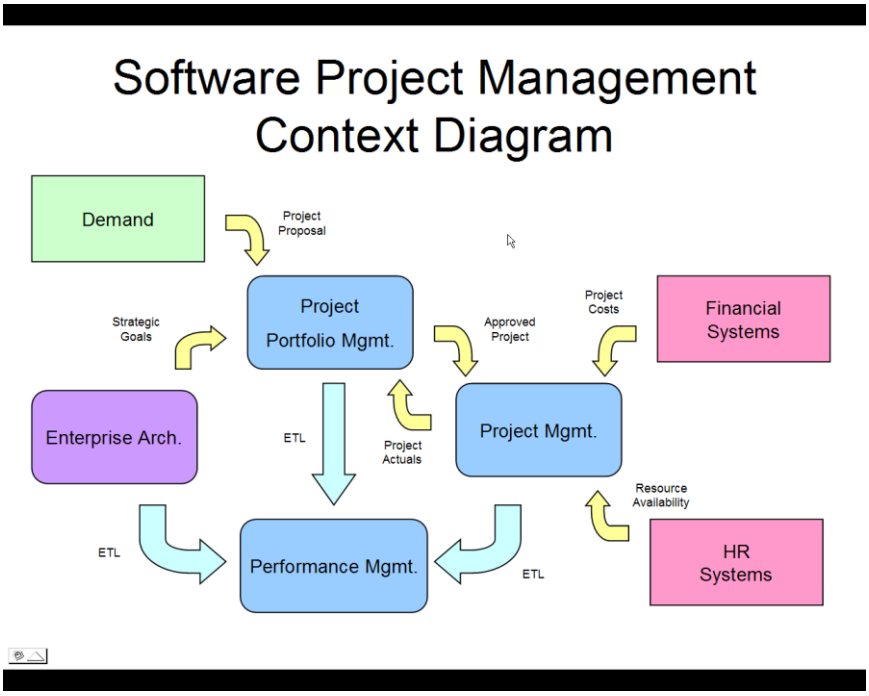
Characteristic	Project Management	Project Portfolio Management
Scope	Control and manage scope against project specific requirements	Select projects with scope that supports organizational goals
Time	Manage task due dates and dependencies to ensure project delivery	Monitor all project timelines against short- and long-term goals
Resources	Utilize provided resources effectively and efficiently	Monitor and manage resource utilization across the portfolio
Tools	Project plans, budget spreadsheets, project charters	Dashboards, resource leveling, PPM applications
Impact of Change	Manage change within the purview of individual project to control scope	Measure change across the entire enterprise to foster user acceptance
Industry Evolution	N/A	Measure and evaluate future state against industry and portfolio

Picture 6 PM Vs PPM : Main differences

2.1.5 Project Management Software

A large number of projects, around 30%, are deleted before their completion while another large majority aren't able to respect the time and cost constraints. The development of the software project management is an answer to this high number of failures .The main aim of this software is **to handle the complexity of projects** maintaining the costs aligned with the budget forecasts and respecting the set deadlines.

Software is utilized for project planning, actions programming, resource assignment and change management. It enables the communication between the involved stakeholders and also it provides visibility on budgeting, quality management and documentation to project managers, stakeholders and users. *"It is the unifying structure that brings programmers and customers together to create new products. It is used in every field of software development, from operating systems (Linux, Microsoft Windows) to games (Quake, Chess) and even to the software used on the International Space Station (ISS).*" (Definition software project management, s.d.)



Picture 7 Project Software Diagram

(Pm Home, s.d.)

DEMAND: Software and any kind of projects demand arrive in the organization from many sources and are registered as project proposals.

ENTERPRISE ARCHITECTURE: The enterprise architecture team involved in the project defines the strategic goals, analyses the current architecture and the "to-be" one, overseeing the steps to reach both the goals and the target-architecture

FINANCIAL SYSTEMS: Financial data related to costs, available cash and resources are analysed by portfolio managers that have to allocate them.

HUMAN RESOURCE SYSTEMS: The management of human resources is a task of these systems that allocate them according to their skills and experiences providing to portfolio managers a clear vision of their availability.

PROJECT PORTFOLIO MANAGEMENT: The value of the projects is estimated by project managers that analyse the benefits and costs of them, rank them according to the risk level of their relative investment and verify their alignment with the strategic goals established. The approval of projects depends on financial and human resources constraints.

PROJECT MANAGEMENT: The approved proposals are received by the project manager that has to execute them starting from the initiating and going through planning, executing, monitoring, controlling and ending phases.

2.1.6 Quality Management in Projects

Quality can be defined as the totality of features and characteristics of an entity that bear on its ability to satisfy stated or implied needs (ISO 9000:2000), where an entity can be a product, a component, a service, or a process.

Project quality management is related to both the management of the project's activities and of the result of them, the product realized. While product quality is easy to be managed since the specifications provided by the customers can be translated into the product's features, dealing with the quality of the activities carried out to reach the final result is more complex. The possibility to be over focused on the product side is a result of a wrong approach that can bring to concentrate all the efforts of the team for delivering the product with the risk of overworking, demotivation and inaccurate delivery.

Good quality in the context of projects and programs is defined (Turner, 2000) as being to

- meet the customer requirement
- meet the specifications
- solve the problem
- fit the purpose

- satisfy or delights the customer.

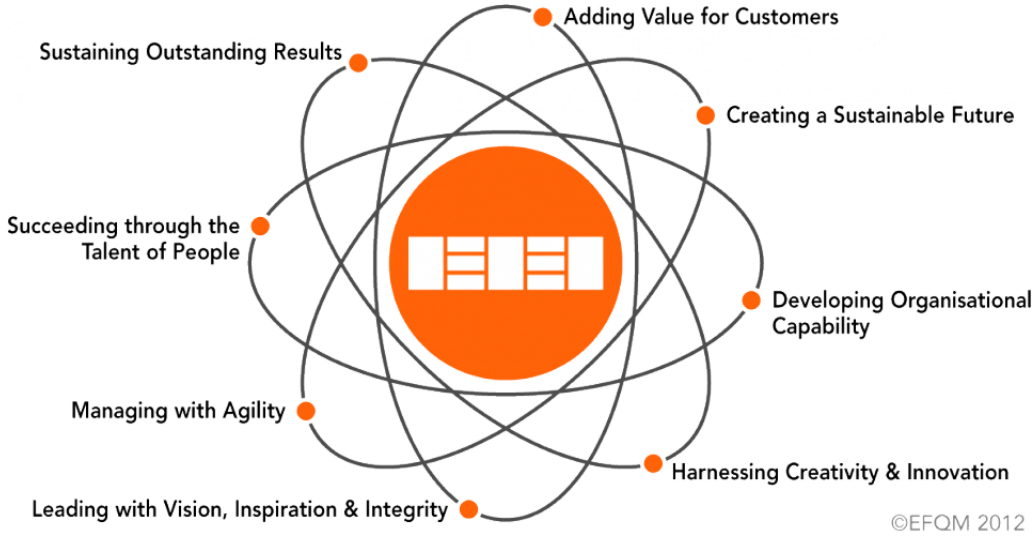
The PMI's PMBOK -4th edition (PMI, 2002) states that project quality management includes the processes required to ensure that the project will satisfy the needs for which it was undertaken. Hence, says PMBOK , quality management includes the following:

- Quality planning. To identify all the quality standards relevant for the project and plan how to satisfy them
- Quality assurance. To evaluate the project to ensure that the relevant quality standards will be met
- Quality control. To monitor, to compare with the relevant quality standards, and to correct the product (components, their configuration, the facility) and the processes

Traditional quality management approaches for projects and programs, says the PMBOK, concentrate more on the product quality as such and on quality control by statistical means like inspections, control charts, Pareto diagrams, statistical sampling, and so on. This perception is rather shortsighted, as projects need more than manufacturing quality management approaches. Quality assurance by using reviews and audits is becoming more important in projects. The processes need to be checked rather early to ensure the quality of the project deliverables, as only sound processes lead to good products and solutions.

2.1.6.1 Excellence Model

A model that is usually adopted to evaluate the "level of excellence" of a project-oriented is the **"Excellence Model**" developed by the German Project Management Association (GPM) in order to provide a cause-effect link between what the organization does and the related results obtained. The fundamental concepts of the model are visualized in the following picture:



Picture 8 Fundamentals of Excellence Model (efqm model, s.d.)

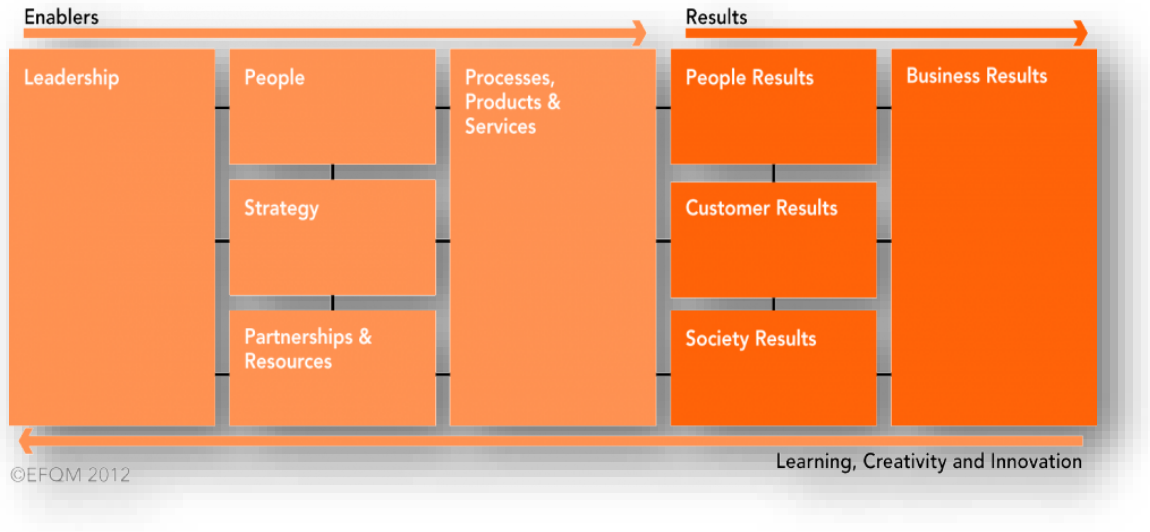
ADDING VALUE FOR CUSTOMERS **by understanding, anticipating and fulfilling needs, expectations and opportunities**
CREATING A SUSTAINABLE FUTURE **enhancing their performance and advancing the economic, environmental and social conditions within the communities they touch**
DEVELOPING ORGANIZATIONAL CAPABILITY **by effectively managing change within and beyond the organizational boundaries**
HARNESSING CREATIVITY & INNOVATION **generating increased value and levels of performance through continual improvement**
LEADING WITH VISION, INSPIRATION & INTEGRITY**, acting as role models for its values and ethics**
MANAGING WITH AGILITY **identifying and responding effectively and efficiently to opportunities and threats**
SUCCEEDING THROUGH THE TALENT OF PEOPLE
SUSTAINING OUTSTANDING RESULTS **that meet both the short and long term needs of all their stakeholders, within the context of their operating environment**

Table 3 Fundamentals of the Excellence Model

The nine basic criteria of these concepts are nine and are divided between:

- Enablers → Cover what an organization does and how does it
- Results → Cover what an organization achieves

The following scheme summarize the criteria that are later explained through the information provided by the EQM Organization



Picture 9 Criteria of Excellence Model (efqm model-criteria, s.d.)

ENABLERS

LEADERSHIP

Leaders have to shape the future and make it happen, acting as role models for its values and ethics and inspiring trust at all times. They are flexible, enabling the organisation to anticipate and reach in a timely manner to ensure the on-going success of the organisation.

STRATEGY

Excellent organizations implement their Mission and Vision by developing a stakeholder focused strategy. Policies, plans, objectives and processes are developed and deployed to deliver the strategy.

PEOPLE

Excellent organizations value their people and create a culture that allows the mutually beneficial achievement of organizational and personal goals. They develop the capabilities of their people and promote fairness and equality. They care for, communicate, reward and recognize, in a way

that motivates people, builds commitment and enables them to use their skills and knowledge for the benefit of the organisation.

PARTNERSHIPS & RESOURCES

Excellent organizations plan and manage external partnerships, suppliers and internal resources in order to support their strategy, policies and the effective operation of processes. They ensure that they effectively manage their environmental and societal impact.

PROCESSES, PRODUCTS & SERVICES

Excellent organizations design, manage and improve processes, products and services to generate increasing value for customers and other stakeholders.

RESULTS

The development of a pool of Key Performance Indicators strictly connected with the achievement of the firm's strategy is a common step that together with the establishment of intermediate area-specific targets, the high confidence in the future and the capability to compare efficiently results of similar organizations for target settings

For all the resulted criteria the main objective is to exceed the expectations of customers, business stakeholders, the society and people

2.1.7 Risk Management in Projects

The term risk is related to an uncertain event that in case of occurring will bring a negative effect. It is important to underline that the uncertainty includes all the types of event which have an impact on company performance (also positive) which involves variability. Risk is more restricted:it is the decision of the company because it includes events that the company decides to manage.

Dealing with a project, the risk of failure is related to not reaching a successful completion of it for example not respecting the deadlines or exceeding the budget. **Project Risk Management** is a discipline that allows to analyze and manage the projects' risks in order to increase the likelihood of achieving the strategic goals of the firms' projects (It's impossible to eliminate the possibility of risk occurrence).

The main question at this point is “Why do projects fail or underperform?”

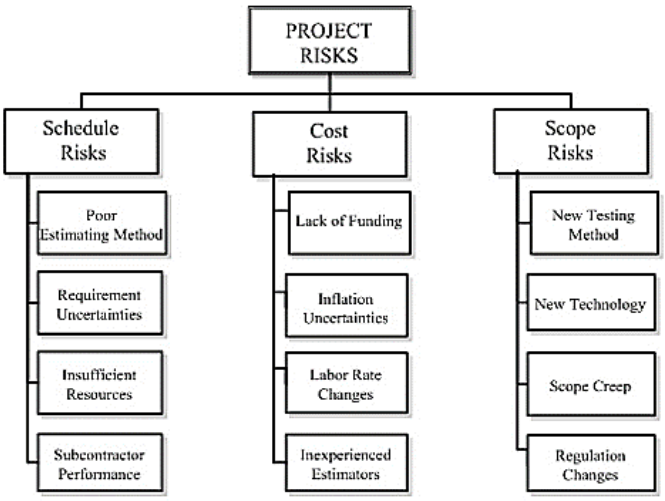
The nature of the causes the can lead to a failure can be of two types, internal or external so not a company can interview only on the latter ones, modifying the initial plan. A too optimistic plan is the only one that doesn’t consider the external factors bringing an internal deficiency to be a reason for an external one also. There are four basic ways to handle a risk:

1. Avoid it (the best solution, if you can do it)
2. Mitigate: If you can’t avoid you can try to reduce the impact in case of occurrence
3. Transfer it to someone else to accept it for you (buying an insurance)
4. Accept: it’s the last opportunity. At least in this case you know what will happen if it occurs.

In terms of company’s actions, since acting when the event occur means being late it’s necessary to create a **Risk Management Plan.** Inside the plan one will find:

- A pool of categories of risk to rank it and a Risk Breakdown Structure (RBS) to manage them (picture 9)
- The potential impact in terms of project damage size
- A scale to help figure out the probability of the risk

The definition of a Risk Breakdown Structure (RBS) is a useful tool that helps the company in categorizing a risk.



Picture 10 Example of RBS

Once realized the plan, the core steps of the project risk management have to be run:

-Risk Analysis

-Risk Management

Risk Analysis

The analysis that will be carried out is not only quantitative but also qualitative.

Quantitative analysis involves sophisticated technologies, generally computer software that allow to calculate the probabilistic combination of different uncertain events and the uncertainty in the cost and estimation.

At the beginning, as a starting point, it is essential to deal with the identification and assessment of the risk (qualitative analysis). This type of analysis examines the source of risk and describes it providing also the possible level of impact in case of occurrence.

Risk Management

The identification of a response is the second core step that also includes the investigation for finding possible ways to reduce uncertainty, the establishment of contingency plans to deal with in case of risk occurrence, considering the utilization of insurances and risk allocation in contracts.

Risk Analysis' Tools	Risk Management's Tools
▪ Risk data quality assessment ▪ Risk urgency assessment ▪ Expert judgment ▪ Risk probability and impact assessment	▪ Risk audits ▪ Technical performance measurement ▪ Status meetings

Table 4 Risk Analysis and Management Tools

2.2 Innovation and Its Management

"*To stay competitive, your company must drive top-line growth. And innovation is the engine for that growth*." (Larry Huston and Nabil Sakkab, 2011)

The definitions of "innovation" are several but at the base of all of them there is the same fundamental concept:

Innovation is different from invention!

It's a common thought that the two worlds have the same meaning. If you ask to a person walking on the street to define the Innovation he will probably starts to talk about science fiction without knowing that there can even be innovation in a corkscrew.

The management of innovation, thus, is not related to how to realize the impossible instead is related to how realize something that the customer doesn't expect but that he will love. Since the customer isn't aware of what is possible, looking at the market needs should not be enough. Innovators must create new needs providing new meanings!

This strategy is called "Design-driven Innovation" where the term "design" is not related to style or creative but is intended in the deepest way possible from its etymological meaning:

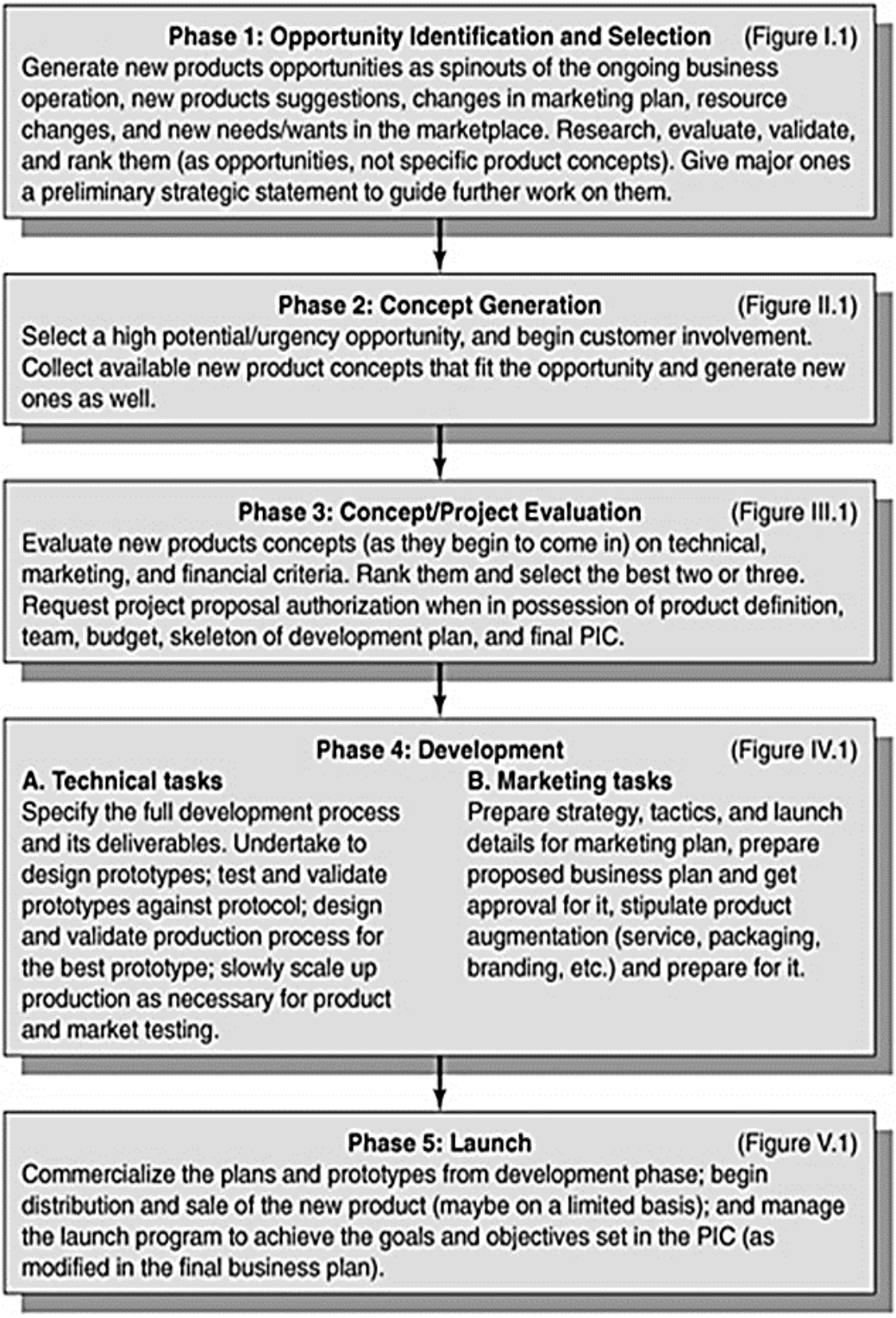
"***Making sense of things"*** (Krippendorff, 1989)

This strategy aims at providing a new reason for that people should buy and love a product.

2.2.1 The Innovation Process

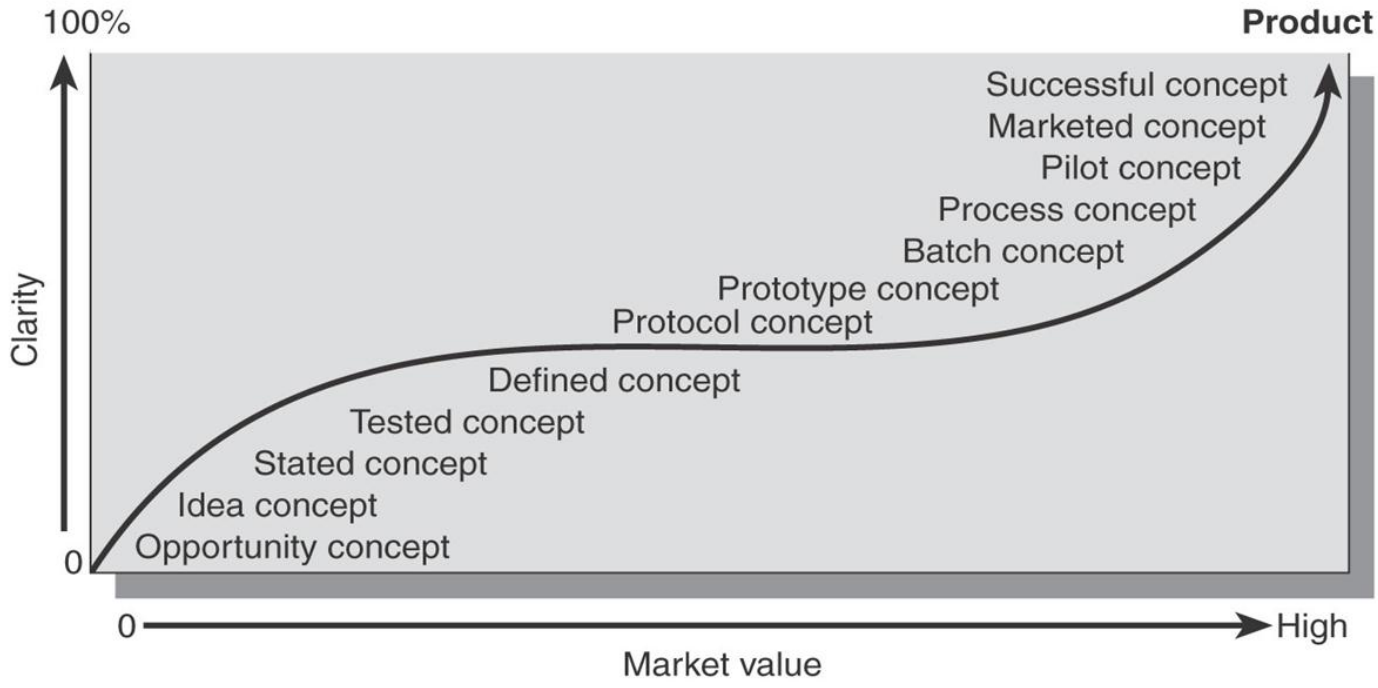
2.2.1.1 New Product Development: the phases

New product development is a process which is designed to develop, test and consider the viability of products which are new to the market in order to ensure the Growth or survival of the organization. The phases of the process are well-explained explained in the following scheme **(Benedetto)**



Picture 1 0 NPD Phases

The evolution from concept to new product is visible in picture 10 that provides a curve going from the opportunity to the successful concept.



Picture 11 Evolution from concept to new product **(Benedetto)**

The first stages of the new products process are sometimes called the fuzzy front end because the product concept is still fuzzy. By the end of the project, most of the fuzz should be removed. The first stages of the new products process are sometimes called the **fuzzy front end** (see the next paragraph) because the product concept is still fuzzy. By the end of the project, most of the fuzziness should be removed.

2.2.1.2 The Fuzzy Front End

During the engineering development process of a new product, the organizations follow some steps and the first one involving the concept development and the analysis of the convenience to develop it is called “fuzzy front end”.

The name gives an idea of the nature of the activities involved - chaotic, unpredictable, and unstructured- that, starting from the definition of the **possible opportunities**, arrive at defining the **idea** on which the company decides to invest, assigning a team and resources for its development.

Time is the main resource consumed by this starting phase during which the course of the whole project will be established. Koen distinguishes the following five different front-end elements (Koen et al., 2007) starting from the genesis of the ideas (phase 0):

1. Opportunity Identification→ definition of **the potential alternatives** and the related needed resources

2. Opportunity Analysis→ Evaluation of the **Impact of that alternatives** on the existent technology and firm's context

3. Idea Genesis→ iterative process that transforms the identified opportunities into **tangible ideas**

4. Idea Selection→Analysis of the **potential value** generable by each idea and choice, on this base, of one of them

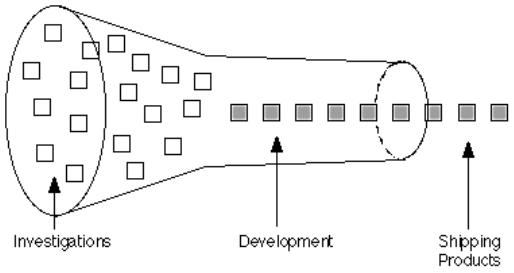
5.Concept and Technology Development→ **Estimation** of the available market and the related level of competition, customers' needs, required investments and level of risk of the project.

The criticality of this phase is evident not only for the huge impact of the phase's result on the whole project but also for the **low level of information** quantity and certainty that counterbalances the related low costs.

2.2.1.3 Innovation funnel and idea selection

A converging funnel is the way in which the development of a project is represented that, starting from a broad range of options, arrives to the selection and development of one concept.

The before mentioned first phase of this process constitutes the first part of the funnel, where a broad range of options are collected and investigated. The screening of these ideas brings to eliminate some subsets of them and putting together for creating a product concept. The objective of this process is to bring an idea from concept to reality, though sequential analysis that will result in a specific product able to satisfy the market needs.

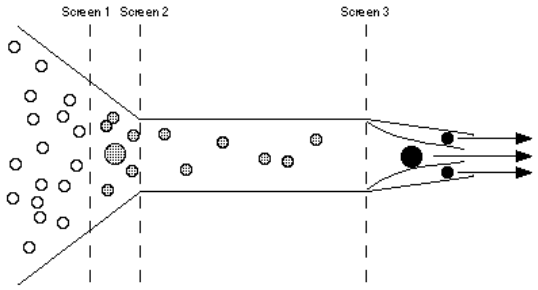


Picture 12 Funnel of Innovation (innovation funnel)

"Managing the development funnel involves three very different tasks or challenges. The first is to widen the mouth of the funnel - the organization **must expand its knowledge base** and access to information in order to increase the number of new product and new process ideas. The second challenge is to narrow the funnel neck - ideas generated must be screened and resources focused on the most attractive opportunities.

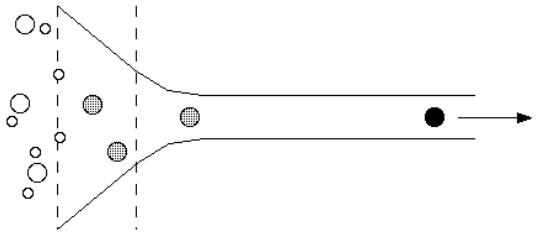
The goal is not just to apply limited resources to selected projects with the highest expected payoff, but to create a portfolio of projects that will meet the business objectives of the firm while enhancing the firm's strategic ability to carry out future projects. The third challenge is to ensure that the selected projects deliver on the objectives anticipated when the project was approved." (innovation funnel)

There are two dominant models of the development funnel that are broad patterns showing the kinds of choices firms have to make.



Picture 13 Innovation Funnel- Model 1 (innovation funnel)

"The picture shows the model one, common in larger, technology intensive firms which rely primarily on their research and development group to generate ideas for technologies, products and processes. Encouragement is given to generate many more ideas than will be applied, and these are then screened in various ways and at various stages. The model below, instead, is a top down model common in small, entrepreneurial start-ups, in which the firm bets on a single project. In both illustrations the circles represent new products; shading indicates the extent of development, and size the scale of the project." (innovation funnel)



Picture 14 Funnel of Innovation-Model 2 (innovation funnel)

The challenge related to the selection of the idea is the more critical since the establishment of some selection criteria is not easy. Saying that you are looking for brilliant novel ideas is too vague while looking for something that for sure won't need further resources beyond the ones already own is too strict. The main points that must be checked are:

-it will be technologically possible to realize it

-It will be a profitable idea

-It will satisfy the customers' explicit or latent needs

Following the **FAN model** developed by Synectics, it can be a way to figure out a general set of possible criteria. The basic question is "Are you a FAN of the idea?" that means if, according to you the idea is feasible, attractive and constitutes a novelty. An example of the possible selection criteria are the comparative ones used during brainstorming sessions by the British retailer Tesco:

> *Is it better? (For customers)*
>
> *Is it simpler? (For staff)*
>
> *Is it cheaper? (For Tesco)*
>
> *Any idea that is better, easier and cheaper is likely to be a good idea and will probably be approved*
>
> http://www.innovationexcellence.com/blog/2010/05/03/evaluating-ideas/

2.2.1.4 Innovation indicators: how to track the evolution of innovations

The management consultant Peter Drucker once said:

'If you can't measure something, you can't manage it.'

Although this is an old adage, it's still a basic pillar in the current management theory.

The application of it it's maybe even more important now than in the past due to the high attention toward cost reductions, resources saving and so on but, even if it is application it's easy in sectors like supply chain management or logistics, when we start dealing with the innovation the situation becomes more complex.

The nature of the innovation is, in fact, the opposite of a measurable process, it's chaotic, unclear, and unpredictable and so every kind of forecast or measurement seems impossible to be carry out.

The reality, instead, shows another scenario thanks to the success of some companies that, through a transparent and consistent set of Key Performance Indicators were and are able to achieve high paybacks from the management of the innovation.

In the article published by the consultancy society Arthur D Little in 2012, "*Innovation measuring it to manage it*"- by Michaël Kolk, Phil Kyte, Frederik van Oene and Jeroen Jacobs- the authors explain the main challenges that a company meets in managing the innovation as a business process and in measuring its performance.

They found three main challenges:

1 ***Innovation performance is difficult to measure and interpret***

According to a survey that they made in 2009, the 72% of the companies interviewed thought that their set of indicators are not a good mirror of the reality

2 ***Even useful KPIs can be hard to turn into meaningful improvements***.

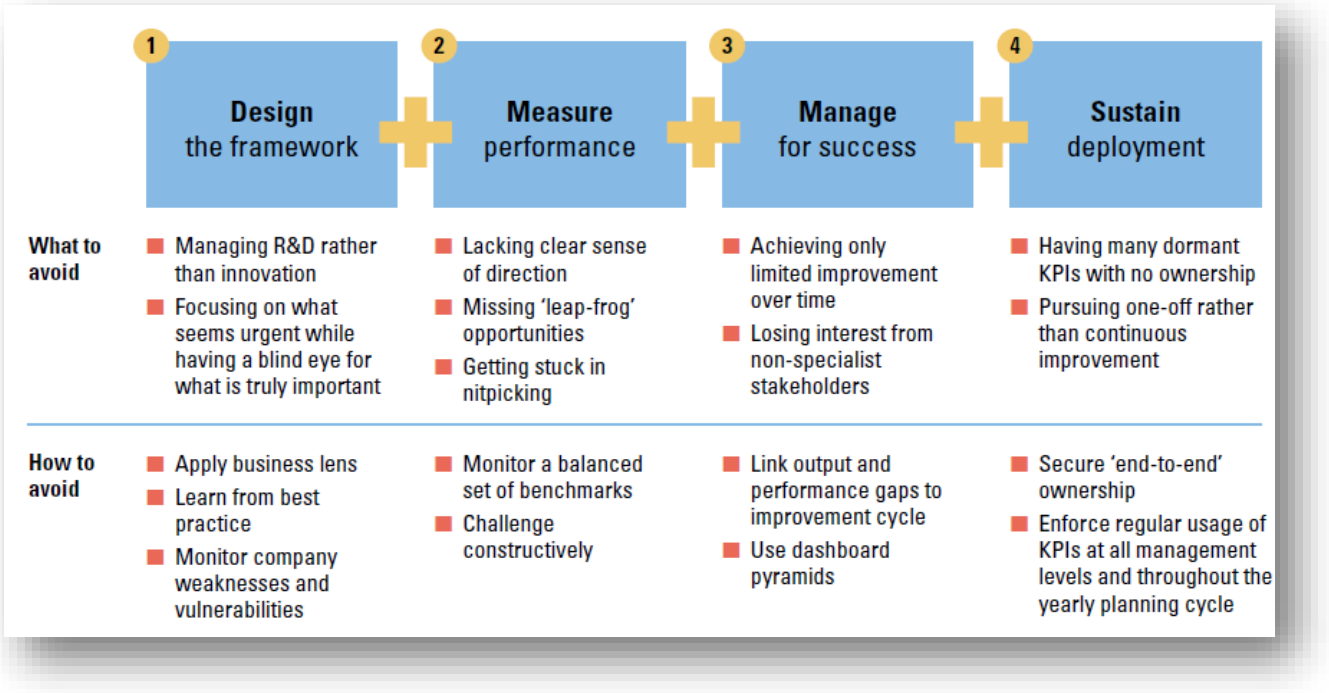
Where KPIs are measured and interpreted, companies struggle with setting shared priorities for improvement.

3 ***Incidental improvements rarely mature into a system and culture of continuous improvement***

Regularly changing KPIs and priorities often hinder companies in tracking innovation performance and trends over time, and demonstrating the success of the implemented improvement actions.

In order to overcome this challenges, companies should accomplish four main requirements that the authors summarized in the following table (Michaël Kolk, Phil Kyte, Frederik van Oene and Jeroen

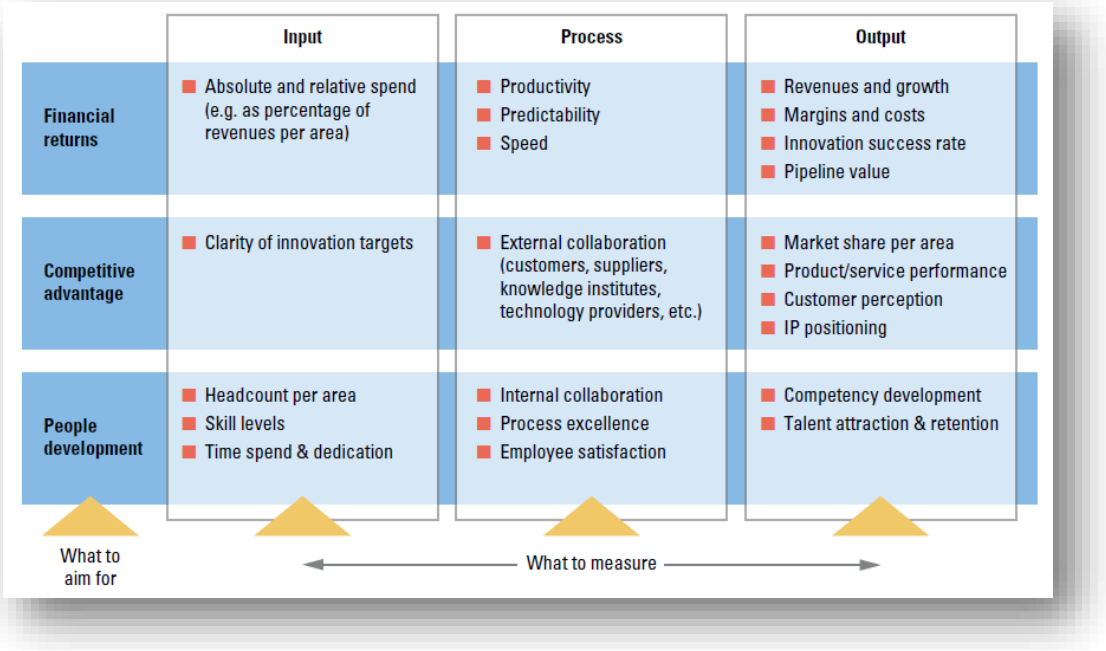
Jacobs, 2012):



Picture 15 Company's four requirements for demonstrating innovation performance

The number of possible indicators among which a company could choose is really high however, in order to find the right ones, it should be understood the main process characteristics and should be addressing the main objectives of innovation: obtaining a satisfying financial return, creating competitive advantage and developing the people belonging to the firm.

In another table, the same authors proposed a general list of indicators related to this three main goals:

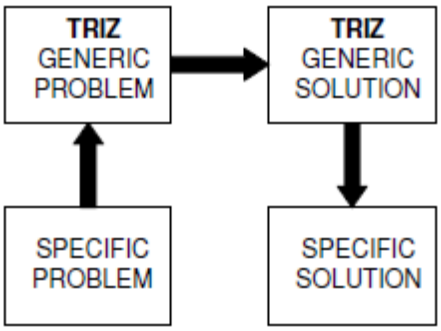


Picture 16 Common types of innovation indicators (Michaël Kolk, Phil Kyte, Frederik van Oene and Jeroen Jacobs, 2012)

2.2.2 Innovation Methodologies

2.2.2.1 TRIZ

The TRIZ is "is the most comprehensive systematic innovation and creativity methodology available to mankind" (Mann). The Russian acronym stays for "teoriya resheniya izobretatelskikh zadatch", that means "theory of inventive problem solving". Developed by the Soviet inventor and science fiction author Genrich Altshuller in 1946, this is a systematic approach that allows to find better solutions avoiding the need of trade off or compromises. The basic of the approach is to access to solutions developed in general terms by the finest inventive minds and gathered in a database. The database is the result of the work of 1500 researches that defined and solved problems mapping them and their solutions in the generic TRIZ framework (picture 17).



Picture 17 TRIZ problem solving process (Mann)

The approach is based on four pillars: **contradictions, ideality, functionality and use of resources.**

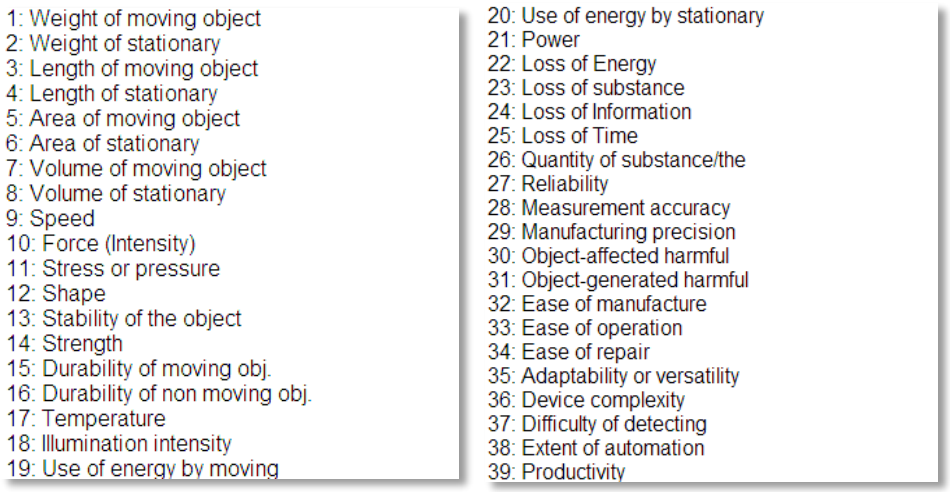
The contradictions pillar is related to the identification and then elimination of the contradictions that affect the system. The traditional approach of finding **trade off s**olutions is refused thinking that it brings designers not to be aware of the real existent conflicts or, in case of contradiction recognition, to accept instead of trying to eliminate them.

The main tool exploitable for eliminating contradictions is the "**Contradictions Matrix**" that contains how others solved similar problems. TRIZ identified 39 contradictions that should include all the possible ones found by managers in developing a project. On the axis of the TRIZ matrix there are vertically the improving and horizontally the worsening features:

GSA-1969	1	2	3	4	5	6	7	8	9	10	11	12
1			15. 8. 29. 34		29. 17. 38. 34		29. 2. 40. 28		2. 8. 15. 38	8. 10. 18. 37	10. 36. 37. 40	10. 14 35. 40
2				10. 1. 29. 35		35. 30. 13. 2		5. 35. 14. 2		8. 10. 19. 35	13. 29. 10. 18	13. 10 29. 14
3	15. 8. 29. 34				15. 17. 4		7. 17. 4. 35		13. 4. 8	17. 10. 4	1. 8. 35	1. 8. 10. 29
4		35. 28. 40. 29				17. 7. 10. 40		35. 8. 2. 14		28. 1	1. 14. 35	13. 14 15. 7
5	2. 17. 29. 4		14. 15. 18. 4				7. 14. 17. 4		29. 30. 4. 34	19. 30. 35. 2	10. 15. 36. 28	5. 34. 29. 4
6		30. 2. 14. 18		26. 7. 9. 39						1. 18. 35. 36	10. 15. 36. 37	
7	2. 26. 29. 40		1. 7. 35. 4		1. 7. 4. 17				29. 4. 38. 34	15. 35. 36. 37	6. 35. 36. 37	1. 15. 29. 4
8		35. 10. 19. 14	19. 14	35. 8. 2. 14						2. 18. 37	24. 35	7. 2. 35
9	2. 28. 13. 38		13. 14. 8		29. 30. 34		7. 29. 34			13. 28. 15. 19	6. 18. 38. 40	35. 15 18. 34
10	8. 1. 37. 18	18. 13. 1. 28	17. 19. 9. 36	28. 1	19. 10. 15	1. 18. 36. 37	15. 9. 12. 37	2. 36. 18. 37	13. 28. 15. 12		18. 21. 11	10. 35 40. 34

Picture 18 : Part of the TRIZ Matrix- In each cell the numbers refer to a solution proposed by TRIZ while the numbers on the axis refer to the contradictions (See the next table)

The cells of the matrix contain the possible solution to the contradiction resulting from the intersections of the two axis. The contradictions are:



Picture 19 TRIZ Controversies

TRIZ has until now identified 40 Inventive Principles to apply to different contradictions types and, when the matrix is not enough, TRIZ provides a table categorizing the principles that should be used for the specific types of problems (picture 20).

Problem Type	Inventive Principles[1]
All	1, 3, 4, 13, 15, 17, 22, 25
Improving Physical Attributes	2, 5, 7, 8, 10, 14, 28, 30, 35, 37, 40,
Improving Performance	9, 10, 16, 19, 21, 23,
Improving 'Ilities	11, 14, 18, 27, 35,
...If a solution still hasn't emerged	6, 12, 20, 24 26, 29, 31, 32, 33, 34, 36, 38, 39

Picture 20 Inventive Principle Solution Strategy

The ideality (second pillar) is linked with the idea that is possible to forecast the shifts of the S-shaped curve that represents the system's evolution. In the traditional problem solving process the known solutions, the ideality process brings first to eliminate the constraints of that solution and then to exploit the derivative final result.

The third pillar of TRIZ methodology is functionality, based on the assumption that "**solutions change, functions stay the same"** (Mann).TRIZ asks problem solvers to exploit more flexible methods during the solving process allowing to classify and gather knowledge by function thereby providing a general solution to the same main problem in different industries.

The last pillar is the use of resources where, with the term "resource" TRIZ refers to "anything in the system which is not being used" (Mann) .These resources thus become a source of "opportunities through which the design of a system may be improved" (Mann).

Although this methodology has huge problem solving power, it does not allow us to overcome all possible problems. A combination with other tools might provide more effective solutions,so overcoming five basic **problems** identified that **cannot be solved using only TRIZ** approach:

a) Problems in which a **new function** is sought

b) Problems in which we wish to **improve** some aspect **of an existing system**,

c) Problems where we wish to make a step **change evolutionary improvement** to an existing system,

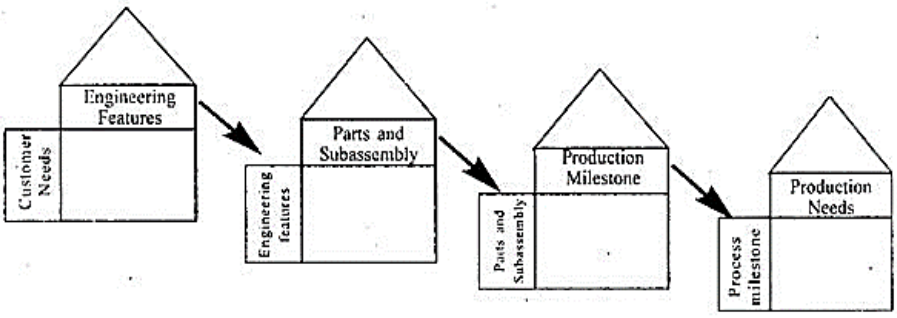
d) Problems which relate to **reliability-type issues**

e) Problems which relate to mature systems in which there are **cost reduction type drivers**" (Mann)

2.2.2.2 Quality Function Deployment (QFD)

While TRIZ provides the tools to define technological innovations without dealing with specific market needs, the exploitation of methodologies such as QFD (Quality Function Deployment) could allow to "listen to the voice of the customers". The QFD concept was developed by Mitsubishi's Kobe shipyard site in 1972 with the aim of wastes in production by identifying customer requirements properly at the beginning of the product development. The methodology consists of a set of matrixes (picture 12) that

link the customer needs to the product's technical requirements, component requirements, process control plans and manufacturing operations. The first and second matrix are the ones used more.



Picture 21 QFD matrices (htt12)

Using the first matrix called "**House of quality**" is possible following seven steps, to realize the technical requirement of a product that will satisfy a customer need not properly satisfied by competitors .The steps to build it are:

1) Identify customer needs expressed in "Voice of Customer"
2) Define the priorities of the needs by ranking them and exploiting the experience of the team and the marketing support
3) Translate them into technical requirements – measurable, testable parameters, specifications limits
4) Relate them to the technical requirements- define a weight of each technical requirement for each need
5) Define interrelationships between the technical requirements- creating the "roof of the house" - identifying the degree of proportional dependency between couple of technical requirements
6) Evaluate the competitors' products and services, providing an evaluation(on a fixed numerical scale) of how well they satisfy a specific need
7) Select critical technical requirements(CTRs) to be deployed in the design and production process (CTR are technical requirements with a high impact on a customer need not well satisfied by competitors)

The QFD methodology is a source of competitive advantage since provides a higher quality, at lower cost, shorter timing allowing the achievement of a marketing advantage. The changes to the products during the development process will be fewer, the timing of the process will be shorter and, mainly, the customer satisfaction will be higher. Moreover QFD allows to reduce the warranty on the product and to transfer knowledge throughout the organization, updating it to the last market requirements and the more effective ways to satisfy them.

The development of a new product is thus facilitated and through the identification of technical requirements interrelationship together with the impact level of the technical requirement on the need, arise new innovative solutions at a lower cost.

"The practical design methods derived from QFD requirement Conversion are provided by personnel with different concepts from different departments. Therefore, it is hard to identify if failure would occur in subsequent design which may cause changes of design." (Chung-Shing Wang, Chen-Ren Yu and Teng-Ruey Chang)

2.2.3 The Latest Innovation Approaches and Methodologies

2.2.3.1 Open Innovation

Henry Chesbrough (2003) in his book "*Open Innovation: New Imperative for creating and profiting from technology*" defines open innovation as a concept in which companies must use ideas from inside as well as outside sources and find internal and external ways to reach the market in order to advance their technological capabilities.

Open innovation combines these concepts of inside and outside ideas into systems and structures so that there is some order in the chaos. In another book "*Open Business Models: How to Thrive in the New Innovative Landscape*" he defines open innovation as the flow of knowledge internally and externally such that it moves the process of innovation at a much faster pace and so that new markets can be found for the use of this innovation.

"Open innovation is the practice of problem solving by looking beyond companies' boundaries to the outside world and its experiences and discoveries as part of the innovation process, instead of relying exclusively on the internal skills of one's own researchers and developers." (Philipp Wagner and Prof. Dr. Frank Piller)

The traditional methodologies used by companies tended to focus exclusively on involving internal resources and so internal knowledge and skills in the development process. Open innovation is an innovative philosophy that opens up of internal innovation processes to include external knowledge aims at achieving a competitive advantage.

The involvement of external players means their real integration of them in the innovation process via informal, short-term network relationships. According to the type of knowledge needed, these players can be:

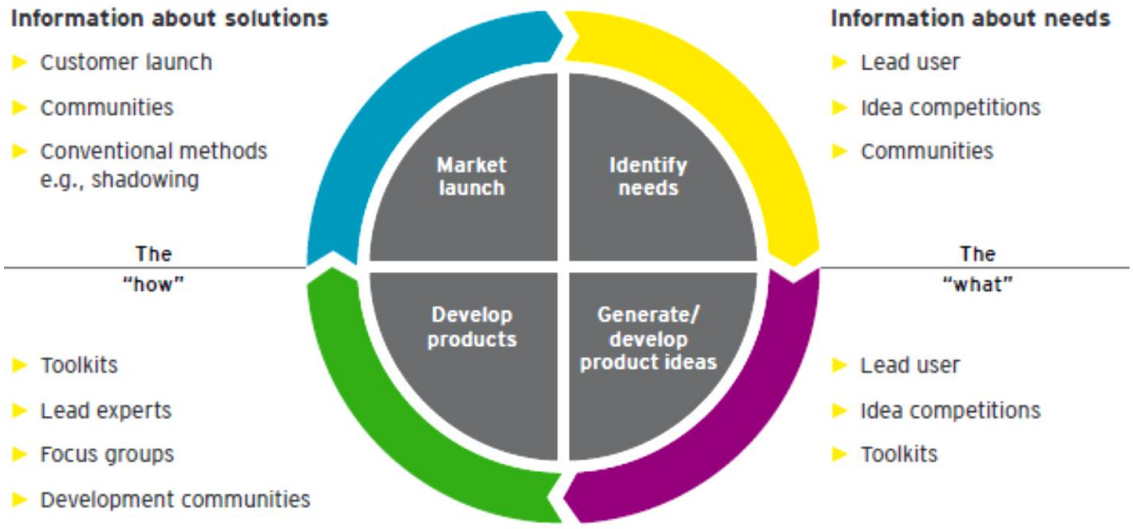
- customers, in case of necessity to acquire information on needs to increase the innovation process effectiveness
- experts, if is needed a technical knowledge is needed to increase the efficiency of the development process

The reasons from which this methodology comes are mainly two, the "stickiness" of information that is often individual and context specific and the limited space of solution that generally is closed to already existent knowledge.

The methods to integrate external players in the process are several but, two are the more adopted:

- Lead-user research for customers' integration (see the *Innovation glossary* in the Appendix)
- Co-creation Workshop for experts (see the *Innovation glossary* in the Appendix)
- Crowdsourcing approach (see the *Innovation glossary* in the Appendix)

Open innovation is the result of the "innovation in the air" concept, according to which since the innovation field is gaining always gaining more visibility and since people bring the main ideas, they should be integrated in the company's environment. The involvement can come from three streets:



Picture 22 Open innovation methods across the phases of the innovation process (Philipp Wagner and Prof. Dr. Frank Piller)

Before deciding to use this methodology, a company should understand if it is ready to manage it, possibly with the help of "*A straightforward auditing tool designed to help organizations prepare for opening up their innovation process and determine their readiness for open innovation*" (Philipp Wagner and Prof. Dr. Frank Piller).

The audit is based on four main concepts.

The first one, "open innovation readiness" that aims at analyzing the current situation of the company in terms of strengths and weaknesses with respect to open innovation readiness.

The central concept is the "absorptive capacity" defined as the "ability to assimilate, evaluate and above all disseminate external knowledge internally thereby ensuring that knowledge flows into development and innovation activities" (Philipp Wagner and Prof. Dr. Frank Piller). The absorptive capacity is the sum of the employers' knowledge and skills together with company's structures that enable the knowledge sharing and the communication.

The company culture and the organizational methods are the last two elements.

The first one plays an important role since spreading the open innovation culture allows to motivate people in the company, sharing the values but also putting clear norms for dealing with external players, integrating the already existent corporate culture.

The already existent organizational structure must change to enable the establishment of this new culture, helping in facilitating open innovation and also increasing the potential for absorbing new external knowledge, which has become a strategic variable for the firm.

2.2.3.1.1 Moving from Resource & Develop toward Connect & Develop: The P&G model for innovation

Internal innovation based on exploiting the R&D function, is the traditional approach used by companies for innovating. Investing in acquisitions, alliances, licensing, and selective innovation outsourcing looked at like the best ways together with the improvement of product portfolio management and of the link between R&D and Marketing Function.

The innovation achieved was, however, the result of incremental changes, far from the disruptive one needed by the market! In a period of being stuck, in 2000, the company Procter & Gamble created a new innovation model substituting the brick and mortar R&D function with a new one called "Connect & Develop": the results were impressive! This radical alternative is based on connecting external sources of new ideas. From suppliers to government labs, university labs even to competitors, the sources provide the ideas that will be developed in a profitable innovative way. The worlds of the CEO of P&G of 2011, A.G. Lafley, sum up the core concept of this method:

" *[…]The strategy wasn't to replace the capabilities of our 7,500 researchers and support staff, but to better leverage them. As we studied outside sources of innovation, we estimated that for every P&G researcher there were 200 scientists or engineers elsewhere in the world who were just as good—a total of perhaps 1.5 million people whose talents we could potentially use We needed to* ***move the company's attitude from resistance to innovations "not invented here" to enthusiasm for those "proudly found elsewhere."*** *And we needed to change how we defined, and perceived, our R&D organization—from 7,500 people inside to 7,500 plus 1.5 million outside, with a permeable boundary between them."* (Larry Huston and Nabil Sakkab, 2011)

Impact's area	Impact's evaluation	Impact's Period of time
R&D productivity	+ 60 %	2000-2005
Innovation success rate	More than doubled	2000-2005
R&D investment as a percentage of sales	from 4.8% to 3.4%	2000-2005

New products	more than 100 new products in the first 2 years	2000-2002
Share price	More than doubled	2000-2005
Portfolio value	22 billion-dollar brands	2005

Table 5 C&D impact on the first 5 years on P&G

2.2.3.2 PROTEE Methodology

The path to follow in order to develop an innovative project is strictly linked with the type of uncertainty linked to it. The majority of realized innovation are "incremental" ones, with which is possible to define a probability of success and to measure risk exploiting existing techniques that belong to traditional project management. The level of uncertainty is, instead high to the point that it is impossible to define such probabilities and also the possible scenarios, when we deal with radical innovations.
The PROTEE Methodology was born with the aim of answering the following question: "is it possible to manage radical innovations and if so how?"

The work of the PROTEE team started with the analysis of the existing models that brought them to look for a new approach in order to develop a new attitude toward innovations: aimed at guaranteeing a **positive learning process.** The core of this methodology is the development of a relationship between an "innovator", defined "as who knows all about his project, its contents, its problems and its difficulties but also its potential) who knows" and an "evaluator" , who "knows little or nothing about the project but who is experienced in evaluating projects and has confronted both their problems and potential dangers many times (PROTEE Main report).

"This relationship covers the early and very uncertain phase of a "rupture" project's life before it is either finally abandoned or matures to the point where more traditional project management methods can be employed.[…] Research in history, management and sociology of technology has shown that innovations fail to explore their environment in a way that ensures a positive learning process for four basic reasons:
• Lack of realism;
• Lack of strategy;

• Lack of falsifiability;

• Lack of innovativeness.

It is around these four pathologies and their associated indicators that a relationship between an "innovator" and an "evaluator" is built. The methodology encourages the two to engage in a learning process to analyze and discuss the project in these "PROTEE" terms. It provides tools to assist this process and analyze the results. To achieve this, PROTEE establishes a paper trail that provides a principled description of the project by documenting the successive meetings between the innovator and the evaluator in terms of PROTEE indicators. This paper trail allows for the progressive build-up of a file allowing the innovators and evaluators to assess the quality of the exploration trajectory of the innovation. The comparison of the indicators over time makes it possible to grade the quality of the learning curve and to decide whether or not to continue the exploration."

The PROTEE approach deals in a new way with the knowledge, it assumes that the nature of the innovation itself brings to a lack of knowledge impossible to calculate and so the main aim of the project goes from the realization of an idea toward a path of growth for all people involved in the process. In contrast with traditional project management, the methodology doesn't link the rationality of the project to the real possibility to realize it.

The following two boxes provide respectively the four group of indicators and the five step of the methodology.

PROTEE does not consider useless all the techniques developed by traditional project management, it consider them not able to deal with the first part of the project (See later, Fuzzy front end in the Innovation literature) due to the uncertain risky ,undefined nature of innovations and the, instead, schematic rigid nature of them.

The value of a project in PROTEE terms is identified as the potential learning that it can provide. During the development the innovator is invited to have a positive approach toward the opposition since from it could rise new allies later.

"The pathology most frequently encountered in the management of innovative project, has to do with the inability of the innovator to absorb opposition to the project other than by saying that opponents are irrational. The good reasons that opponents - human or non-human - could have not to co-operate are thus ignored and the project remains as it is, without learning anything new from its environment. This inability to learn is a sure recipe for disaster and is one of the features that the evaluator must weed out, if he or she wishes to score the learning trajectory." The description of the project passes by

an always more detailed map of the relays, human and non-human, taking into account the "entities involved in action of transformation. […] What is impossible is to claim to be promoting an innovation and to define it as something that reaches existence without encountering opposition and without suffering any deformations in doing so; this is what we call negotiability."(PROTEE Main Report)

Box 1: The PROTEE Indicators

Class 1: Realism or "anti-ballistic"

The whole class makes sure that innovators have not started with a project and then looked for a world in which to implement it with as little deformation as possible (the ballistic pathology) but are able to first describe a future world and only then search out elements that render their innovation more realistic.

The evaluator will then grade the description given of the project at hand:

I,a): by its richness;
I,b): its heterogeneity;
I,c): its uncertainty;
I,d): its contingent.

Class 2: Strategy or "anti-paranoia"

This second class makes sure that the project is now thought of in strategic terms, that is, considers every opposing view as an opportunity to modify the project and entering into a negotiation as to its character, goal and functions. The evaluator will grade the description according to the following indicators:

II,a): opposition;
II,b): justification;
II,c): specification;
II,d): negotiability.

Class 3: Falsifiability or "anti-manipulation"

The third class of indicators makes sure that the trials proposed by experts, politicians, technicians, public etc. for assessing various aspects of the future project are themselves relevant, useful and quality controlled. Without this double checking of the relevance of the trial objectives, the trials would be carried out in vain.

The evaluator will grade the research PLAN proposed by the innovators according to the following indicators:

III,a) arbitrariness;
III,b) openness;
III,c) proof of proof;
III,d) criticality.

Class 4: Innovativeness or "anti-monsters"

The fourth class of indicators makes sure that the process of exploration itself should not be continued without good reason, either because the project should be discontinued (it is a "white elephant") or because, on the contrary, it is a very innovative and long-term risky project (a "hopeful monster") or, finally, it has matured so that other project management techniques are applicable.

The evaluator will grade the description given by marking the following indicators:

IV,a) retroactivity;
IV,b) reconciliation;
IV,c) risky diagnosis:
IV,d) limit conditions.

Box 2: The PROTEE 5-Step Plan

1. The Innovator's Story. The Innovator tells a story to the Evaluator. This is contained in the documentation and other material supplied to the Evaluator prior to a project meeting. The subsequent procedures, described in points 2-5 below, take place at the project meeting itself.

2. The Consensus Story. The Evaluator retells the story of the project to the Innovator in the form of a summary - a chronology of events. Through this process they agree on a Consensus Story - an agreement about what has happened on the project since it started, or the last meeting.

3. The Socio-Techno-Therapeutic Dialogue. The Evaluator and the Innovator enter into an analytic dialogue structured by questions formulated by the Evaluator to encourage the Innovator to make risky descriptions of the project. This dialogue is designed to lead to a PROTEE redescription of the project.

4. The Redescription. The Evaluators and Innovators each make a record of the PROTEE redescription. The PROTEE redescription would be a record of the quality and quantity of the descriptions of the project made within the framework of the PROTEE Indicators. The Innovator and the Evaluator do not have to agree on the project's redescription, but their respective redescriptions should address the same points. A method has been designed for preparing the PROTEE redescription which involves the completion of Project Description Summary Sheets. The Sheets would record a summary of how the parties redescribed the project at the time of the meeting with respect to the quality and quantity of its descriptions.

5. The Evaluation. The Evaluation is the outcome of the comparison of project redescriptions made at two consecutive meetings. Clearly, it is not possible to make an Evaluation at the first meeting. At the second and subsequent project meetings, however, the Innovator can compare his two redescriptions and the Evaluator can compare his. What is important for the Evaluation is the difference between redescriptions at two different time points.

"The concept of 'therapy' is at the heart of PROTEE. Through interaction between Innovator and Evaluator, construed as a form of socio-techno-therapy (STT), Innovators are encouraged to enrich their description of the project - to entertain riskier aspects of the project in their descriptions and to imagine other possibilities. It is evident that the success of the therapy depends crucially on the interaction which, just as in any form of counseling, depends in turn on the relation between Innovator and Evaluator.

The advantage of PROTEE for Evaluators is that they learn more about innovation projects.

Instead of just knowing that a project succeeded or failed, the Evaluator will also know more about the process of innovation. In addition to the benefit of the acquisition of information per se, use of PROTEE could mean a saving of resources if the information gleaned meant that some project were terminated sooner rather than later, while others offering major benefits in the future were continued".(PROTEE Main Report)

The PROTEE radical innovation management methodology, which was developed in conjunction with and tested on a real EU funded international transport R&D project, was the culmination and a practical

application of Latour's previous work on science(The Salk Laboratory) and technology (the "Aramis" project) and based on the Actor-Network-Theory which he and his colleagues had developed. The innovation management potential of ANT will be examined in the following section.

2.3 Actor-Network Theory

2.3.1 Actor-Network Theory: the main concepts

The first concepts about the theory were developed during the 1980s by three professors: Michel Callon, Bruno Latour and John Law. . However, the theory has started being spread among managers only during the last years.

It has origins in the study of the networks of interdependent social practices that constitute science and technology. ANT attempts to describe the interrelationship between the social and technology by tracing the complex relationships that exist between actors involved. According to the proponents, ANT is more of an approach, a "how-to" rather than a theory.

"[…]*At its lightest touch, ANT can be seen as a methodology for unravelling rich descriptions of development processes, or as a sensitization to particular aspects of development otherwise downplayed. At its most ambitious, ANT is the basis for an alternative approach to all of social science. Applications may explore different points along this continuum but will typically acknowledge core features of ANT:*

- *its recognition of the role of non-human, material 'actants' alongside humans in development, and*
- *its focus on the way in which networks of actors form and dissolve in development, particularly through the process of 'translation'.*

These features mean that an investigation of ANT in development is particularly timely. Conceptually, there is growing interest in understanding agency, process and relations among development actors. In practice, there is ever-greater use of networks of individuals and organizations to deliver development; and an ever-greater role for the material (especially technology) in development processes[…]" (Heeks, Development Studies Research and Actor-Network Theory, 2013)

ANT is «A disparate family of material-semiotic tools, sensibilities and methods of analysis that treat everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located. It assumes that nothing has reality or form outside the enactment of those relations. Its studies explore and characterize the webs and the practices that carry them » (7. Actor Network Theory and Material Semiotics, 2009)

In ANT, all actors-human as well as non-human which influence the progress and the outcome of a process, are included and equalized and pitched with their degree of buy-in or opposition to the project. The actors are mapped in a chronological net-work where it is possible to track the status of the project over time. At the end of the period designated for the process, it is possible to see whether the "black box" – the objective of the process has been reached and the interrelationship between the behaviors of the actors that brought about this effect.

«*Classical sociologists are en-chanted with the notion of the social and they identify it as having both negative and positive properties: it should not be purely economical, biological or psychological and it must actively do things – it must reinforce, maintain or reproduce the social order* » (Latour, What is Actor-Network Theory?, 2005)

« *ANT assumes the radical in-determinacy of the actor. For example, neither the actor's size nor its psychological make-up nor the motivations behind its actions are predetermined. In this respect ANT is a break from the more orthodox currents of social science. This hypothesis opened the social sciences to non-humans* » (Callon, 1986)

ANT may alternatively be described as a 'material-semiotic' method. It attempts to map net-work relations that are simultaneously material (between things) and 'semiotic' (between concepts). It assumes that many relations are both material and semiotic. ANT tries to explain how material-semiotic networks come together to act as a whole. As a part of this it may look at explicit strategies for relating different elements together into a network so that they form an apparently coherent whole.

2.3.2 The ANT Diagram State of Arte: The Map of Controversies

Bruno Latour introduced the map of controversies as a supporting tool for visualizing the results of the Actor-Network Theory.

The word controversy refers here to every bit of science and technology which is not yet stabilized, closed, or "black boxed"; it does not mean that there is a fierce dispute, nor that knowledge has been

somehow politicized; we use it as a general term to describe shared uncertainty. We can define uncertainty about science and technology as a special condition in which the public, the experts but also you are altogether faced with a puzzling condition: "we know that we don't know, but that is almost all that we know" (Callon et al., 2001, p. 40.)

"Controversies is a very general term to describe the fact that we have moved from matters of fact to matters of concern. That is linked to the end of modernism. In the modernist project you could stabilize most of it by saying that the matters of fact part is essentially solved, and then we disagree, but when we disagree it is about opinions, political opinions, religions, art, and so on. But the basis, 90 percent of our world, is matters of fact, and of course the problem now is that the basis has disappeared because every matter of fact is becoming a matter of concern. It is very difficult now to find matters of fact. In the exhibition for Making Things Public, we were actually looking for a way to do a little installation about what we would have called "the last matters of fact." We wanted the installation to be about the last matters of fact, but we could not find one. Every time I was proposing one, in the end, it was not one! Every single factual statement now becomes a matter of concern.

I am sure that this tea, for instance, is immediately associated with poor children in India. So suddenly these poor children in India are attached to your tea. It is the same with scientific issues; they become more and more contentious. The more science extends, the more contentious it becomes, because it is coextensive to whole fields of practice." (Latour)

The map of controversies is an analytical tool that, through the analysis of the process and of both human and non-human actors involved in the project, aims at understanding the final effect of the process in terms of interrelationships between the behaviors of the actors involved.

This project management means tries the traditional practice of imposing standard technique that obstacles the creative process of exploration and exploitation of new ideas.

The identification of the actors is done following the chronological order in which they act and the human actors have the same relevance of the non-human ones. This **equality of treatment of the actors** was one of the reason for that the theory wasn't trusted during the first period, however the managers of the **current days** are aware of the importance of **non-underestimating any type of actors**.

Since the current era is dominated by the "agile" concept, some controversies arose relating to the effective application to ANT in this context. The pillars of the agile management, short time and important features first, look as if they were not supported by this theory which needs a long actors' identification time and a focus on all the main process characteristics. Overcoming this "problem" is

possible if we look at the controversies 'map as a tool for identifying all the characteristics and the right strategy at the conception of the process, during the first development phase.

Talking in general, instead, this tool provides the best result if applied during the phases of initiation, execution, monitoring and control, allowing to define the goals, the risks and the opportunities to be defined.

The development of the diagram available in the literature follows four steps:

1. Identification of the Human and Non-human actors related to the project's development
2. Identification of the position of the actors identified toward the project's realization
3. Creation of the diagram
4. Analysis of the evolution in time of the project

I provide here an example of the traditional diagram's application on a project I developed during the Master studies.

The project aimed at developing a social network on which unemployed designers could publish their work and companies looking for talented people could find them looking at their sketches. The following two tables contain the human and not human actors involved in the project while the diagram will show the forecasted evolution of the project over the time.

The actors' behavior is explained in a chronological order following 7 main phases:

1) Development of the idea

2) Conducting a marketing analysis

3) Hiring the main human resources and acquiring the physical's ones

4) Improving and start gathering clients

5) Starting be known by current and potential competitors

6) Starting gaining money for paying back the loan and end the initial investments

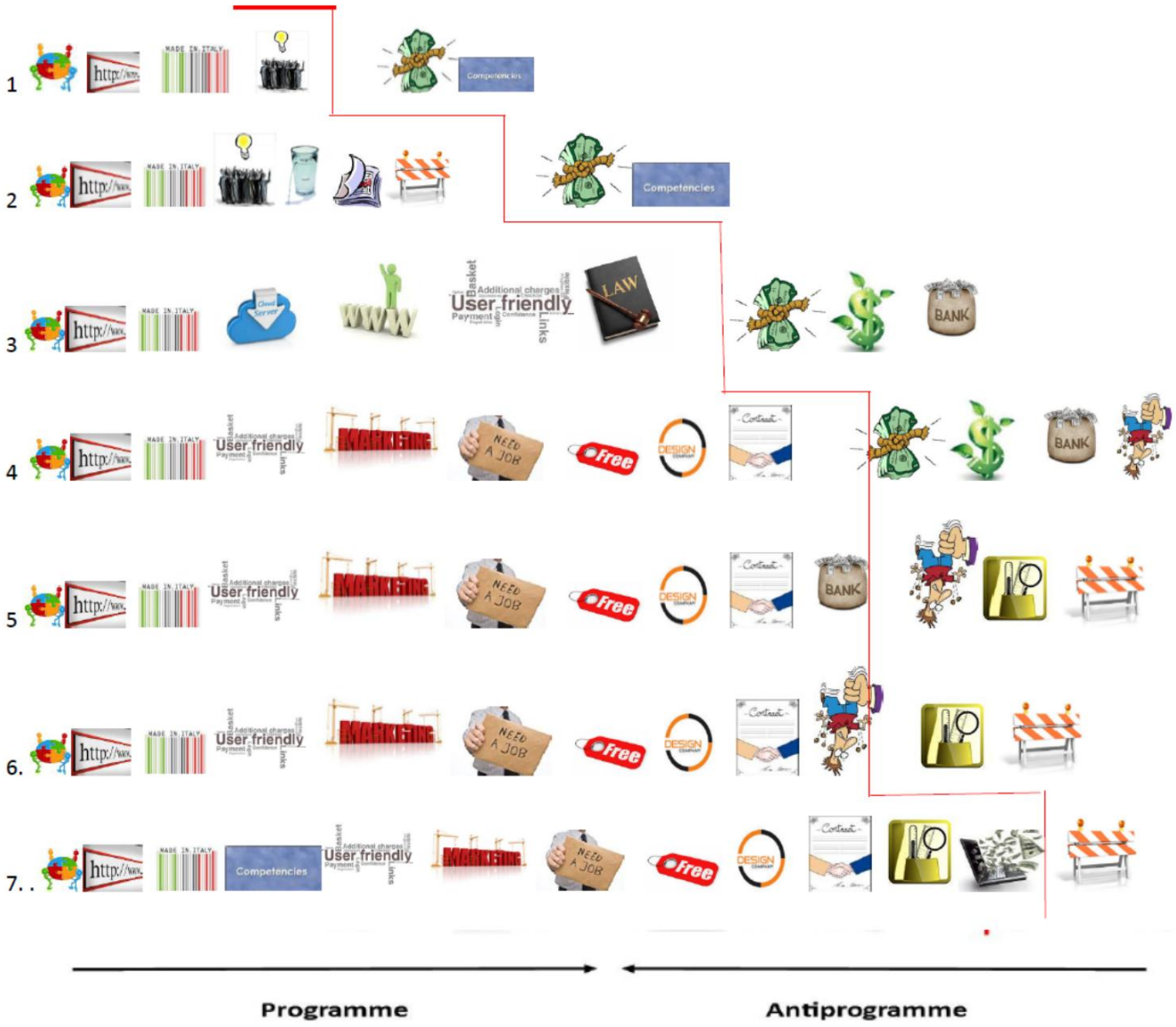
7) Starting gaining a positive profit being known by the main part of the "target clients"

Non-human actors	Role	Interest	Buy in/Hostility	Added /Nuisance value
Marketing Activities	For the project	Sustaining project development	Buy in	Medium added value

				
Need 	For the project	High level of unemployment among young people	Buy in	Medium added value
Website 	Innovation	Realizing something that can satisfy a huge need	Buy In	High added value
Virtual Server 	Innovation base	Supporting the creation of the website	Buy in	High added value
IT Competencies 	Against and then For the project	Supporting the innovation – a lack in the team, it will be provided by the expert	Hostility and then buy in	High nuisance and the added value
Entry Barriers to the sectot 	For and then Against the project	Low entry barriers allow us to easily enter the market but also it will allow the easy entrance to future competitors	Buy in and then hostility	Medium added and then nuisance value
Italy Design Recognition 	For the project	Italy is recognized everywhere as a ”country specialized in design”	Buy in	High added value
Crowdsourcing 	For the project	This methodology allows us to propose a new concept of “ social network “	Buy in	Medium added value
User-friendly Website 	For the project	The social network approach must be easy for everyone, no need of specific knowledge to access and use it	Buy in	Medium added value
Budget 	Against the project	The limited financial resources are a constraints till the starting of the positive profit	Hostility	High nuisance value
Contract 	For the project	The legal contract protects designers from plagiarism increasing users’ confidence	Buy in	High added value
Annual Fee (companies) 	Against the project	The companies have to pay an annual fee but it’s really low	Hostility	Low nuisance value
Free-use (designers) 	For the project	Designers are unemployed so a free use is allowed	Buy in	Medium added value

"Restart Italy" Report 	For the project	The report support the startups allowing us to look for others financial supports	Buy in	Medium added value
Investments 	Against the project	The starting investment are a problem due to the limited budget	Hostility	Medium nuisance value
Profit 	For the project	Positive financial results forecasted from the second year	Buy in	High added value

Human actors	**Role**	**Interest**	**Buy in/Hostility**	**Added /Nuisance value**
Me and my team 	For the project, Innovators	Realizing a new efficient social network	Buy In	High added value
IT freelance 	For the project, help in the realization	Being the first to realize a new social network	Buy in	High Added value
Legal Consultant 	Establishing conditions	Protection of his clients' business	Buy in	Medium added value
Unemployed Designers 	Users	Finding a job through a new way	Buy In	High added value
Companies looking for designers 	Users	Finding talent designers easily	Buy in	High added value
Bank 	Against the project	Financial supporter	Hostility	High Nuisance value
Already Existing Companies 	Against the project	They want to not compete with a new potential successful competitor	Hostility	High Nuisance value



The chronological path starts from the first idea of the website and arrives to the realization of a positive profit from the business.

1.The idea comes from the analysis of the social situation of unemployment together with the recognition of Italy as a country in which the design achieves the highest levels. Doing some researches we came next to the concept of crowdsourcing that we decided to exploit for realizing the project. The really low budget was the main constraint together with the lack of IT competences that we aimed at overcoming working next to an IT expert.

2.Analyzing the market we discovered that the unemployment among young people is really huge and that the State of Italy encourages the birth of startups through some laws. In a report called “Restart

Italy" we found the advantages to develop a startup and possible financial sources. The low entry barriers of the sector due to the "light technology" allowed us to enter the market.

3.After the political and social analysis, we contacted the IT freelancer responsible of the website creation and the legal consultant for realizing the conditions of use of the service provided. The renting of a virtual server together with the needed physicals and human resources required a level of investment that pushed us to ask for a bank's loan.

4. The marketing activities conducted exploiting mainly Google and Facebook allowed us to start gathering the first users: designers-with a free access to the service- and companies looking for designers-asked to pay for a registration fee. The stipulation of a contract for all the users allows designers to avoid the risk of plagiarism and companies to deal with a fair recruitment process.

5.The competitors at this point will be aware of the provision of this new service and there is the risk of a reaction from them. The low entry barriers to the market, moreover, allows other potential competitor to come into and develop their own competitive service.

6. After the very first period, the startup will start to pay back the loan and to invest only in marketing activities and operative ones. The starting investments are concluded and the social network starts to be known from its "target customers".

7.The forecasted analysis of this following period sees the members of the team owning the IT competences necessary to update and maintain the website. The profit of the company starts to be positive and the fee asked to companies won't be a problem since, for them, the service provide will worth it.

The diagram shows a successful path for this project, the team is able to improve internal competences providing a "socially useful tool". The main antiprogramme elements are represented by lack of money but, due to the high sensitivity of the State for it, the team should be able to overcome it.

CHAPTER 3

3 Developing the new framework: The ANT house model

3.1 The open issues in the analyzed literature

The criticism about the actors or better the "actants" (Latour, 1987) involved in the network is supported by several authors and is well described in the article " The riddle of things: Actor Theory and ANT as approaches to studying innovation", by Rejio Miettinen written for the Center for activity Theory and development work research in the University of Helsinki. Miettinen advances **three main criticisms** toward the ANT methodology and, among them, he underlined also the roles of people involved in the development of a project.

1. ANT Subjectivity

One element on which I worked for improving the traditional ANT Diagram is the **absence of a forward looking perspective** that brings to evaluate the forecasted phases of the project's development from a singular point of view, the one of the team involved in it.
The complex nature of the problems a team could face during a project cannot be manage in a so very simplified way. Moreover, although the team will be the one with the higher knowledge about project's features, it could be also the blinder in front of the **project's limitations**!
Being objective when you are dealing with your project is really difficult and the need of an external point of view becomes essential. The **enthusiasm** and a high level of **confidence** are basic requirements for a successful project but can also bring you **out of the track**. I defined the "***question mark** phase*" as the one at which you don't have any resources for forecasting in an objective way the possible evolution of the project in an objective way due to the presence of a problem and/or a lack of information.

The phases before the "question mark" one, are less subjected to the point of view of the author and more representative of the real network relationships, the provision of the third module aims also at maintaining this rational approach.

The AssistANT database has to support the solving of doubts and problems faceable by the dedicated team during the project's diagram development. The idea is built on the model of the database provided by TRIZ.

Analyzing the contradictions and the related solutions proposed by TRIZ in the TRIZ Matrix (see the related paragraph in the literature review), I found that the **methodology** is mainly **focused on the operative activities** and physical characteristics of the objects involved in the phases.

The aim of this function is to provide **a similar database** moving the focus toward the managerial point of view and in particular **on the steps involved in the development of an innovative project.**

2. Silent Actors:

The asymmetry in the research of symmetry

According to his point of view, shared by several others, "ANT has difficulties **selecting the relevant actors** and structuring the **analysis of relationships** between them. At this point ANT faces the same problem as positive empiricism did: **how is it possible to decide what is important and essential and what is not without theoretical preconceptions**? This problem leads to another one, the problem of **silent actors**. […]It seems as if **in the empirical accounts of innovations the most prominent actors, those speaking loudly, tend to be selected**: innovators, managers, and politicians, the princes of network construction […]. The work of engineers and users remain marginal. […] Consequently **the contribution and resistance of nonhuman elements also remains marginal** and is involved in the analysis mainly as a rhetorical resource used by human actors in the controversies." (Miettinen, 1999)

From this point of view ANT is blamed as being **amoral:**

"Morally, the accusation has been that ANT is amoral and apolitical: silent on the **unequal distributions of power** that enable some translations and then networks to dominate over others"

"*Star presents an influential critique of the network mode of thought. She argues that the ANTers see only through the eyes of the powerful, and that they base their studies on actors who have the power to ally themselves with others, build networks and empires, in other words, entrepreneurs. They follow the actors, but only those with the power to make their will prevail. Star criticizes the ANTers, as previously mentioned, for not seeing more than one part of this world. ANT loses sight of those who perform the invisible work of maintaining the networks, for there are many groups involved in maintaining and protecting networks. It also loses sight of the invisible work that consists of building an identity on the margins of, or in relation to, several networks where others build and hold the power*". (Kristin Asdal, 2007)

One of the most original and applauded features of ANT, the overcoming of the duality between human and non-human actors, was the result of a research of symmetry in the networks of relationships in which we are immersed. The problem of the silent actors has, therefore, a huge significance since it surreptitiously reintroduces asymmetry into this diagram.

3. The ANT Diagram as a BLACK-BOX

The building of the diagram contains another contradiction. Latour, when he spread the diagram among his students, defined it as "just a description" however the easiness in this case is only apparent. The complexity hidden by this definition comes from "just" put next to a real difficult action: the description. Providing a description means being able to transmit the essence of what you are looking at. In describing the network of actors the ANT diagrams sacrifices objectivity for the sake of simplicity.

The diagram thereby becomes a static **black-box in which all the actors chosen are put on a line without any consideration about the depth of their interactions.**. The network that links the actors is provided only visually without any study about the nature and their characteristics of them.

There are no actions made for understanding what happens inside that alignment of "powerful voices", ANT closes the box too early losing a huge amount of information that could bring to a better understanding of the alliances, negotiations, controversies that are hidden by the one-dimension of the traditional diagram.

"*The problem is that researchers do not know how to differentiate networks from other frameworks and as such rely on an evaluative model that is dependent on inputs and outputs. In practice there is nothing wrong with this. A thorough review of network inputs (individuals, money, and infrastructure)*

and outputs (publications, patents) is essential for gauging the effectiveness of any given network. But, ***this particular approach disregards both the idea of network as process and the formal structure of networks****. It is assumed that successful networking is key to the success of a network as measured by outputs****, but there are no tools on hand to evaluate what actually happens within a network.*** *If we reduce evaluation to inputs and outputs both the form and the process of a network are, at best, loosely related to the primary evaluative concerns. In short, the evaluation of research networks emphasizes everything but the network itself.[…] ANT can potentially open up new avenues of network evaluation by* ***examining****, first, the heterogeneous* ***associations that constitute networks****. And second, by* ***paying*** *closer* ***attention*** *to* ***how networks are performed*** *instead of attempting to provide a snapshot of a network based on inputs and outputs*" (Cressman, A Brief Overview of Actor-Network Theory: Punctualization, Heterogeneous, 2009)

The definition of actors provided by Latour and shared by other authors in the literature is not related to the "humanity features" of it but with its involvement in a network of translation.
Translation is main mechanism that creates and sustains the networks and being part of this chain defines the "actor".
"*It is not a given who can be actors in technological development and which characteristics they possess, ANTers argued. People, technology and natural phenomena can all be components in materially heterogeneous actor-networks and take on the role of actors*." (Kristin Asdal, 2007)

The way in which actors can influenced each other, build alliances, negotiate is an important source of knowledge for whoever is going to develop the diagram. The main feature of a problem, as already said, is the **uncertainty** and in the networks of actors in the moment of forecasting, the key element that represents the uncertainty are the **controversies**.
Having a clear idea about the links among the actors instead of only putting one next to the other in a line, it is surely a powerful way to gain **reactivity** and **avoid waste of resources**. Moreover, it will bring one to have a better idea about the actors and so a better idea about how to **exploit** possible **alliances and negotiations.**

3.2 The new framework: the ANT House Model

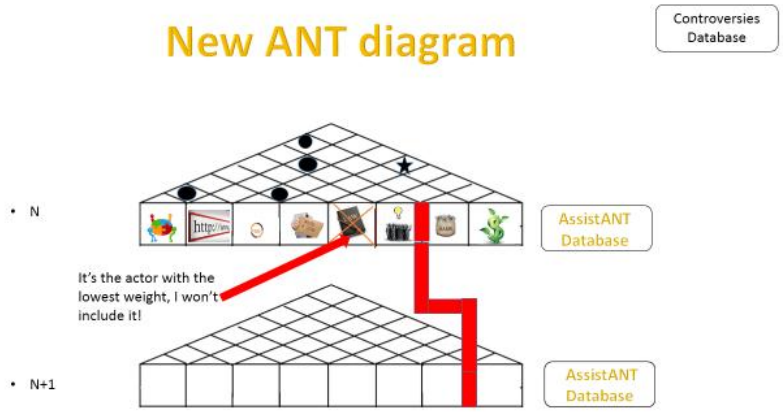
The new framework proposed in this thesis aims at overcoming the three main gaps found during the ANT literature analysis. The first two open issues analyzed, the silent actors and the black-box nature of the diagram, are overcome by proposing a ***new 3-D quantitative-nature diagram: the ANT House Diagram*** (picture23) .The structure of the ANT House Diagram comes from a powerful tool used in Quality Management, the House of Quality.

The development of the diagram follows two main steps: the filling in of the "House of the Actors" and the subsequent creation of the diagram itself.

The subjectivity characterizing the traditional ANT Diagram is, instead, overcome through the ***AssistANT database,*** a tool exploitable also outside the ANT context. The database will be a problem-solving means for supporting managers in finding a solution to every possible problem faceable during an innovative project's development.

The values added by this new model of diagram are several:

- The absence of silent actors
- A quantitative way to evaluate the actors to be inserted in the diagram
- An evaluation of the actor-to-actor relationships that allow the forecast of controversies.
- The development of a tool usable also outside the ANT context



Picture 23 The new ANT 3d diagram

3.2.1 AssistANT Database Development: Overcoming the ANT Subjectivity

The absence of an external and/or objective point of view is a basic gap for ANT or, more in specifically, for the ANT diagram. The development of a diagram from the only perspective of the project creator is not realistic and surely brings one to look at the project development in a filtered way.

The need of innovative ideas is always a solution in a period of stalling for firms of all sectors and being able to innovate is not easy at all.

At the base of the innovation there are some pillars that companies have grown to understand during these years, making them their competitive advantage.

The database proposed is a tool useful in two main moments of an innovative project's development:

- the first moment of the definition of the main idea of the project
- the "question mark" moment in which the team cannot forecast the next sequence/actions or stops being objective and in doing so starts providing personal points of view not linked to concrete resources and sources of information.

The project management tool analyzed here is a database that for each possible phase of the project development provides generic solutions for overcoming the possible related problems the manager could be meeting. The main idea is to provide a dynamic dimension to the diagram, involving the firm in dealing with general solutions that altogether have to adapt to their specific case.

The difference with the previous diagram is huge, not only in terms of contents but also in term of basic principles: we pass from a **static map of controversies** around the development of a well-defined objective to an iterative project development that brings all people involved to reflect on it thus dealing with "real-reality" instead of "fictitious-reality" filtered by their point of view.

The idea of the database comes from the 40 innovative principles provided by the TRIZ matrix , that aim at solving all the possible controversies a project manager can meet when he wants to improve a feature preserving another one (nature of the controversy). Analyzing the TRIZ model I found that the nature of the controversy has mainly **an operative nature**, so my aim is to provide a model that deals with **managerial problems and solutions**.

The potential of the solution provided by the database depends of the capability of the manager to adapt it to his specific case. As I said before, **flexibility** is the keyword of our days.

The program used to develop the database is Microsoft Access and the private nature of its license doesn't allow to export the tool as an independent program.

The AssistANT's development in this work, follows two steps:

1. Personal definition of "innovative project" and comparison with the phases defined in the literature
2. Database creation figuring out general problems and general related solutions through the study of journals, articles, books and case studies provided among the references

3.2.1.1 The Innovative project definition: Database Starting Hypothesis

The creation of the database is founded on a basic hypothesis that involve also a personal definition I provide for the "innovative project".

The traditional project is generally the result of a planned path toward an identified objective.

Among the previously mentioned main differences between traditional and innovative projects, we found the absence of a clear objective. The impact of it is really high and brings to deal with a starting point for the project different from the one of non-innovative projects.

The networks in which innovations are immersed are far from the closed concept of project developed in traditional terms.

"*One assumes that innovation is a **stand-alone concept** which works well independently. In reality this is not true. To convert a good idea into a profitable product/service a lot more input from **different people and different perspectives** is required. Making innovation happen is about bring people or teams together in a creative and productive manner*. […] *building, maintaining and developing **networks** becomes the key issue in the process of innovation*." (L. Panduwawala, S. Venkatesh, P. Parraguez , X. Zhang , 2009)

The following hypothesis has the role to provide a clear vision on how I consider the starting phase of an innovative project in this work.

An innovative project is defined as a project realized as an answer to an unmet and unarticulated market need. The answer will be developed in an "open environment" built for the innovation made by networks of interacting human and non-human actors.

The final result will be the learning came from the path of development in a form of discovery not only for the market but also for the actors involved in the project development.

The latent need will be treated as a "problem" and the process toward which the team will identify and realize a "suitable solution" will be iterative, following the feedbacks provided by the external world.

Network, Iteration, Openness, Learning and Uncertainty are the keywords of a project that can be defined "innovative".

The development of an innovative project cannot be undertaken without a previous **spread of the culture of innovation** that should be driven from the top throughout all the levels of the company. The potential of this approach has to be understood by everybody since the best ideas can come from everyone and everywhere.

The process of **innovation has to be methodical, organized and systematic**. As for the traditional projects is important to trace the progress using metrics and **is also important to stimulate employees linking a system of bonuses to innovators.**

The best ideas coming from both, outside and inside, have to be **rewarded** in an "economic" or in a "social" way and they also have to be financially sustained without putting boundaries to the innovation realization.

The process of innovation can be assimilated to the one of an "idea factory" (Robert B.Tucker) in which the ideas generation and screening constitute the input, the feasibility study, scheduling implementation the throughput and the marketing and post-launch phase the output.

Following the factory's model, not one idea that is not labeled as "good" will be labeled as "bad", this concept contains the core of agile methodologies, namely iteration. Going on with the project development the firm can realize the unfeasibility of the idea chosen or the acquisition of new information can lead to revaluate previous not-chosen ideas. Moreover, the path done to generate those ideas will be part of the firm's knowledge so no efforts will be useless!

The aim of the database is to guide the firm toward a path of learning that will result in a dynamic, interactive and challenging process but, independently from the final result, it will bring growth.

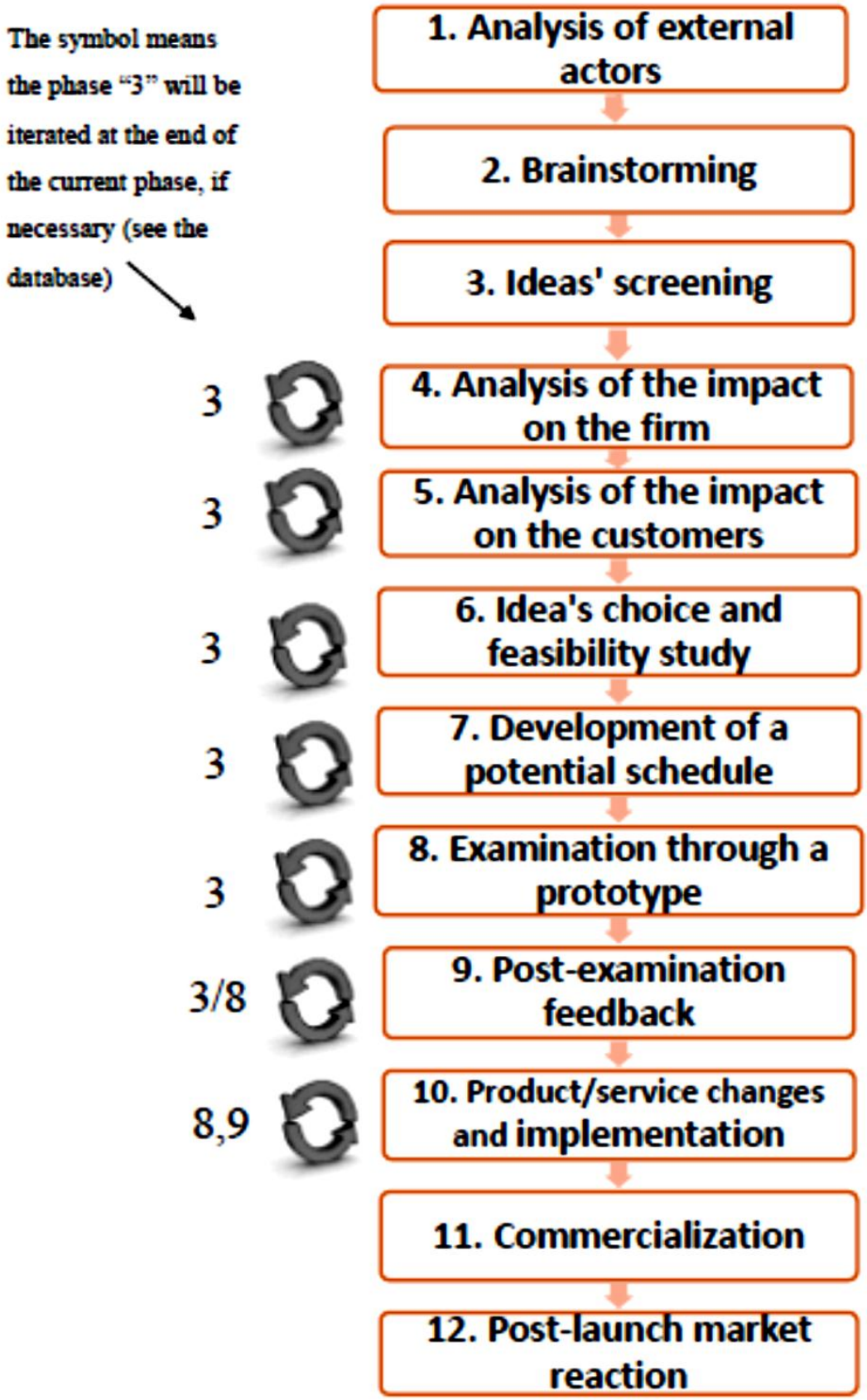
Starting from the input of the "ideas factory", the absence of a well-defined objective and the uncertainty about the environment in which the firm is going to operate, slows down the speed of the project if we compare it with the "project conception and initiation" phase that belongs to traditional projects.

The iterative nature of this learning process is included in the name I have given to this group of activities: "Potential solutions identification".

Although the main structure of the phases is similar to the traditional cycle one, these are built with a different perspective, taking into the background the essential concept of ANT, open innovation and agile project management.

In the following pages I will start by outlining the phases included in the database, mention the principles which were involved and then provide the complete Database of Problems and Solutions.

Picture 1 1 *Visualization of the Database's structure*



Going more into details, the group of activities for an innovative project's development with the relative phases are the following:

Input Idea Factory

1. Potential Solutions Identification
   - *i)* Analysis of the external actors
   - *ii)* Brainstorming
   - *iii)* Ideas Screening

Throughput Idea Factory

2. Project feasibility
   - *iv)* Analysis of the impact of the idea on the firm
   - *v)* Analysis of the potential impact on the customers
   - *vi)* Analysis the feasibility of the idea

3. Project plan
   - *vii)* Development of a potential detailed schedule

4. Prototype and Implementation

The selection of an alternative leads to the concrete realization of a first prototype of the identified solution. This is an iterative phase that will be performed several times on the basis of the feedbacks received by the users and the stakeholders, and the possible competitive solutions generated in the meantime.

Related phases:

- viii) Examination through a prototype
- ix) Post-experimentation Feedback
- x) Idea changes and full-project implementation

Output Idea Factory

5. *Project launch and market analysis*
   xi) Project Commercialization
   xii) Post-launch market reaction

3.2.1.2 Database Building

The practical building of the database is the result of the identification of:

-General problems faceable during a specific phase

- General solutions related to the identified problems

The main difficulty at this point is the necessity to be as more general as possible since the users of this module as of all the work, can belong to all possible sectors and firm's size.

The first phases of the project will be based on the learning process that belongs to the PROTEE methodology(see the literature review). The agile project management will be applied for achieving the right level of flexibility needed in innovative turbulent context.

The path toward the project realization has to become a process of growth for all people inside the company, it has to be part of the firm's strategy instead one a standing alone objective.

3.2.1.3 Database General Problems

The identification of the problems is made from a managerial point of view, dealing with the possible obstacles that can stop a firm during its project development.

The analysis of the case studies, the traditional project management obstacles, the characteristics of the innovation's environment, the already mentioned theories and methodologies together with my experience with the projects developed during my Master in Management Engineering, were the main sources for developing this section.

In the next paragraph the identified problems will be analyzed deeper together with the related general solutions.

Phases and related general problems:

xiii) Analysis of the external actors

- Looking for the value the market is missing
- Involving the right actors an gathering potential successful ideas' sources
- Not being sure to know all the possible actors that could contribute more in your analysis

xiv) Brainstorming

- Undervaluing proposals from people in the firm
- Finding difficulties in putting together internal and external inputs
- Not being able to trust the external worlds
- Facing difficulties in merging different evaluations on an input's potential
- How to start the brainstorming process

xv) Ideas' screening

- Not being sure about how to screen ideas
- Finding different evaluations on the same alternatives from different actors
- Not being sure about considering all the pros and cons of each alternative
- How to choose potential successful innovation' ideas

xvi) Analysis of the impact of the idea on the firm

- Undervalue the knowledge of other people
- Being aware about the internal level of knowledge
- Not having the related experts
- Having an incomplete knowledge

xvii) Analysis of the potential impact on the customers

- Inability to choose the right group of external actors for testing the concept
- Doubts about choosing the right impact assessment methodologies
- Inability to transmit the potential of the idea

xviii) Idea's choice and feasibility study

- Choosing the right parameters for making the right choice
- Underestimating the related costs
- Underestimating the needed human resources
- Underestimating the needed time
- Underestimating the practical feasibility of the idea
- Not being aware about the impact on the other products realization and/or development
- Not having enough resources

xix) Development of a potential detailed schedule

- Having different ideas about the plan realization
- Realizing a good plan

xx) Examination through a prototype

- Realizing a successful prototype
- Not being able to follow the project steps of idea realization
- Understanding that you don't have enough resource for the idea's implementation
- Defining the testing group of people for the pilot

xxi) Post-experimentation's Feedback

- Not gathering fast feedbacks

- Understanding the prototype is not successful
- Not being aware about how to gather and analyze the feedbacks
- Not using the feedbacks received properly

xxii) Idea's changes and full project implementation

- Not implementing the necessary corrective actions on the base of the received feedbacks
- Making ineffective changes
- Facing an unforeseen problem

xxiii) Commercialization

- Understanding the right instruments
- Understanding the right channels

xxiv) Post-launch market reaction

- Not achieving the expected results
- Seeing a decline in the market results
- Deciding which strategy should be adopted after the innovation launch

3.2.1.4 Detailed Analysis of the Database: The nature of the General Problems and the relative General Solutions

This part of the work contains the practical explanations of:

-how I chose the problems listed before

-the general solutions I figured out for helping all kinds of firms to overcome them.

-the screenshots of the electronic version of the database in the form of an application .exe

The analysis will follow the phases order, going activities by activities.

INPUT OF THE IDEA FACTORY

1) Analysis of the external actors

The starting as also all the further phases of the project are looked with the prospective of the open innovation and the Actor-Network Theory. Looking at external actors is a first step toward the development of a dynamic project development in which the static close internal thinking is substitute with fresh values coming from the external

The involvement of external actors - human and non-human (ANT) - in the innovation process is not only a source of competitive advantage but also a matter of firm's survival. In the current changing world firms understood the high value added by the collaboration with actors outside the company or, better, the value derived by their involvement during the projects' development.

The development of traditional projects was focused on the efficiency instead of dealing with the effectiveness of the project's development .The system in which companies worked didn't have any interactions with the outside where, instead, there are the main sources of potential brilliant ideas and also the main judgers of the projects' results.

If we ask to a customer to think about an innovative product/service, maybe he wouldn't be able to provide an answer but the analysis of what he is missing in his life can be a huge source of new ideas' generation. It's possible that firms that used to deal with traditional project management's methodologies feel lost and also don't trust this new open environment, as it's possible that startups updated about these last " projects development' needs" are not able to figure out a way to practically "satisfy" them.

Next to the exploration of the world of unmet and latent needs, companies exploiting tools as crowdsourcing, co-creation or institutional platforms can also gather clever ideas for solving an already defined problem or to develop an incremental innovation on the base of an already existent product/service.

A brilliant example of the power of this involvement is represented by Procter&Gamble ***Connect&Develop*'s department** (See the literature review).

On the basis of these concepts I figured out the following potential general problems (P) and the relative general solutions (S):

(P)	**Looking for the value the market is missing**
(S)	➢ In case of **incremental innovation** analyze the actors involved in the previous version of the product/ service. Look for actors, human and non-human, connected with "**adjacent markets**". ➢ In case of radical innovation look for **lead users, visionaries** and **serial innovators**. Use the following tools for dealing with the actors you are more interested: • Contact them exploiting a **proprietary network** together with an **open network**. • Develop a **platform** for collecting ideas both for solve a problem proposed by the firm and start a **new project.** • Spend time with your **key customers**
	My Starbucks Idea: It's the website where Starbucks does its business crowdsourcing from more than over 3 years now. It encourages customers to submit ideas for better products, improving the customer experience, and defining new community involvement, among other categories .Customers can submit, view, and discuss submitted ideas along with employees from various Starbucks departments 'Idea Partners' • . The company regularly polls its customers for their favorite products and has a leaderboard to track which customers are the most active in submitting ideas, comments, and poll participation. The site is at once a crowdsourcing tool, a market research method that brings customer priorities to light, an on-line community, and an effective internet marketing tool. **Coca-cola Freestyle:** One exciting innovation is the FreeStyle machine, a new generation of fountain dispenser. Offering over 100 products, it enables any kind of flavor mix, creating new and unique flavor combinations. It's a big shift: out of manufacturing and into equipment innovation to enable consumer co-creation and customization. The individualized consumer experience with the products is a key Millennial expectation. The new mobile app lets consumers save all their blends, so any Freestyle machine will know their favorite flavor combo. Data based on user feedback on the Freestyle, combined with technical monitoring which provides Coke with insight on product, consumer engagement and new dispenser opportunities. It is real-time consumer co-creation with the potential to develop completely new markets for the company. – Avi Dan on Forbes

	"A solution reward is important in the early stages of an innovation process because at this stage customers are unlikely to benefit directly from their contributions through new product availability within a short time frame.[…] rewards or recognitions are not given to everyone submitting an idea, but only to those with the "best" submissions. This competitive mechanism is an explicit strategy to foster customer innovation. It should encourage more or better customers to participate, should inspire their creativity, and increase the quality of the submissions."

(P)	**Not being sure to know all the possible actors that could contribute more in your analysis**
(S)	• Look for **actors indirectly linked** to your project and analyze the possible **alliances** you could build with them • Look **periodically for new customers** you haven't done business with yet and look again at the previous customers you did business with in the previous years.
Real Case	*"[…] Most organizations have a fixed idea of who their customers are. But if you expand your definition of customer, you can also expand your ability to generate winning ideas.* *The medical products division of Holland-based Philips Electronics assumed its customers were doctors in hospitals, since they were the ones making decisions about medical supplies. But Philips managers looked more deeply at changes in the health-care industry and saw that more services were being provided in nontraditional environments, such as outpatient clinics, homes, and even on the street for homeless people.* *By asking themselves what these customers in non-hospital environments might need, Philips came up with such products as a stethoscope with improved acoustics to filter out voices, traffic, and other background noise, making it easier for caregivers in chaotic settings to hear heart murmurs or breathing problems.[…]*" - Robert B. Tucker From "Seven Strategies for Generating Ideas" (http://www.innovationresource.com/resources/seven-strategies/ , s.d.)

(P)	**Involving the right actors and gathering potential successful ideas sources**
(S)	Define your "right customers", the one that will provide you a different wide view on new potential solutions development. Possible involvement tools: • Crowdsourcing platform • Co-creation communities (definition of a problem and implementation of the related solution) • Co-design toolkits (definition of a problem and of the relative solution) • Develop a reward system for the best ideas, social or economic • Develop content-creation competitions with prizes or free products/services • Led Users workshops • Say thank you
Real Case	*"P&G's proprietary networks include its top 15 suppliers, who collectively have 50,000 R&D staff. It created a secure IT platform to share problem briefs with these suppliers—who can't see others' responses to briefs. P&G's open networks include NineSigma, a company that connects interested corporations with universities, government and private labs, and consultants that can develop solutions to science and technology problems. NineSigma creates briefs describing contracting companies' problems and sends them to thousands of possible solution providers worldwide." (L. Huston and N. Sakkab, 2011)* *"I spend 4/5 days per month to talk with customers, 2 days per month I host town-hall meetings with several hundred customers to share ideas on GE's direction and listen their thoughts. We are doing "dreaming sessions" with key customers thinking our business in 5-10 years. We ask to customers :* *<< If you had $400 million to spend on GE's R&D, how would you prioritize it? >> "* *-CEO General Electric Jeff Immelt,* *Interview for Fast Company, 2005*

2) Brainstorming

Looking at external actors is only the first step toward the generation of the "potential right ideas".

The next step is the internal brainstorming around the main values came from the previous analysis.

The output of this phase is the proposal of several ideas aim at solving a problem figured out through the "analysis of the external actors", and that could be well or not clearly defined.

This internal activity must involve should involve the highest possible number of people inside the firm since the best ideas can come from everybody. Moreover it's important that the top management sustains this phase in order to guide the organization into an innovative environment. Traditionally the top management's role was to distribute jobs and check their accomplishment but this static approach to project management cannot stand the turbulent field of innovation.

Traditional schemes can be an obstacles and so a problem in this activity and must be overcame. The more the view will be wide, the more the minds will be open, the better the results will be.

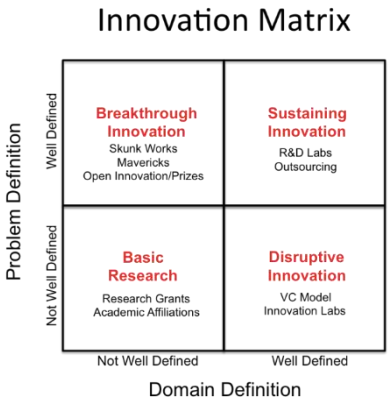
The possible problems (P) the firm could face during the brainstorming and the general solutions (S) proposed in the database are:

(P)	**Undervaluing proposals from people in the firm**
(S)	• Spread the culture of sharing and participation inside the company based on the concept: Innovation comes from everyone and everywhere. Each person inside the company must be involved in the innovative process also because people with different backgrounds, experiences, skills have different points of view. • Find a way to extract the tacit knowledge and to spread it inside the firm in order to leverage the knowledge's level increasing the trustiness among people.
Real Case	"[…] Internally Virgin also sources business plans and ideas from employees. Once a **flight attendant** had an idea. It got presented to the CEO and before long she had a considerable role in starting up **Virgin Brides** (which beyond being a fantastic idea didn't quite work out in the market place). It's incredible that a flight attendant can have an idea that makes it that far in a company!" (Idea generation-Virgin Case study)

(P)	**Facing difficulties in merging different evaluations on an input's potential**
(S)	• **Document** all the possible points of view on the input • Ask for the main **reasons** of that evaluation • Evaluate the **source** of **that input** • Eliminate input that will bring to develop **"white elephants**" • **Challenge** ideas that looks "easy to be realized" • Ask for **risky analysis** of the input and **possible network alliances** that could be built

(P)	**Finding difficulties in putting together internal and external inputs**
(S)	• The external inputs must be evaluated understanding what the external actors are missing. • Clean the input from all the peculiarities of the actors and of their environment, looking for the main value that is missing. • The behaviors of the external actors, mainly the one of the visionaries, should guide you toward what they are looking for. • Don't expect to find the idea, you have to figure out a new meaning or a new product and bring them to need it.

(P)	**How to start the process**

(S)	• . The first step that must be taken is understanding how well the problem is defined. Often is not easy to have a clear idea in mind of what you want to achieve but, in order to not waste efforts, at least the nature of the problem must be known in order to understand the main resources that will guide you to solve the problem. • The use of tools like the "**Innovation Management Matrix**" (http://www.digitaltonto.com/2012/4-types-of-innovation-and-how-to-approach-them/, s.d.) can help you in defining toward which kind of innovation you are going and what resources you should exploit for solving your problem . .  **Picture 24 Innovation Management Matrix**[3]
Real Case	*"If I had 20 days to solve a problem, I would spend 19 days to define it."* - Albert Einstein "*When Steve Jobs first envisioned the iPod, it was simply a device that allowed you to put "1000 songs in your pocket." That meant you needed to have a certain amount of memory fit into certain dimensions. Those were difficult problems that took a few years to solve, but it was pretty clear what was involved and who was capable of solving them* " (http://www.digitaltonto.com/2012/4-types-of-innovation-and-how-to-approach-them/)

[3] See the appendix for further information about the Innovation Management Matrix

(P)	**Not being able to trust the external world's ideas**
(S)	The problem underlines a not-spread culture of open innovation. All people inside the organization must be aware of the benefits related to it. Events -as seminars- with companies that made of this culture their competitive advantage could develop some trust toward the external world.
Real Case	"*Managers tend to discount the advantages of open innovation for two main reasons. First, many managers worry that innovation contests will get in the way of collaborative innovation. Second, they tend to think that open innovation doesn't work on anything but very narrow technical problems. In both cases, they are mistaken. In terms of undermining collaboration, we found that contests can be designed to allow (if not encourage) "coopetition" among tournament rivals. This was the case with Netflix's $1 million contest to find the best algorithm for recommending movies to its customers. The winning entry represented the efforts of two competing groups that merged late in the contest — a maneuver that prompted other participants to pool their resources as well. Indeed, throughout the contest, rivals were freely sharing knowledge and often merging into new teams of competitors."* (Andrew King and Karim R. Lakhani, 2013)

3) Ideas' screening

The ideas generated during the brainstorming are scanned have to be scanned in order to select the "potential successful" ones. The process should involve a heterogeneous pool of experts and the ideas have to be selected using the "learning criteria" that means basing the evaluation on the level of learning the idea could provide, instead of on its rational possible feasibility (PROTEE Methodology- See the Appendix).

The main problems I identified during this phase are:

(P)	**Not being sure about how to screen ideas**
(S)	The screening process must be a result of merging internal and external proposals.

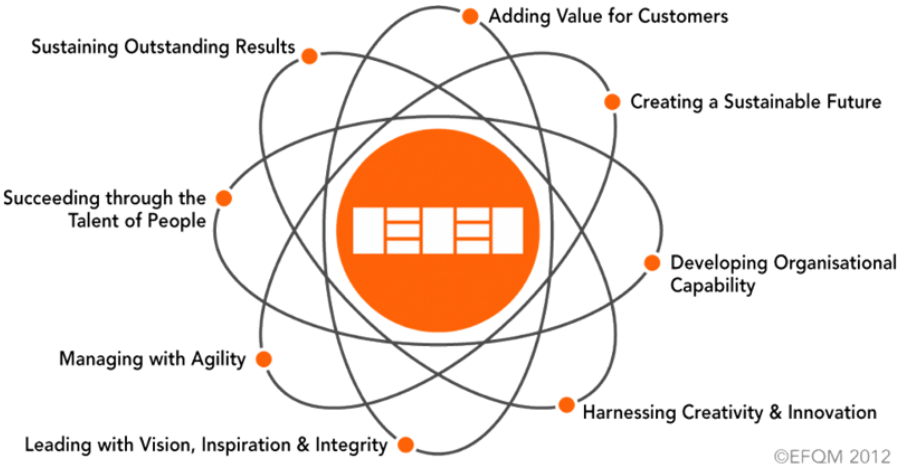
	• **Analyze the external ideas and extract the main values on which they are based.** Then scan the ideas resulted by the brainstorming using also the "external point of view", trying to merge the external and internal values. • **Distribute the main ideas** in the company through interactive real-time platform • **Involve** the highest possible number of people with a different background. A **bigger heterogeneous set of judges** • Use the **PROTEE Methodology** for eliminating **"white elephants" and** understand the value **of "hopeful monsters"** • Evaluate the possible oppositions to the project realization and the willingness to negotiate (PROTEE Methodology-literature review)
Real Case	"*At P&G, product ideas are logged on P&G's online "eureka catalog," through a template documenting pertinent facts—such as current sales of existing products or patent availability for a new technology. The document goes to P&G general managers, brand managers, and R&D teams worldwide. Product ideas are also promoted to relevant business line managers, who gauge their business potential and identify possible obstacles to development*." (L. Huston and N. Sakkab, 2011)

(P)	**Finding different evaluations on the same alternatives from different actors**

(S)	• The differences in evaluation must lays on different points of views of the idea. The top management must guide different people in understanding the others points of views. Each "evaluator" must explain to the other ones his position, providing his idea's prospect on the long term. Often, obstacles look **insuperable only in the short term.**
	  • The top management must spread an important basic value of the open innovation's culture: the **risk management**.
	  • The evaluators during their explanation, must underline their position in front of the risk and, the risk adverse ones **must be guided toward a risk taker behavior** together with all the company.
	
	Apply the **PROTEE approach** to ideas screening:
	
	• **Document each judgment** to avoid arbitrary
	• Ask for the **reasons for rejecting** an idea
	• Be sure that the evaluation is based using a **learning perspective** (What is the value that the idea will bring in term of learning curve?)

	• Eliminate judgments based on the statement :"It looks **rational** so it will be feasible"

(P)	**Not being sure about considering all the pros and cons of each alternative**
(S)	• The pros and cons of each alternative must be evaluated **on the same period of time**. • The position in front of the risk management must be **the "risk taker" one**. • The evaluation must be done performed **on the long term** including a forecast of the competitors' reaction toward the idea introduction. • The evaluation must be done by **a heterogeneous large group of people instead of a one person** or a restricted **homogeneous** group.

(P)	**How to choose potential successful innovation' ideas**
(S)	• The innovation in order to be successful should be able to **create new goals** that nobody looked at before, satisfy latent needs still unmet and unarticulated. • The definition of the goal has to **be supported** by the contemporaneous creation of a **new group of people, the target** of the innovation. Exploiting the **"Excellence Model"** evaluate the potential impact of the main ideas on the points of the model[4] 

[4]See furhter information inside the literature review

4) Analysis of the impact of the idea on the firm

The screening of the ideas has the aim to provide a first selection of the potential right ideas in order to evaluate their possible impact and feasibility. These steps can be really expensive and time consuming so they cannot be performed for all the ideas generated. The iterative nature of the innovative process could bring analyze later the impact and feasibility ideas not-selected in the first screening due to a different level of knowledge and/or context conditions.

Analyzing the impact of an idea realization on a firm includes a lot of activities, from the financial to the marketing, production divisions and so on. The reliability of the evaluation is really important since the development of ideas with a negative impact could bring to the firm's failure while the non-selection of a potential positive impact one can increase the advantage of competitors and bring the firm to lose a potential successful possibility. The study of the potential solution can bring to discover that the firm cannot stand it in terms of knowledge and resources as it's possible to see among the identified problems:

(P)	**Not having the related experts**
(S)	The open innovation allows to rely on **external sources of knowledge,** enlarging the base of the company itself.
Real Case	"*Dell has grown at an 89 percent compounded rate for some years, achieving $700,000 of sales per employee in its fast-moving, competitive business. Dell concentrates its own resources on a superb customer knowledge and support system downstream and a shared information system that deepens its relationships with suppliers upstream. Outside suppliers provide virtually all Dell's componentry design and innovation, software, and (non-assembly) production for its computers. It invests only where it sees an opportunity for unique value-added and avoids the huge*

	inventory, facilities, and development risks assumed by more integrated competitors or supply specialists" (http://sloanreview.mit.edu/article/strategic-outsourcing-leveraging-knowledge-capabilities/)

(P)	**Being aware about the internal level of knowledge**
(S)	Before starting with the analysis you **must be aware of the level of knowledge** of the company. A lack in the **knowledge can be overcame with the external one but first of all must be detected**, otherwise a potential successful idea can be translated in a failure providing also idea's input to your competitors. Analyze the past failure projects that were based on the same "knowledge field" of your current idea and try to figure out what your company is missing. Analyze also **the failed products of your competitors** that share the same knowledge of your current idea. Try to understand **what they missed and if your company has the same lack of knowledge**

(P)	**Having an incomplete knowledge**
(S)	• Study the knowledge on which the idea is supposed to be developed, **compare** possible **similar field of knowledge** with the one of realized products both yours and of competitors. • **Discuss with suppliers** about the needed knowledge, the risk of spillover exists but **you should be in any case a risk taker!** **The "translation of the interests"** is a key element that allows you to transform **"a claim into a matter of fact (Latour, 1987).** In order to "spread out in time and space your black box […] you need to do two things at one: • To enroll the others so that they participate in the construction of the fact • To control their behavior in order to make their actions predictable […] The easiest mean to enroll people in the construction of facts is **to let oneself be enrolled by them**. By **pushing their explicit interests**, you will **also further yours**. You need no other force to transform a claim into a fact; a **weak contender** can thus **profit f**rom a vastly **stronger one** […]" (Latour, Science in Action, 1987)

Real case	"*P&G developed a knowledge sharing solution, **Innovation net**, that provides access to 18,000 knowledge workers at P&G from the R&D to the Patent/Legal and Business Information systems The main function of innovation net is to allow users to catalogue, locate and maintain employee knowledge. This provides employees with the ability to take immediate action when required*." (L. Panduwawala, S. Venkatesh, P. Parraguez , X. Zhang , 2009)

(P)	**Undervalue the knowledge of other people**
(S)	• **Everyone has a knowledge**, it can be based on academic studies, personal experiences, interests and so on. The value that each person can add to a new project **cannot be related only to the position inside the firm.** • Define methodologies for **extracting tacit knowledge and sharing** the explicit knowledge • Evaluate the impact of everyone inside the firm. • Support the creation of **interactive projects** that involve team made by people with **different backgrounds**

ITERATION OF THE IDEA GENERATION AND BRAINSTORMING IN CASE OF LACK OF INTERNAL RESOURCES

5) Analysis of the potential impact on the customers

The previous analysis, since it's related the internal perimeter of the company, although can be difficult and can bring to negative results, it's easier to be carried out.

The analysis of the potential "market response" to the idea's realization it's more critical and difficult. The aim of this phase is to understand the potential reaction of customers to the new idea, if the customers will find a useful way to exploit it, if they will be able to accept it.

The analysis id done on a group of external actors providing them full information about the concept developed and analyzing their reactions to it.

On the basis of this phase's explanation, I figured out the following potential problems (P) and the relative solutions (S):

(P)	**Inability to choose the right group of external actors for testing the concept**
(S)	• Look for the **"visionaries"**[5], the actors that live in a proactive way, anticipating the problems and finding their own solution not used by others yet. • Focus on lead users[6] , innovative companies, scientists that always challenge themselves and their knowledge. Go far from off the shelf solutions, methodologies and approaches to problem solving and instead go to those who look for new ways, new paths and new challenges. • Identify **serial innovators**

(P)	**Inability to transmit the potential of the idea**
(S)	On the basis of the PROTEE Methodology, understand the different descriptions people around you have about the idea. • Analyzed the idea in the way you see it, writing down the **features that make it valuable.** • **Propose the idea** without any introduction to external actors, including also customers of your previous products and the ones you aim to reach. • Ask them to describe the idea from their point of view • **Find the gap** between what in your mind you are going to provide and what people perceive they are going to receive. • **Understand the nature of the gap**:

[6] See the appendix

	a) if it's related to a **wrong perception** of the idea's functionality decide between modifying your idea **aligning** it with the external expectations (ITERATION) or to work on it and on the marketing activity in order to **spread your first concept** b) if it's related to **some secondary aspects, change them** aligning with the external opinion

(P)	**Doubts about choosing the right impact assessment methodologies**
(S)	Before start using any kind of methodologies be sure that you decided: -**who will be in charge** of collecting assessment outcomes, -**what kind** and of information do you want to gather **and in which form** -the **frequency** of information gathering -the way in which and to whom they will be reported • Exploit the "sharing trend" of our times creating **discussion forums** on which the idea can be freely discussed by your customers. • Next to traditional methods as surveys, group interviews introduce **dynamic methodologies** that bring the customer **to feel part of your project** development. Create inside your firms new approaches in which the customer will have an active role.

ITERATION OF THE IDEA GENERATION AND BRAINSTORMING IN CASE OF NEGATIVE EXTERNAL ACTORS' RESPONSE AND WILLIGNESS TO ALIGN YOUR IDEA TO THE EXTERNAL OPINION

6) Idea's choice and feasibility study

The feasibility study is performed only if the potential impact on both firm and customers resulted positive.

The feasibility is an analysis in terms of needed resources by the concept development. The activity involves three main categories of resources:

-monetary resources

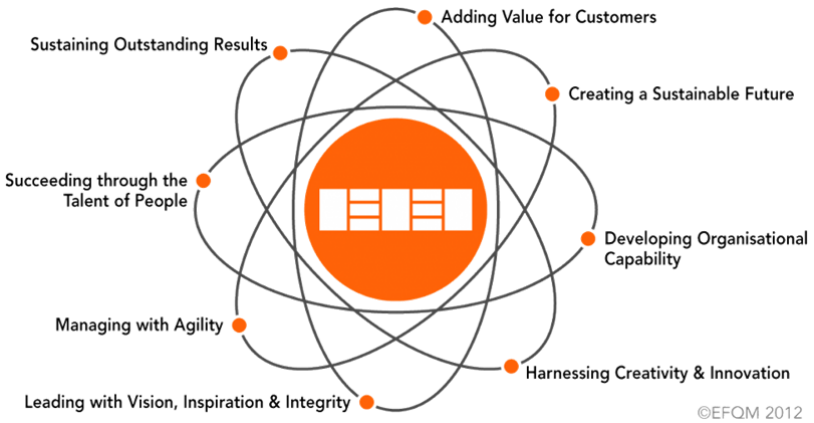
-time

-human resources

-practical realization

Moreover it is linked to the practical creation of the idea in terms of production feasibility.

The main obstacles faceable at this point are:

(P)	**Choosing the right parameters for making the right choice**
(S)	• Confront the idea with the **core skills** of your company • Analyze the **lack of resources** and define the possible solutions • Analyze if it meets an **innovative business model** where the networks toward and from which will come all the firm's flows are the main sources of value • Compare with the **Excellence model** for understanding if you will be able to provide an adequate level of quality 

(P)	**Underestimate the related costs**
(S)	Analyze the **remaining financial resource**, if won't be enough to cover the idea realization decide among:

	• iterate the process of idea screening reevaluating potential good ideas left, • looking for external founds or adapting the idea to the current resources • Decide the main essential characteristic of the idea, remove all the others not related to them, prioritize the ones removed and add them on the base of the amount of money you will have left. If the idea will be successful you could add that characteristics in the next version.

(P)	**Underestimate the needed human resources**
(S)	Analyze the current situation of your firm in terms of human resources. Look for people could be **reallocated** from other positions to project's related activities. In case of no available resources **outsource** some steps of the idea's realization to specialized companies.

(P)	**Underestimate the needed time**
(S)	Focus on developing **only the core idea** without any other features communicating the arrival of a complete version with more functionalities. If the time won't be enough also for completing the core functionalities, look for specialized companies that can make faster the production **outsourcing** some phases or collaborating with the whole production cycle.

(P)	**Underestimate the practical feasibility of the idea**
(S)	Evaluate: -the real possibility of **having a demand** for the product -the possible level of **profitability** -the **potential competitors** -the forecasted **sales** and their characteristic (regular or seasonal) -**the marketing** expenses -the **time to market** Monitor the competitors and the last trends on the market, comparing them with your idea in order to update it.

(P)	**Not being aware about the impact on the other products realization and/or development**
(S)	Realize a schedule about **the physical and human resources** the new product will absorb. If it's a totally **new product**, compare with products or competitors. **Divide** the product realization in **phases** and find among the already realized products or the ones of the competitors, products that face at least **one step similar** to the ones of your project. Putting all the resources needed together figure out the average impact. Finally, in case of **new processes** make a **plan involving external actors as suppliers** of a new machine or experts in the area of the new product.

(P)	**Not having enough resources**
(S)	• **Outsource** some phases of the idea realization • **Reallocate** internal resources • Develop only the **core functions** with the available resources. In case of impossibility reiterate the process of idea screening and select another one.

ITERATION OF THE IDEA GENERATION AND BRAINSTORMING IN CASE OF LACK OF RESOURCES

7) Development of a potential detailed schedule

The phase deals with the realization every 2-4 weeks of an iterative plan that shows the chronological forecasted going of portions of project together with the resources consumption. The phase exploits the agile project management approach in order to obtain a flexible and more reliable scheduling.

Potential general problems (P) and solutions (S):

(P)	**Having different ideas about the plan realization**
(S)	The presence of different ideas underlines different points of view about the idea's realization. Be sure that people involved are all **aware about the final object** in detail. Bring all of them to compare step by step the ideas' development underlining the different bottlenecks or more critical phases. The different plans can be a result of **different approaches to forecasting** – optimistic or pessimistic or can be a **signal of a real misalignment** due to errors in planning. Key elements: • Forecasts don't have to exceed **2-4 weeks** • Establish **prioritized functionalities** that will be perform former

(P)	**Realizing a good plan**
(S)	The innovativeness of the project, the number of variables involved can bring to a lot of doubts about the plan realization. The **iteration** is a key process of the project development, the pilot will provide you feedback about the plan realized that can be modified. Apply the **agile project management methodology:** • Organize **time bound iterations from 2-4 weeks** in length during which **portions of your project** will be developed • Develop highly **detailed** plans only for **"routine** iterations**"** • Develop a **dashboard** for measuring **how the project is progressing** for example in terms of number of tasks accomplished or a percentage of the work not still done Be sure you performed the following points: • **the resources' level** must be accurate • the **outsource** evaluation must be considered among the main possibilities for the **non-core activities** • **the time** must be treated in a **realistic** way, taking in consideration the limitations of the firm, the variability related to human resources, the possibility that not forecasted events occur • the plan must be **flexible** and it has to consider different possible **scenarios** since the firm is immersed in a network of actors whose can have an impact of it

	• **the controversies**[7] figured out in the **ANT diagram** and the **type of relationships**[8] inside the **network** must be considered among the main variables

8) Experimentation through a prototype

This phase is the first related to the concrete realization of the larger project on a small scale.

Conducting a pilot test is a really important step that has the following advantages:

- It allows you to understand if you are ready for the implementation of the whole project, bringing you to deal with possible adjustments to your plan for the implementation, with unforeseen challenges that can be visible only during the implementation and with your human resources level of preparation to react to these challenges
- It's a possibility to analyze the reaction of the project's target population
- It allows you to improve and make more realistic your scheduling

However, although all these advantages, the implementation of what was till now only an idea, can rise practical obstacles as yet not forecasted:

(P)	**Realizing a successful prototype**
(S)	The prototype has to be a **small-scale version** of your full project so you must be sure that it contains only the **core functionalities** and that they **perform properly**. The success of the prototype depends on the way it's realized and managed. The main objective at this point is to learn so: -create a **plan for gathering feedback** -**track all the modifications** (if any) to your potential plan of development -develop **instruments for evaluating** the feedback received and the level of **success** achieved by your project -realize a scorecard with a **pool of indicators** that trace your activities' performance -define **the testing group** on which testing the small-scale project -**share with the community** your positive results. Involve actors interested in your project and spread among them the pilot effects

[7] Further information about controversies are in the literature review about ANT
[8] See the new framework developed in this thesis

	-realized multiple prototypes
Real Case	"Satish Kanwar, partner at Jet Cooper, the user experience agency that has helped to develop products for clients like MaRS and TEDx, advises against this approach.Kanwar says, "to get the real nuggets of insight from testing a prototype, aim for simplicity. In fact, each prototype should be aimed at answering one question. That means only include a very specific and limited set of functionalities. Otherwise, you run the risk of diluting the purpose of the prototype" (Andrew Brown and Simon Brightman, 2012) "As Steve Jobs was bringing to life what was to become the first iPod, he started with a piece of crudely cut piece of wood that fit in the palm of his hand and had a rotating wheel. That's a far cry from the portable music player that revolutionized the music industry and had ripples in dozens of others. Months later, Jobs took an updated iPod prototype, one with playback functionality, and dropped it in a fish tank to prove to his design team that it was too large — he concluded that because air bubbles were seen escaping from the casing. For him, if there were air bubbles, this revealed there was wasted space that could be eliminated." (Andrew Brown and Simon Brightman, 2012) "As good as the product idea is, initial prototypes always reveal a weakness in the concept or the engineering. So even the most experienced companies should expect to go through additional prototyping to develop a product that is ready for market testing". - President of Toronto-based Custom Prototypes, Andrew Sliwa

(P)	**Not being able to follow the project steps of idea realization**
(S)	Compare the **plan and the real evolution** of the project: was it a realistic plan? • If the plan was **too strict**, revaluate it and understand if you are neverthless going however on the right track. • If the **intermediate objectives** were **unrealistic,** adjust them and understand if the project could still respect the planned limit of time. In case of lack of time **realize first** the ones related to the **core functionalities**, **prioritize the others** and add them in case of having time left. • If it's related to a **lack of resources** you have to face this problem reallocating available resources or looking for **outsourcing** part of the process. • If the problem it's related to a **lack of knowledge** look at the solution proposed before in the "Analysis of the impact on the firm".

	• If the problem is **time** look at the solution proposed before in the "Idea feasibility".

(P)	**Understanding that you don't have enough resource for the idea's implementation**
(S)	An error with the feasibility study or some not forecasted events occurred. In order to overcome them you can do one of these actions: -**Outsource** some phases of the idea realization. -Look for **reallocation** of internal resources. -Develop only the **core functions** with the available resources. In case of impossibility of doing one of these actions **reiterate** the process of idea screening and select another one.

(P)	**Defining the testing group of people for the pilot**
(S)	Choose people as similar as possible to you project's target population. Define the **main characteristics** that should characterized them and on the base of them write down the **forecasted reactions**. Moreover, once defined the testing group, take notes of the **differences** among people involved and analyze how they could impact on the people when they will deal with our product. The differences resulting from the different behaviors, personalities, experiences and so on will help you to **improve** the way in which your product will **be perceived** by the market and they also allow you to **deal with unforeseen weaknesses**. Record the people that contribute more in your previous projects and identify the "**serial innovators**"[9] (people that allowed the birth of at least two breakthrough products in your company)
Real Case	Chuck House, who developed a number of new products for Hewlett-Packard, was awarded a "Medal of Defiance" by Hewlett-Packard's president who did it "as a reminder to all the firm that breaking the rules can be associated with great reward."

[9] Defined in the appendix

9) Post-examination Feedback

The aim of realizing a pilot or a prototype version is to understand the main drawbacks of the result of the innovative project developed. The value that the product can provide is totally dependent on the customers' judgment. The collection of feedback on the pilot test is, so, really important for improving the innovation realized and also really critical due to the following possible problems:

(P)	**Not gathering fast feedbacks**
(S)	Time during an innovative project development is a key element since source of competitive advantage on competitors. So the time needed to gather precious feedback and implement them must be as short as possible. The best modality is to create a dedicated team to the feedback gathering and to develop a way for **real-time feedback system**. **Exploiting the social network model,** you could create an **online platform** on which people belonging to the target group can express their thoughts, sensations and practical feedback about your project.

(P)	**Not being aware about how to gather and analyze the feedback**
(S)	The testing should be performed in **conditions** as **similar** as possible to the one in which clients will be **when they will use** the product. The feedback gathered must be analyzed immerging them in the **context** of the people **on whom the test** is conducted. Their environment, their demographical characteristics, their personality: the impact of all the variables must be evaluated in order to understand the degree of influence of them on the feedback provided. It allows also to gather **different perspectives** on the project coming **from people with "pro-project characteristics".**
Real Case	"Focus groups, surveys and structured observations all have their merit, but the key to understanding how a product will be used and embraced in the market needs to include the elements of surprise, immediacy and urgency. In other words, you need a context that allows for genuine human behavior." - President of Experience It Inc. D.Jones

(P)	**Not using the feedback received properly**
(S)	• The feedback guide you toward adjustments **for improving the project**. Sometimes the plot outcomes bring toward **huge modifications** and new assumptions. You should **avoid to do** it, acting through **moderate adjustments** since the pilot is a mean for having a first preliminary reaction on the base on which you cannot totally forget all the work done during the previous phases. The plan development, the idea screening, the potential impact on firm and customers all of them are time and efforts consuming steps so, **it's unlikely that you have to modify the whole result** of them on the base of the pilot test. • Avoid, the opposite mistake: **linking the negative feedback to personal characteristics of the people of the testing group**, thinking that the project itself doesn't need adjustments. What you have to understand is the **value of the project perceived** by these people and it involves also the emotional sphere, the personality, things from which it's impossible to separate a person for achieving objective feedback. The **precious real-time spontaneous reactions as a source for making the project a success.** "*An innovator may be aware that there is an environment to his or her project, but immediately fall into a paranoid definition of this environment as made up of idiots, of irrational, unfair opponents, of envious competitors, of workers with outdated attitudes, of unstable users"* - *from PROTEE Methodology* Follow the **PROTEE methodology** (PROTEE Final Report, March 2000) • **Recreate the logic of the opposition** otherwise you won't be able "to learn and will simply try to force the innovation onto a hostile environment without learning or modifying anything" • **Not lose allies** when opponents' specifications are taken into account. "If it were the case, then **any new obstacle would terminate** the project because it would have **no way to maintain** its own inner **core** and would end up being entirely **driven by antiprogrammes".**

ITERATION OF THE IDEA SCREENING, IMPLEMENTATION AND PROTOTYPE REALIZATION IN CASE OF NEGATIVE FEEDBACK

10) Ideas' changes and full project implementation

Although the firm can be aware of the high potential of the project developed, if the customers don't perceive that product as a "value-adding" one that could improve their life in some ways, the product will be a failure. This phase is really delicate and important. Firms have two alternatives: either exploiting the gathered feedback to provide some changes or being too much slow or reluctant in doing it, it will be a choice between potential success and sure failure.

The main problems (P) faceable at this point and the relative solutions (S) are:

(P)	**Not implementing the necessary corrective actions on the base of the received feedbacks**
(S)	• **Reevaluate** the feedback received. • Analyze the changes implemented and compare with them. • Gather **other feedback** and involve all the company and also external sources in the **analysis of the gap** between the whole feedbacks received, the objective of the project with the **idea before and after the changes**. • Link some metrics to the feedback received and to the objective planned in order to evaluate also **the existent gap** in a **quantitative way .**

(P)	Making ineffective changes
(S)	Receiving the same negative feedbacks means that the changes implemented weren't effective or that the product proposed was perceived in a wrong way by the market. Understand the idea perceived by the customers and evaluate if it's aligned or not with what you were supposed to provide. • If **the idea is aligned** reevaluate the feedbacks together with the changes implemented and **find the gap**. • If it's **not aligned** you can make it **aligned changing the initial idea** objective or **spread the real reason** for that the product was realized.

(P)	**Facing an unforeseen problem**
(S)	The **prototype** test **doesn't give you the safety** of having forecast all the possible problems and made the right adjustments for avoiding them. Due to its small-scale project nature and due to the presence of **external not controllable variables**, the possibility to face a problem remains high. First of all **define the boundaries** of the problem, have a clear idea of the **areas in which it impacts** and though a **root cause analysis** figure out the primary and secondary causes. • If the **primary causes are internal**, involve all the firm in finding a solution for it. Understand if the problem is a signal of a **"wrong implementation"**, of a **wrong plan** or if you are not going out of the track but **the evaluation system** for controlling your implementation contains some **mistakes**. **Don't blame anybody** while treat the problem as a source of knowledge for all the company. • If the problem is due to **external reasons**, understand if the **environment and the conditions** in which you are operating are **the same** on which you made your plan, check if **new elements** came in the market or if the problem detected is a result of a **move of your competitors**. Exploit the social media for analyzing the external environment better. In both cases **reevaluate your project**, understand if is still possible to go with it, if it needs some adjustments or if the problem doesn't allow your firm to end the project development. If third case occurs, try to **use what was produced** during the previous phases of the project development **in a new way**: maybe you will come with a **more successful idea**!

ITERATION OF THE IDEA SCREENING, IMPLEMENTATION AND PROTOTYPE REALIZATION IN CASE OF NEED OF FURTHER CHANGES OR OF PROJECT REEVALUATION

OUTPUT OF THE IDEA FACTORY

11) Commercialization

The end of the iterative cycle of generating and realizing the innovative concept brings to another phase that concerns the commercialization of the product. The way in which the marketing proposes it, the feelings linked to it and transmitted to the market play an important role in spreading the new innovation.

(P)	Understanding the right channels	
(S)	• The **definition** of **the target customers** is the basic requirement. In order to reach them addressing in the right way your marketing efforts you have to deeply analyze them and the way in which they were reached by other marketing activities for other purposes by your competitors. • Take into consideration the **current situation**, the **last communication technologies** developed and the increasing **need of involvement** of the customers. • The customers that will first deal with your product will be **the visionaries**, people that are always **looking for customized solutions**, attracted by revolutionary solutions. • It's not a matter of creating a new technology for perform marketing activities while it's a mainly a matter of **how you will be able to exploit existent technologies in new way**. Being innovative also in the marketing activities will bring your customers to be more attractive by your project too	

(P)	Understanding the right instruments
(S)	The digital technologies explosion changed the traditional communication strategies, bringing from a **one to many push communication** to a many to many pull one. This means that the actors -firms, customers, brand, influencers- are now on the some level and that these actors are not passive anymore. This new context required also **new marketing activities** that go under the name of **DIGITAL MARKETING** that enables: -the **customization** of the marketing **experience** - the **integration** of the distribution **channels** and the **support activities** - the continuous **measurement** of firm's actions on the market - the building of **long-term relationships** with the customers - **the multichannel** exploitation - the **improved listening** of the market The main instrument of the digital marketing are: • **Social Media**: the social network are a basic element for reach the customers on the web .The best way to do it is to be on the most popular ones, using a communication strategy and a **language as similar** as possible the one of your **customers,** potential or actual. Moreover it allows to provide **fast answers to questions or critics.** • **Blog**: it can be a real powerful tool that must be built in an accurate way, dividing the **contents in categories**, providing **smart tag for the research**, **updating the news** and their optimization for search engines as frequent as possible • **Digital Email Marketing**: informative **newsletter on the firm's activities and services** sent to a **specific target** of customers. It allows to **increase** the **conversion rate** and so the visits on the webpage of the firm, **increase** the **database** of profiled peopled interested in your news and to maintain a **constant contact** with them. • **Website**: institutional space that gather all the **official information** about the firm and its services and activities. It's important to have a **responsive web design,** allowing the access to the page from the highest possible number of devices. The **degree of "search friendly"** is also a key element for the website success. Together with these latest technologies you can use **offline instruments** as radio, television, journals, brochure and so on **depending on the target** of your activities and **your resources**. Exploit the **PARTECIPATORY MARKETING** : • Involve customers in your **advertisement**

Real Case	**Doritos-Make your ad**: "It started in September 2006 when Frito-Lay decided that its popular Doritos brand would not air the standard agency-made ads during the next Super Bowl. Instead the brand launched "Crash the Super Bowl," a contest that invited civilians to create and upload their own Doritos ads. The winners--determined by online voting--would air during the Super Bowl and winning entrants stood to win big money. Frito-Lay has many ways to track the success of user generated content ads. To judge the effectiveness of the contest, Doritos measures pass-along value, online contest currency, media value, and brand equity throughout the contest. According to Frito-Lay Chief Marketing Officer, Ann Mukherjee, since the launch of "Crash the Super Bowl" all of those measures have consistently gone up, as have sales. Submissions also doubled this year reaching an all-time high of 6,100. In her analysis, these campaigns have been the most successful marketing initiatives in the brand's history. Besides, as Mukherjee points out, "I have 25,000 ads in the can…and they're free!" In fact, the Doritos advertising campaign for 2011 consisted entirely of the best ads from past "Crash the Super Bowl" contests. " (Burstein)

12) Post-launch market reaction

The last phase proposed is the one in which the firm realizes the outcome of the project.
It can happen that, although the hard work of all people involved, the innovation won't be successful or that it will reach a point in which it will be obsolete.

Moreover the project life cycle doesn't stop at the launch in the market. If a firm aims at developing innovative ideas, it must think innovation as a portfolio and each project has to be seen as a part of a whole not as a standing alone work.

This is the point in which the companies must take an action in order to define its future strategy, to overcome some problems related to the market's reaction or to decide to exit from the market.

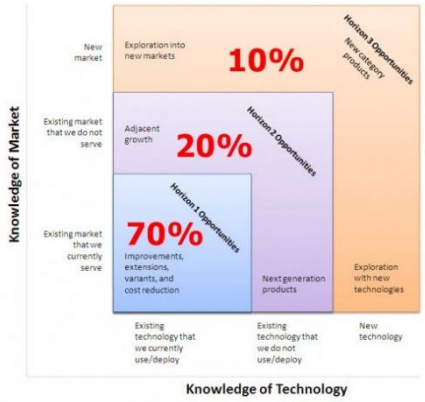
The main problems a firm could face at this point are listed with the related solutions in the following tables.

(P)	**Not achieving the expect results from the innovation**

(S)	The possible reasons at the base of this problem are two: 1) The **market wasn't ready** for the innovation The main mistake is dealing with the innovation instead of the "innovation ecosystem". If the market wasn't able to metabolize your innovation is because you didn't create the basic for it. There are two possibilities: - **Retire t** - **he innovation** from the market waiting for "the right moment" to introduce it again - **Create you the right conditions**, "the ecosystem" for the innovation 2) **Competitors moved faster** The competitive advantage of the fast mover is really huge and if you arrived late on the market you probably lost a possibility of success. However, what you can do now is **to study the competitor's product** in order to provide a better innovation, **working** on competitors' **weaknesses or** adding **new features** that will expand the "meaning of the innovation".
Real Case	"Sony failed to grapple with the whole ecosystem when it brought out its Reader for e-books in 2006. It didn't deal with the economic and legal challenges e-books would pose for authors and publishers; it didn't offer a compelling enough digital rights management solution; and it didn't know how to build a good online store. Publishers didn't sign on, and neither did readers. The next year Amazon came along with Kindle and got it all right. As Adner writes: "*As a device, the Kindle was regarded as inferior to Sony's Reader.It was larger than the Reader, weighed more, and had an inferior screen. Moreover, it was a very closed platform that was able to load content only from Amazon. . . . How could Amazon engineer a triumph with a weaker product?* *The key difference was the way in which Amazon aligned the ecosystem to bring its value proposition to life. . . . Amazon did not simply bully publishers into supporting the Kindle. Amazon created conditions in the ecosystem that made joining the long-awaited e-book revolution a more attractive proposition for publishers than any previous attempt*." (http://www.forbes.com/sites/frederickallen/2012/03/05/why-great-innovations-fail-its-their-ecosystem/)

(P)	**Seeing a decline in the market results**
(S)	The innovation starts to be obsolete and it's better if you take a decision before arriving to a complete failure. There are two streets that you can take: -**Exiting** from the market

	-**Re-launching** the innovation Since spending a lot of efforts for developing the innovation, before deciding to exit take into consideration the knowledge accumulated in the "idea field", the skills acquired in that sector and the related resources. Evaluate the possibility to use them for **developing another product** in the **same sector** of the market. The other possibility is to **re-propose the idea** providing a **new meaning and/ or improving the existing functionalities**. In order to perform these actions, **reiterate the entire project life cycle.** The aim is to analyze the current situation of the market, the new missing values for coming out with an "updated innovation".

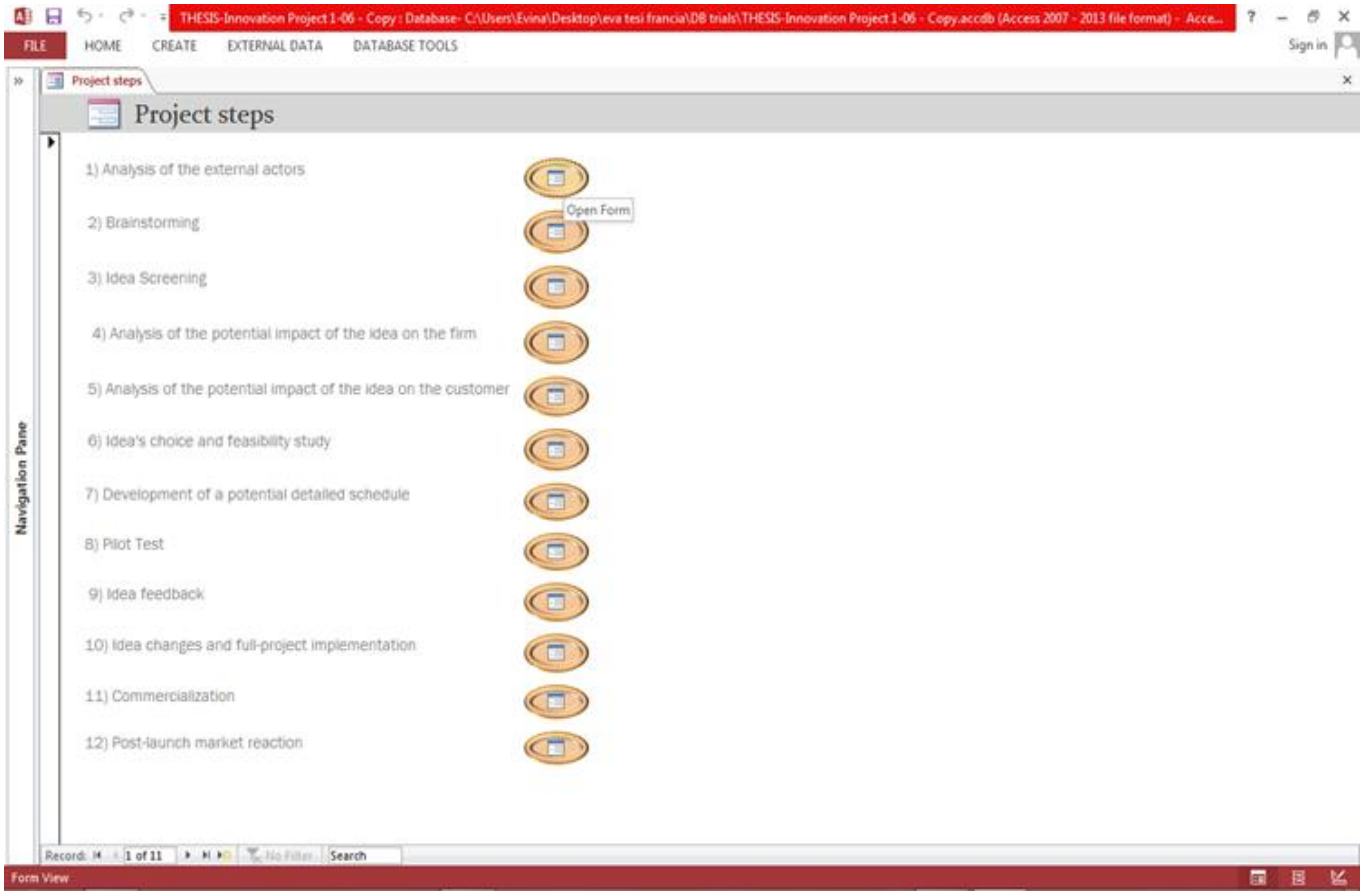
(P)	**Deciding which strategy should be adopted after the innovation launch**
(S)	 The innovation must be thought as a **part of a portfolio** in which all the parts must be **balanced**. A tool to balance your innovation portfolio is the "**Three Horizon approaches**"[10] The **70-20-10** rule is the standard rule that can guide toward the achievement of a long-term success. However **you don't have to develop innovation in all the horizons but you must be sure in which one you are operating and how is the situation of the rest of the firm's innovations.** "When you innovate using the three horizons framework, the **first horizon** involves implementing innovations that **improve your current operations**, **horizon two** innovations are those that **extend your current competencies** into new, related markets, and **horizon three** innovations are the ones that will **change the nature of your industry**. In general, H1 innovations tend to be incremental, while H3 are more often radical innovations." (http://timkastelle.org/blog/2010/08/innovation-for-now-and-for-the-future/)

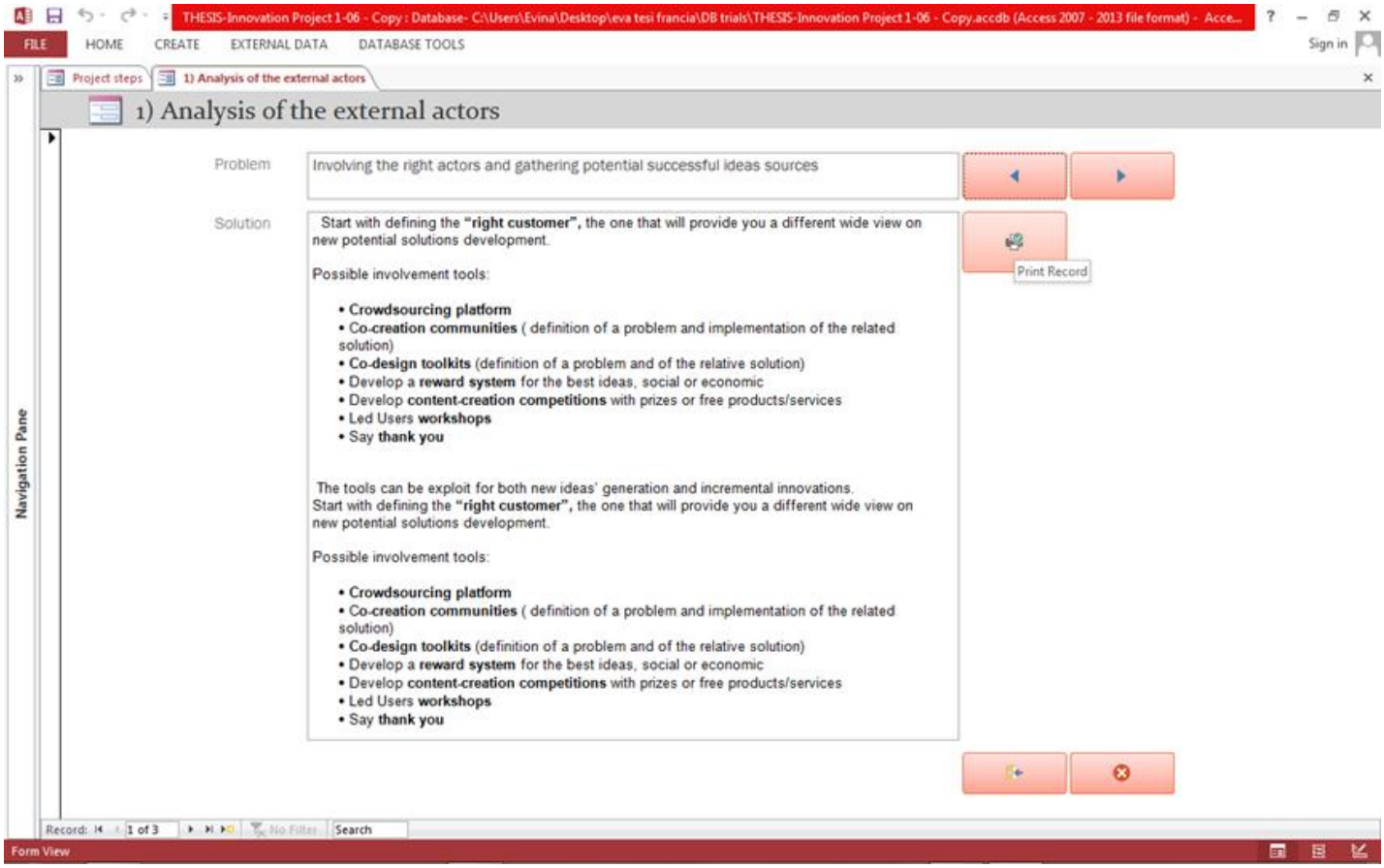
[10] See the appendix

3.2.1.5 Electronic version of the database: AssistANT.exe

Exploiting Microsoft Access I developed the online version of the database. Compiling it, it was possible to create an application of the AssistANT Database: the AssistANT DB.exe

The following pictures are screenshots done during the running of the application.


THESIS-Innovation Project 1-06 - Copy : Database- C:\Users\Evina\Desktop\eva tesi francia\DB trials\THESIS-Innovation Project 1-06 - Copy.accdb (Access 2007 - 2013 file format) - Acce...
FILE
HOME
CREATE
EXTERNAL DATA
DATABASE TOOLS
Sign in
Project steps
Project steps
1) Analysis of the external actors
Open Form
2) Brainstorming
3) Idea Screening
4) Analysis of the potential impact of the idea on the firm
5) Analysis of the potential impact of the idea on the customer
6) Idea's choice and feasibility study
7) Development of a potential detailed schedule
8) Pilot Test
9) Idea feedback
10) Idea changes and full-project implementation
11) Commercialization
12) Post-launch market reaction
Navigation Pane
Record: 1 of 11
No Filter
Search
Form View


THESIS-Innovation Project 1-06 - Copy : Database- C:\Users\Evina\Desktop\eva tesi francia\DB trials\THESIS-Innovation Project 1-06 - Copy.accdb (Access 2007 - 2013 file format) - Acce...
FILE
HOME
CREATE
EXTERNAL DATA
DATABASE TOOLS
Sign in
Project steps
1) Analysis of the external actors
1) Analysis of the external actors
Problem
Involving the right actors and gathering potential successful ideas sources
Solution
Start with defining the "right customer", the one that will provide you a different wide view on new potential solutions development.
Possible involvement tools:
• Crowdsourcing platform
• Co-creation communities (definition of a problem and implementation of the related solution)
• Co-design toolkits (definition of a problem and of the relative solution)
• Develop a reward system for the best ideas, social or economic
• Develop content-creation competitions with prizes or free products/services
• Led Users workshops
• Say thank you
The tools can be exploit for both new ideas' generation and incremental innovations.
Start with defining the "right customer", the one that will provide you a different wide view on new potential solutions development.
Possible involvement tools:
• Crowdsourcing platform
• Co-creation communities (definition of a problem and implementation of the related solution)
• Co-design toolkits (definition of a problem and of the relative solution)
• Develop a reward system for the best ideas, social or economic
• Develop content-creation competitions with prizes or free products/services
• Led Users workshops
• Say thank you
Print Record
Navigation Pane
Record: 1 of 3
No Filter
Search
Form View

3.2.2 Innovating the map of controversies: The ANT House Model

3.2.2.1 Why a new diagram

The necessity to develop a **new ANT diagram** came during the research done on the literature review.

The **power** of the Actor-Network Theory diagram comes from its "**ability" of going beyond the labels** and the attributes people are used to provide to everything surround them, analyzing the impact of the actant.

However, the open issues resulted from the literature brake this potential reducing the applicability of the method.

The two-dimension traditional **ANT diagram** looks too much **poor for providing an exhaustive vision of the actors' relationships**. The **new** framework proposed here is **a 3D-quantitative diagram** in which the **black-box of the relationships will be open** and there **won't be any silent actor**.

The new model is called "**ANT House Model**" since it exploits the framework of a famous model used in Quality Management for improving the quality of a product: the "House of Quality" (see page 48)

The third dimension added to the traditional diagram is the roof the "house of the actors" (see later) that links the several actors (opening the black-box of the network of relationships) . The relationships will be analyzed since they could be either positive – both the actors can have benefits interacting each other- or negative – the interaction includes some "conflicts of interests" and also with a different level of strength (strong,medium,weak)..

Starting from this "map of relationships" is possible to categorize in a tabular form these relationships, building **one table for each "level of strength".** The tables will contain a separation between **positive and negative interactions** and a column for the **effects of them on the company.**

The analysis of the effects will so allow the company to **forecast** the possible impact of **potential controversies** on the project's development.

In order to complete this diagram I will suggest the building of a database of these controversies that includes a ready analysis each time the company will face the same couple of actors.

3.2.2.2 Building the new diagram

The criticism about the alignment of human and non-human was and is strong but mainly because **putting labels makes us to feel safe**, while providing also to non-humans the **power of interacting** in the network of actors create further **uncertainty**.

The model developed aims at **solving** two of the already mentioned gaps found in the literature:

1) The silent actors
2) The network's "analysis"
3) ANT Subjectivity

The model includes all the actors, fields, concepts and values involved in the project's and, moreover, allows to have a picture of the networks of relationships among all of them.

The building of the house is supported by the **AssistANT Database** that allows to understand if the path followed till the choice of the idea (phase number 6 in the database) is aligned with the innovation culture. The database will bring you on the way of the open innovation, PROTEE methodology and Agile Project Management.

The beginning of the diagram development is the filling in of the House of the actors.

The "**House of the actors**" aims at guiding in the first phase of the new ANT House diagram, it provides a **quantitative way to choose the actors** that should be inserted in the diagram (overcoming the silent actor's problem) and a **picture of the status of the relationships** among them (opening the "black-box).

The new ANT House diagram that **will contain the actors resulted from the House** of the actors and will have a **third dimension about the network** of relationships. On the base of this network, it will be possible to deal with the **forecasting of controversies** (adding a looking forward perspective). During the diagram deployment, it will be possible to consult the AssistANT in case of problems and difficulties in next phase's forecast.

Some of the information needed to develop the diagram are already inside the firms since they should have been gathered during the first 4 phases of the project's development that brought to the choice of the idea around which the diagram will be built.

The **building** of the **House of the actors (picture 12)** follows 12 steps:

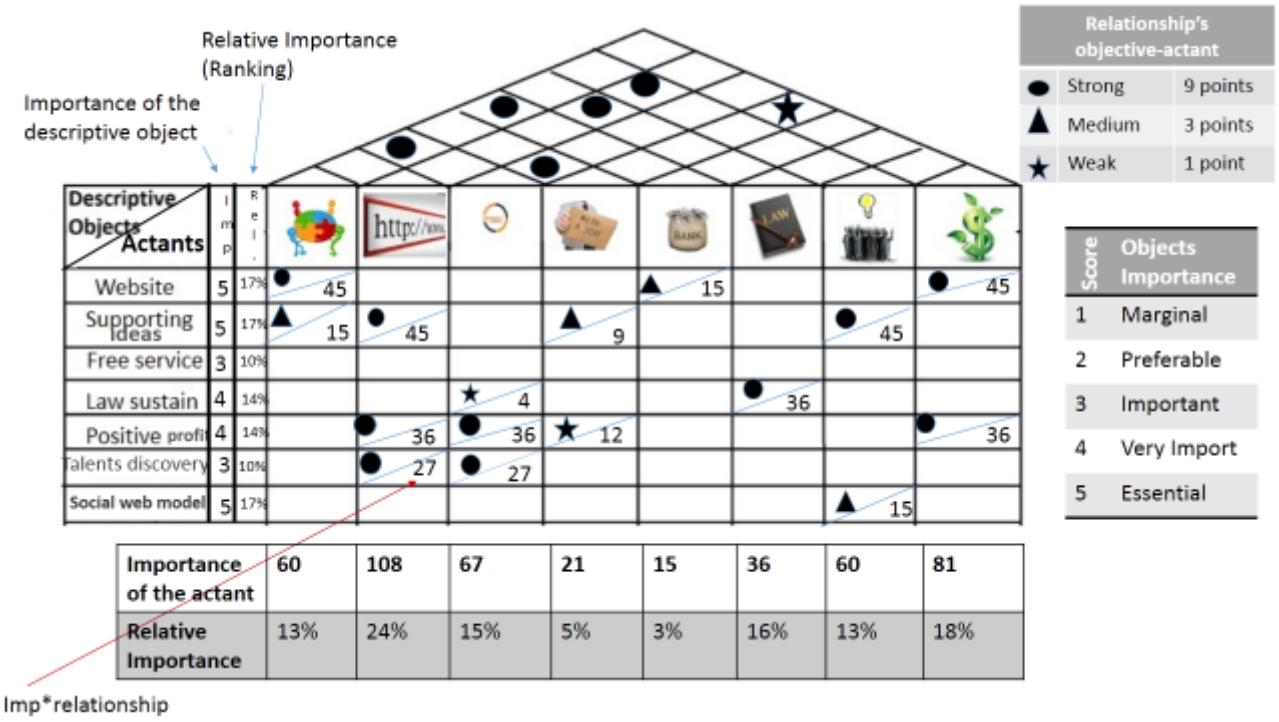
1. Collect all the information gathered during the previous phases about the idea and put together:

- The external actors involved
- The suppliers, competitors and their related products, machines,
- The knowledge's sources exploited
- The internal resources exploited
- The tools used
- The concepts and values figured out during the idea's perception test
- The resources analyzed for the feasibility

2. Describe the ideas in terms of "*descriptive objects*" (all the features characterizing the product):

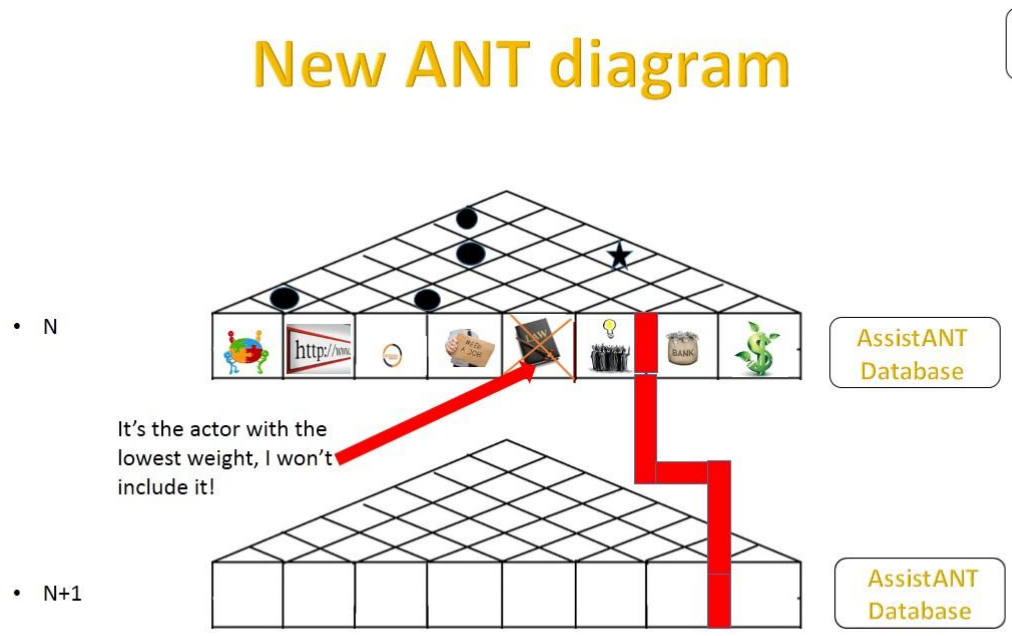
- Sectors could involve (listing the characteristics of the idea that bring to deal with that sector)
- Main features (functionalities, values, impacts, background, knowledge, support, "needs"...)
- Main objective

3. Gather all the "**descriptive objects**"
4. **Give weight to them**, on the base of your own scale (a scale for evaluating the relative importance of a descriptive object for the whole idea)
5. Define the level of **relationship** -if there is- between the **descriptive objects and the actants** individuated and give weight to it
6. Multiplying the level of relationship by the importance of the object, define a **quantitative measure** of the link between the **actants** and the **descriptive objects**
7. Analyze the possible link among all the actors combination, putting in the roof a weight to their strength of relationship (it can be positive – **mutual interest**- or negative – **conflict of interest**)
8. For each actant sum the values found at step 6 and choose the actants more related to the idea's core descriptive objects for your diagram (highest values)



Picture 1 2 House of the actors

Once defined the **actors to introduce on the diagram, develop it using them and the roof of the house.** Following the programme- antiprogramme basic idea of the ANT, divide them putting on the right the ones in favor of the project and on the left the ones in contrast with its development. The actants will be divided by the classical red line. If in the diagram evolution, the antiprogramme will be absorbed/ contrasted by the programme ones, the project would be successful. Otherwise, it will be necessary to define the moment in which the antiprogramme will start to undermine it and find new alliances, negotiations or changes to the idea for absorbing the opposition.



Picture 1 3 ANT House Diagram

During each phase, in order to forecast the controversies evolution, it will be necessary to complete the model with some tables.

The tables will include the same level relationships. The relationships will be divided in negative and positive and the firm will evaluate a possible impact of them on the firm's project. Although the tables can appear too simplified, they allows to decompose a very complex element, the relationships among actors, the act of dividing them in relationship of couple of actors, categorize them allow to have a clear picture of them. The more we clean the relationships from details not related to the interaction with another actor, the purer will be the effect analyzed.

Programme to Programme actors' relationship (P2P):

Positive:

-The actors share common interests and are both in favor of the project's development. You could exploit that common interests creating alliances related to them for strengthening their support and maybe for exploiting them in absorbing part of the antiprogramme actors.

Negative:

-Conflicts of interests among programme actors could be source of negative controversies for the project. Understanding the nature and trying to find a way to align their interests is important for avoiding the reciprocal creation of obstacles with possible negative effects on the project too. Finding a positive way to make them interacting will allow to avoid the controversy.

P2P	Negative	Positive	Impact on the firm's project
Strong	couple of actors		
Medium			
Weak			

<u>Antiprogramme to antiprogramme</u> actors' relationship (A2A):

Positive:

-The creation of strong alliances between actors against the project's development is the main source of controversies. Understanding the interests that link the two actors and either:

- try to destroy that alliances absorbing one of them or
- find a way to align the project to their needs or
- figure out a better interest that could attract one of them and, later, the other one (since they are linked)

Negative:

- Exploit the conflict of interest for attracting one of them toward the programme actors. For the other actor study the other relationships it has for attracting it too in another way

A2A	Negative	Positive	Impact on the firm's project
Strong			
Medium			
Weak			

<u>Programme-Antiprogramme</u> actors' relationship (P2A):

Positive:

-Exploit the interests share by them and leverage on them for absorbing the antiprogramme actor. Through the translation of interests, use the programme actor for delivering the "right idea of the project" that will bring the antiprogramme actors among the programme ones

Negative:

-It could create source of controversies since if you make some changes for absorbing the antiprogramme you could lose the programme one .Study the nature of the conflicts of interests and find a way for acting on features that don't impact on the programme actors but that are valuable for the antiprogramme one.

P2A	Negative	Positive	Impact on the firm's project
Strong			
Medium			
Weak			

CHAPTER 4

4 The Empirical Research

4.1 Methodology

The development of the new ANT House Model started with by several **e-courses, documents, journals, reviews** and **cases study** analyzed during the period in France together with online lessons about the last methodologies, needs and missing values of companies. The improvement of the model and the validation of the framework proposed was done through **6 face-to-face interviews and 13 questionnaires**.

4.1.1 First steps of the research

The literature analysis provided me the sources for developing the model's idea and, more in detail, it followed two main phases:

1) The analysis of the TRIZ Matrix provided me the idea for the AssistANT database's generation

2) The analysis of the "Quality Function Deployment" inspired me for the ANT House's idea generation

1) Database's idea generation

At the beginning of the empirical researches, in order to deal with the latest news about methodologies exploited by the main companies, nor reachable for a face-to-face interview or a questionnaire, I followed some video-courses, two of them were fundamental for the research:

- *Inside the Innovation Elite* (http://clickandlearn.bmgi.org/course/category.php?id=20, s.d.) : This online executive briefing reveals the five mega-disciplines that firms in the forefront of innovation use to drive growth, meet the ever-changing needs of customers, and revitalize internal processes to embrace change.

- *The Idea Factory*, introduction to innovation management, a lecture for students of the international Minor "Knowledge Sharing and Web 3.0" Part of "The Idea Factory" course on innovation and the use of social media by Boyd Hendriks of Informationland.

The next phase was about analysis of:

- cases study about the main innovative companies,

-reviews,

-journals' articles,

websites and blogs about the latest trends among the business communities

These sources, together with the work of literature review done before, guided me toward the first database's draft in terms of structure,identification of the general problems and the related general solutions .

The main companies that inspired the AssistANT database creation are:

- Procter & Gamble
- Apple and the point of view of Steve Jobs (whose biography also provided me a different way to look at the innovation)
- Coca-Cola
- Kodak
- 3M
- Dell
- Whirpool
- Virgin

Inside the tabular version of the database, I provided the cases study related to the firms mentioned before that applied - with a positive result- the solutions proposed in the related table. Next to these summaries of cases studies, I provided also the opinion of important figures among the business communities and the initiatives of minor firms.

2) Regarding the ANT House, the starting idea came from the research of a quantitative tool for overcoming the silent actors' problem.

The analysis of the articles about the ANT Diagram criticism together with the one about the methodologies for analyzing the quality of a project, brought me to identify in the "House of a Quality" the right tool. The main characteristics for which I looked for during the model ideas' generation were:

- Quantitative-based
- Network-based
- Dealing with the relationships among different entities involved
- Dealing with the interrelationships among entities and features of a product/service analyzed.

The House of Quality is used in Quality Management for connecting the needs of customers to the potential characteristic of a product that has to be developed. It involves also the competitors' products that in the ANT House are omitted.

The research went through the quantitative model available in the literature and the ones generally exploited by firms for considering the actors involved in a project.

The database was constantly updated during the period spent in France, through the prototype's test since the face-to-face comparison with people belonging to the real world, made me realizing the feasibility of the solutions proposed.

4.1.2 The next step: the comparison with the external world

The main value-added to this work of research is the output of the interviews and the questionnaires done for validating and improving the model and the derived theory for managing innovative projects.

In this second phase I decided to exploit to main form of empirical research:

- Face-to-face interviews
- Questionnaire

Face-to-face Interviews

The main objective of the interviews was to absorb the highest level of information from managers belonging to really different sectors and mainly involved in innovative contexts.

The interviews were done for improving and validating the database's model and the theory derived from its realization. The meetings with the respondents lasted from 3 to 5 hours and all of them followed a structured scheme:

0) Presentation of the research and its main driving topics
1) Open and closed questions the respondent in terms of :
    - ✓ personal data,
    - ✓ current job,
    - ✓ project and innovation experience and opinions
2) Explanation of the prototype proposed
3) Test of the prototype proposed
4) Questions about the model proposed in terms of strengths, weaknesses, possible improvements and applications in the real world

The value added by the face to face interviews come also from the place in which I did them, the place in which the respondent used to work. This allowed me to understand the real environment in which the managers use to work and so to better understand also their managerial point of view.

The interaction with respondents brought to deal also with questions not strictly part of the structured interview and these unexpected information constitute the main cause for reflections for this work.

The methodology used during the first three meetings was both qualitative and quantitative. The respondent, during the database validation, analyzed the whole pool of tables providing both a scale of values to the problems and solutions proposed and also personal comments.

The lasting time of these type of interviews (around 6 hours) forced me to change the methodology in order to maintain the focus of the respondent. During the following 4 face-to-face interviews, I discussed with the respondent about the phases of the innovative project development they considered more critical – justifying the database's realization- and the focus was on that phases.

Instead of a scale value, now they were asked to cross, among the problem and solutions proposed, the ones they judged more concrete and feasible.

Questionnaires

The questionnaires supported the validation of both the database and the diagram and, consequently, of the whole theory about the management of innovative projects applying the Actor-Network Theory.

In both cases, the structure was similar to the one of the face-to-face interviews however, due to the type of methodology, the answers were more limited.

In this case, the value-added resulted from the reaction of people with complete different backgrounds, occupations and nationalities that faced the same questions but provided different points of views, sometimes totally in disagreement with the others. The respondents for the ANT House questionnaire were mainly people that took the International Master at ESIEE Management (Paris). This choice came from a double reason:

- All of them come from a different country and a different previously academic background
- Among them, half already worked while the others were completing the academic path after the bachelor degree
- All of them come from a different country and this came out from their way to look at the same problem
- Everybody had followed with a course about Actor-Network Theory and had applied the traditional diagram to a project of their own, so they knew deeply the traditional methodology and were able to understand the potential value of the new framework provided in this work

The questionnaires allowed the respondents to feel free to answer in the time and place they considered better and so the answers were free from pressures and constrictions.

Moreover the answers were completely focused on the information I needed to elaborate and so clearer.

4.1.2.1 The respondents

I gathered the information about the respondents in the following table.

ANT House testing

Name	Age	Profession	Nationality	Academic Background
Anonymous	27	Student	African	Computer Engineeering / Technology Management
Indu Poudel	25	Student	Nepalese	Technology and Engineering

Sara Altaie	26	Student	Danish	Global Business Engineering
Divij Babbar	25	Project Manager	Turkish	Engineering, Information Systems (ESIEE)
David Lawrence	43	Company Owner	Canadian	B. Comm.
Anastasia Belchankova	27	IS Administrator	Bielorussian	Automated Information System
Souvik Ghosh	22	Stagiaire Assitant Qualite IT	Indian	Management of Technology in Information Systems

Table 6 ANT House respondents

AssistANT Database interviews:

Name	Age	Profession	Nationality	Academic Background
Antonio Calabrese	49	Director of MBA&EMBA Division at MIP Business School and Professor at Politecnico of Milan	Italian	MSc in Engineering
Yuri Sillano	27	Project Coordinator	Italian	Space Engineering
Ngo Van Vincent	30	CMO for EGG-one	French	Electronic Engineering
Camille Freisz	29	CEO	French	Pharmacy
Mattia Vincenti	27	GRDP	Italian	Space Engineering
Sébastien Randazzo	43	Project Manager	French	Engineering
Sébastien Palanicaouden	26	Entrepreneur	African	Civil Engineering
Nicolas Trub	46	Company Owner	French	Telecommunication Engineering
Quentin Martin-Laval	26	CEO	French	Energetic Engineering

Table 7 AssistANT Database respondents

4.2 Results

4.2.1 First steps of the empirical research

The research for developing the database allowed me to figure out the best solutions exploited by the more relevant companies of the market and allowed to support the solutions identified on the base of the literature analysis. The analysis of the main cases study resulted in a pool of knowledge about the latest trends and the way in which companies among the 500 Fortunes translated risks and stuck-period in new successful opportunities.

The research for a quantitative tool brought me to identify the House of quality as the right skeleton on which to build the new ANT diagram. The resulting model was aligned with the characteristics I was looking for and working on its adaptation to my necessities pushed me to add details such as the table of the relationships and the database of the controversies (suggested for further researches).

4.2.2. The next step: the comparison with the external world

The comparison with the respondents provided me the most valuable results. Instead of focusing only on the information about the model itself, I looked for information that brought to know more about the management style of the companies in which the respondents work and the influence of their background and personality on the answers. The result analysis will be divided into two parts that will be merged in the end. The first part will include an overview of the gathered information not strictly related to the model but that influenced the respondents' point of views and the second one will be about the model.

Face-to-face interviews

This type of research was done for validating the AssistANT Database Model and the deriving theory.

The respondents in this case are:

A. Nicolas Trub, the founder of the *Stilic Force* a creative company existing for 18 years.
B. Sébastien Palanicaouden, a young engineer that is founding a startup
C. Quentin Martin-Laval, a young manager founder of a startup that deals with green energy called *Echny*
D. Ngo Van Vincent, another young manager that ideated a startup that provides video-games' services,the *EGG-one*
E. Camille Freisz, a young CEO of a pharmaceutical startup, the *Valwin*

F. Mattia Vincenti, a GRDP (rotational position for outstanding young engineer) in *Cameron*, one of the 500 Fortunes that operates in the Oil&Gas sector

G. Sebastién Randazzo, a highly experienced project manager at *Orange France Radio*, operating supervision system strategy

Overview of the respondents' **personal information and opinion**:

Questions	Results
Dealing with innovation	• 100% of the respondents
"Best" organizational structure	• 5/7 Hierarchical for maintaining the control • 2 Flat for increasing speed and flexibility • 100% of the respondent deals with the chosen structure in his current company
Opinion about last sharing tools as cloud, platforms etc	• 100% agree with their use • 6/7for improving the existent methodologies and overcoming problems in a more efficient and effective way • 1/7 for substituting the existent technology (Ngo Van) • 1/7 for establishing a healthy competition that will bring to high quality ideas (Randazzo)
Crowdsourcing	• 100% agree with its use manly for building a valuable relationship with customers and gaining different points of views
Open Innovation	• 60% of the respondents already use it • 100% considers it a powerful methodology mainly for increasing internal knowledge and flexibility
Customer Involvement	• 5/7 agree with this methodology for gathering more information and provide a higher customer's satisfaction (Ngo Van and Randazzo didn't agree)

Overview of the respondent's **project experience and job information**

Questions	Results
Project's experience	• 2/7 not existent, • 2/7 medium (less than 5 years) • 1/7 low (less than 2 years) • 2/7 Huge (more than 10 years)→(Trub, Randazzo)
Management style of their current company	• 4/7 whole involvement of all the employees in projects • 2/7 creation of restricted teams
Use of traditional PM methodologies	• 2/7 of respondents (Randazzo: <only for "non-extreme projects>)
Dealing with innovative projects	• 6/7 of the respondents dealt with innovative projects mainly for satisfying new need of the market
Training on PM	• 2/7 of respondents
Training on Innovation Managemnt	• 2/7 of respondents
Training on Agile PM	• 2/7 of respondents

Table 8 Respondents' project experience and job information

The interesting side of this interviews' section was to understand that, although the respondents belong to companies that aim at pushing toward the innovation world, the absence of training makes it difficult to be applied. Often, the methodologies mentioned were not known by the respondents but, after an explanation, they found them "powerful, interesting and useful for overcoming problems in a more efficient and effective way".

However, the management style together with the exploitation of the latest PM methodologies could partially cover the absence of knowledge about Innovation Management and Agile Approach.

Results from the AssistANT Database:

The respondents were ask for identifying the three most critical phases among the twelve proposed characterizing an innovative project development. The answers to this request were extremely heterogeneous and the level of information gathered was really high. I gathered by respondent the summarized answers together with the personal opinion about the database (Table 8).

The approach to the database was completely different from one respondent to another.

To sum up the main learnings, the database turned out as difficult to be applied to the startups' environment since most of the methodologies need money and time, the main resources a startup usually does not have.

The top management remains for the majority of the respondents, the main guide in the company and this was easy to be understood looking at the organizational structure preferences in the previous table. This point is in contrast with the latest trends of high involvement and also with the position of the respondents' companies that try to involve all the employees during a project but without providing them an acceptable level of decisional freedom. There is a low level of confidence in external sources and the customer is seen as the primary actor to deal with. This is the result of the lack of knowledge about open innovation and so the database should be implemented in an environment more open to the external or, better, with a basic knowledge about the potential of the OI approach.

The creative CEO, Nicolas Trub, was the one with a totally different point of view. The main difference with the others is his focus on the random factor. According to his point of view, the company should consider that all the events that happen have, for the majority, a random-nature so all the forecasting practices should be deleted.

Nicolas' point of view brought me to see that the random-factor is missing in the AssistANT Database and it should be introduced.

The respondents agree for the majority of problems and solutions but also gave me further information.

The managers of the startups underlined the difficulties, for them, to adopt the standard methodologies of the literature, the phases 'borders of a project development are less defined and often the early ones collapse into one stage.

Older, more stabilized companies like Cameron in which Mattia Vincenti works, due to their high level of experience, are used to deal with more standard and stabilized approaches. The use of restricted teams reflects the firm's approach to more traditional methodologies, a characteristic of the classical mature companies that face difficulties in adapting to the latest trends.

In both cases, startup and mature company, the database appear as an essential tool for guiding the team through the uncertainty of the innovation field, providing a more user-friendly tool to startups and an updating tool to mature companies. That should be in further prospects part the idea of a simple tool that is valuable because Nicolas point of view brought me to see that the random-factor is missing in the AssistANT Database and it should be introduce.

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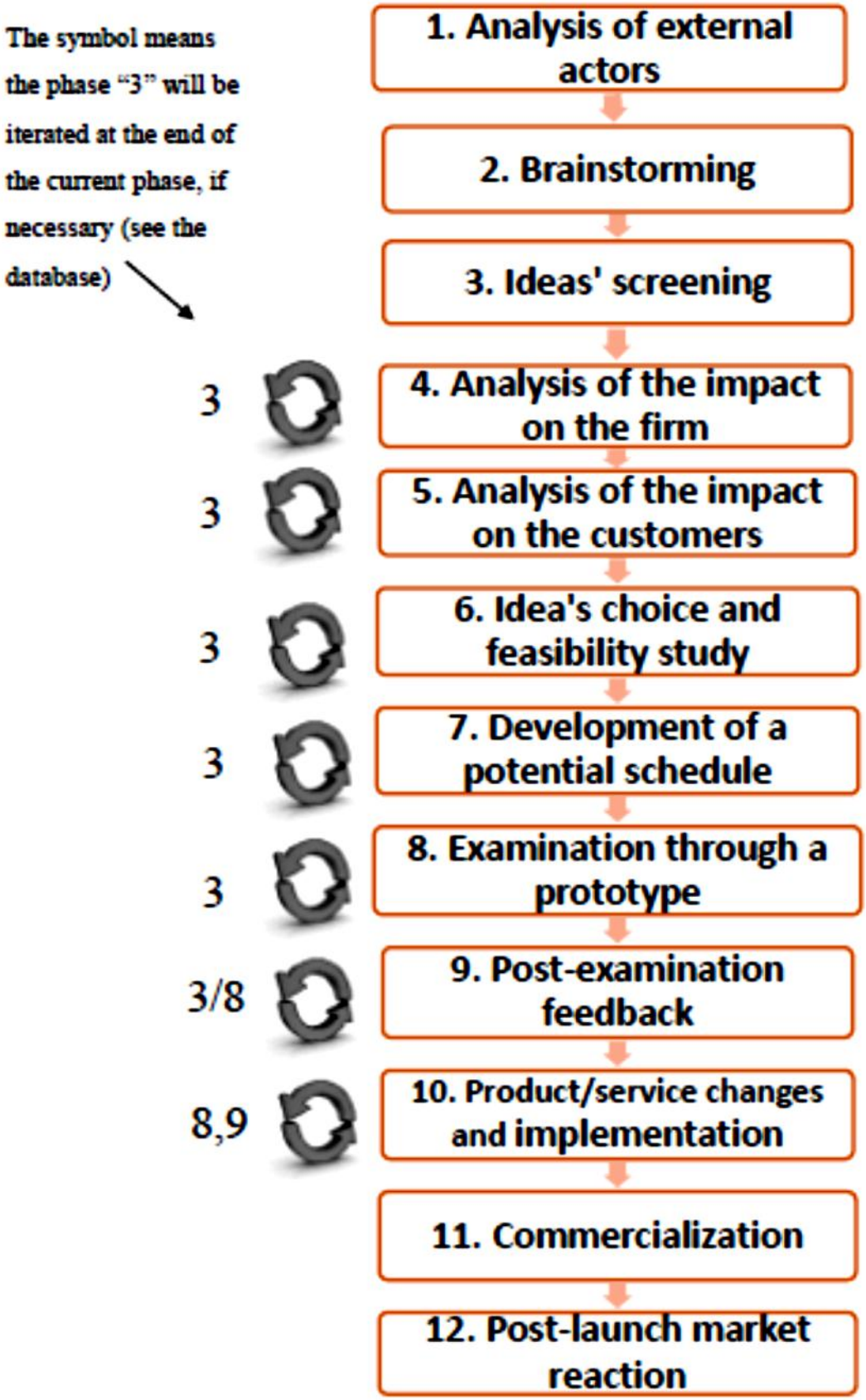


Picture 1 4 Phases Visualization

Resp.	Chosen phases(look at picture 14)	Reason	Opinions regarding the problems	Opinion regarding the solutions
A	10, 11, 12	Before them, there isn't enough information and the cost is low	Agree with all of them	Phase 10 :Impossible linking a quantitative measure of the gap between the version of the product before and after feedback's implementation Phase12: Cannot retire a product from the market, wait for the right moment
B	All	The project is always in the uncertainty	Phase2: It's not a problem "merging external and internal" concepts since the customer should receive the product, He doesn't know what can be realized!	Phase1: The development of involvement tools is too expensive for startups
C	3,5,7	The first phases are collapsed into one and the last are more standard	Phase5:The only external actors to be considered are only customers	Agree with all of them, except for involvement of lead users and visionaries →only customers!
D	All	For a startup everything is critical	Phase2: The "difficulty of merging external and internal ideas" cannot exist, the solutions don't have to fit the external input!	Phase1:It better to trace customers' actions instead of "developing a platform for collecting ideas" since they don't know what they need Phase3 :The top management doesn't have "to guide the team toward a common decision" ,it should take the decision
E	1,2,3	The beginning is the basis for success or the failure	Phase 3:"Do Not trust the external world's ideas" it's impossible if the company is already dealing with innovation	Phase 1: Involvement tools cannot be applied by startups because of money constraints
F	6,9,12	The idea's choice and the implementation can decide the destiny of the project	Phase 9: "Not being aware of how to gather feedback" It cannot be a problem in a good company, they must know it!	Phase 6: The development of the only core functions leads the risk of competitors that decide to copy the idea proving it faster

G	1,2,3	The more risky part of the project development, need of a support	Agree with all of them	Phase 2:Documents all the points of views can result in a waste of time and resources

Table 9 Respondents' personal information

The last questions submitted to the respondents were about the opinion on the overall model.

The impact on the managers was in general, very positive. The respondents' opinions defined the database as the supporting tool able to guide the firm in a user-friendly way. Moreover, discussing with these people belonging to really different sectors I validated also the flexibility of the AssistANT and the need of the market to have a support during the development of innovative projects.

The following table summarizes the results of the last questionnaire about the overall AssistANT.

	Identified 12 Phases' Evaluation	Iterations' Evaluation	Applicability To companies of different size/sector	Global evaluation	Applicability in the reality	Applicability in the current belonging company
A	Partially agree, adding the random factor	Agree	Maybe is possible, it should be tested before deciding	Good work, needs some improvement	It should be tried	Applicable
B	Agree	Agree	Applicable	Innovative, Useful	Applicable if customized for startups	Applicable
C	Agree	Agree	Applicable	Valuable, Innovative Top impressive	Applicable	Applicable
D	Agree	Agree	Customized version for startups	Valuable	Applicable if improved	Applicable if improved
E	Agree	Agree	Customized version for startups	Valuable, Innovative	Applicable if improved	Applicable if improved
F	Agree	Agree	Applicable	Innovative	Applicable	Applicable

G	Agree	Agree	Applicable	Innovative, aligned with current innovation's trends	Applicable	Applicable

Table 10 Respondents' overall opinion

Questionnaires

The questionnaires brought to more "clean" answers in both cases, both during the database and the diagram prototype's validation.

AssistANT Database

The two questionnaires were addressed to:

H = Antonio Calabrese, a Director of MBA&EMBA Division at MIP Business School and professor at Politecnico of Milan with a huge experience in Project Management

I= Yuri Sillano, project coordinator at Cameron, an American multinational company in the sector of oil and gas.

The answers will be merged with the previous 6 ones in order to have a more complete scenario on which to validate or not validate the model and the deriving theory, provided in this thesis.

Questions	Results
Dealing with innovation	• 100% of the respondents
"Best" organizational structure	• 2/2 Depends on the culture of the country where is the company
Opinion about last sharing tools as cloud, platforms etc.	• 2/2 agree with their use for improving traditional management tools • 50% of respondents agree with their use for overcoming problems in a more efficient and effective way
Crowdsourcing	• 100% of the respondents consider the method as a tool for improving company's results • 2/2 respondents consider the improvement in term of building a valuable relationship with the customer • 50% of the respondents consider also the possibility to reach a pool of heterogeneous ideas out of the company's boundaries

Open Innovation	• Only one of the 2 companies (Cameron) deals with open innovation and consider it powerful since allows to improve the company's knowledge and to deal with new sectors
Customer Involvement	• Only one (Cameron) of the two belonging companies involve the customer during the idea's generation, bringing better results but also higher costs and risks

Table 11 Respondent's personal information and opinions

Overview of the respondent's **project experience and job information (Table 11).**

Questions	Results
Project's experience	• ½ low (less than 2 years) • ½ huge (more than 10 years)
Management style of their current company	• One company (MIP) works with restricted dedicated team • One company (Cameron) works involving everybody in the project's development
Use of traditional PM methodologies	• ½ of the respondents
Dealing with innovative projects	• 2/2 dealt with innovative projects
Training on PM	• 2/2 of respondents
Training on Innovation Managemnt	• None of the respondents
Training on Agile PM	• None of the respondents

Table 12 Respondent's project experience and job information

The different approach of the two companies is visible from the different way in which they involve the employees in the projects. The absence of a training in pillar on which the company builds its strategy.

The experience in terms of project of the two respondents is totally different but, the particular thing is that the one with the lower experience (Yuri Sillano) has a more "innovative knowledge" since the Cameron (where he works) deals with Open Innovation and several ways to involve the customer during the idea's generation.

Both the companies are huge (more than 250 employees) and with more than 30 years of history.

Analyzing these and the companies of the face-to-face interviews I identified in the multinational background a driver for spreading the latest innovative trends inside a firm.

The need of guiding tool for developing innovative projects is evident after this research. Often the companies decide to spread innovation inside a rigid environment, where the organizational structure doesn't provide the right freedom to the employees. Huge companies as Whirpool use to exploit the air cover methodology: they keep the control providing, however, a freedom to the employees that are supervised from "on high".

The database should increase the level of confidence of the companies allowing the creation of more flat organizations where the flexibility meets the market's needs.

Results from the AssistANT Database:

The respondents were asked also in this case to identify the three most critical phases among the twelve proposed characterizing an innovative project 's development. The answers to this request were totally heterogeneous and the level of information gathered was really high. I gathered by respondent the summarized answers together with the personal opinions about the database (Table 8).

The first result from the questionnaire about the database was the different focus in terms of critical phases. Prof. Calabrese focused on the first phases of the project's development, being confident about the project management methodologies for the following phases The criticality of them is related to the possibility to exploit innovative methodologies for achieving a higher result facing, however, higher risks. The education sector in which the professor works is totally different from the oil and gas one, and the approach to the database underlined it. In this emerged the difficulty to adapt some solutions to the oil and gas sector due to the less degree of flexibility mainly in terms of time and money, required by the sector's projects.

The questionnaire provided an opposite result if compared with the personal one analyzed before. The company in which Mr. Sillano works spread the innovation value as one of the main pillars however the product realized does not allow to achieve level of flexibility(of costs and time not in terms of

product-they work on order) typical of the innovation field. Instead, the Education field in which the professor Calabrese works, provides higher elasticity.

The overall opinion was still positive although the only negative point is the adaptability to every sectors that is one of the main features of the model. In the following table are gathered the results of the questionnaires about the database prototype and the overall model.

Resp.	Chosen phases (pict. 14)	Reason	Problems opinion	Solutions opinion
H	1, 3, 6	The phases selected have the main influence on the project's success	Agree with all of them	Phase1: Main focus on the involvement tools and methodologies, alliances are precious! Phase 3: Focus on the PROTEE Methodology and the values inside the external ideas→ for innovating is essential creation of new goals Phase 6: Important deciding to be focused on core functionalities, if necessary to outsource or reallocate
I	6,7, 8	The idea's implementation is a risky phase that can bring to several problems	Phase 6: -The monetary problems shouldn't exist It would be too late to face them -The time's problem would lead to fees not to design reduction Phase 7 : The plan realization cannot be updated	Phase 6: Considering that outsourcing is not always possible Phase 7 : If the prototype production required more time than expected, the whole schedule for production has to be reconsidered, but usually the delivery date required by the customer is already frozen

			later, the problem doesn't exist	

Table 13 Respondents' database test

	Identified 12 Phases' Evaluation	Iterations' Evaluation	Applicability to companies of different size/sector	Global evaluation	Applicability in the reality	Applicability in the current belonging company
H	Agree	Agree	Applicable	Valuable, Innovative	Applicable	Applicable
I	Agree	Agree	Applicable if improved	Innovative, Useful, Well structured	Applicable	Applicable if customized for some aspects specific of the sector

Table 14Respondents opinion about the overall model

The ANT House Diagram

The validation of the new framework introduced in this thesis went through a questionnaire in which the respondents were asked to provide an opinion about the model on the base of their knowledge about Actor-Network Theory.

The results are again divided into two main sections, personal information and experience and opinion about the framework.

In Table 13 is possible to visualize the main important information gathered with the first part of the personal questionnaire.

Questions	Results
ANT Knowledge	• 100% of the respondents
Use to map the actors	• 6/7 of the respondents use to map actors related to a project. All of them considered important to trace both human and non-human actors (Sara never thought to use it)
Analysis of the Relationships among actors	• 100% of the respondents consider the relationships' analysis necessary for the project management
Oppositions and obstacles management	• 5/7 of the respondents negotiate with the "antiprogramme" with the aim also to build alliances, to learn and to improve the current project. • 2/7 of the respondents think that understanding and analyzing the "antiprogramme actors" will however allow to build alliances and increase the project's learning
PM & Innovation training	• Only one respondent didn't receive innovation training. (Sara) • 100% of them received PM training
Experience with innovative projects	• 4/7 of the respondents dealt with innovative projects in their career
Experience with projects	• 3/7 of them has a low experience (< 2years) • 2/7 of them have a medium experience (<5 years) (Anonym., Anastasiya) • 1/7 of them has a good experience (5-10 years) (Sara) • 1/7 of them has a huge experience (>10 years) (David)
Approach of the belonging company to the actors mapping	• 2/7 of the respondents belong to a company that is used to mapping the project's actors.(Anonymous, Indu) • 2/7 belong to a company that due to its characteristics can't map the actor • 3/7 belong to a company that doesn't use to map the actors but that, according to their opinion, should

Management style of the belonging company	• 4/7 of the respondents belong to a company that use to involve every employee in the project • 1/7 of them works in a company that manage projects with restricted dedicated teams(Divij) • 2/7 of them work in a top-down management company and don't agree with this management style (Souvik, Anastasiya)

Table 15 Personal information and opinions about respondents

The main information gathered on this phase of the questionnaire is useful for enlarging the idea about the current situation about the management of innovative projects trends.

All the respondents already knew Actor-Network Theory and it was interesting to know that the majority of them use the mapping methodology also if not required by the company in which they work.

All the respondents agree about the power of the theory and the necessity to take in consideration the relationships among all the actors linked to the project's development. The answers provided, supported the theory here proposed about the necessity to deal with the "antiprogramme actors" with a positive and proactive behavior!

Generally, companies used to treat the project's opponents as a source of problems while they are a precious source of knowledge! Among the answers, the negotiation is the most mentioned behavior in front of project's opponents. The respondents see this approach as a source of potential successful alliances and improvement for the project itself.

The analysis of the relationships among the actors look at a precious tool for sustaining this approach toward the opponents' negotiation.

Although the experience with projects is really different among the respondents, all of them agree in sustaining the mapping methodology also if the environment in which they work doesn't deal with this approach.

The value of the theory for the respondents stays mainly in taking in consideration the non-human actors in the mapping process as active during the development of the work. The opinion of Divij about the non-human actors mapping, gathers the thought shared also by the others:

"*Non-human actors are more important than the human actors because they equip a human to do what is supposed to be done. I can negotiate and argue rationally with a human actor to get what I want but I cannot do it with the non-human actors. Which implies that I am essentially powerless against them,*

and the only source of a good plan in such a losing battle is to know your enemy and to track its movement and existence. Therefore I postulate that non-human actors are much more interesting to manage than human actors as the onus of getting things done is on the Project Manager, so the PM should know what as well as who is influencing his Project."

Result from the ANT House Diagram questionnaire:

	Whole work evaluation	Applicability in the reality	Value added by the model
Anonymus	Valuable	Yes,if improved	Quantitative approach
Indu	Valuable	Yes	Evaluate anti programme actor in the place on supportive actor
Divij	Good and innovative	Yes for small projects, also for bigger if it will be programmed	Depending on the size of the project
Souvik	Valuable	Yes	Quantitative approach
Anastasiya	Valuable	Yes	Network analysis
Sara	Valuable	Yes	Overcoming the silent actors problem will reduce the obstacles and will force the manager/ employee to look deeper into the project and therefore avoid as much as possible the future conflicts
Dave	Innovative	Not right now, it's a bit complicated	it will make managers consider much more deeply the role of the actors in a project and enable them to strategize more successfully

Table 16 New framework evaluation by respondents

The questionnaire about the model provides interesting results.

The new framework proposed and analyzed here aims at overcoming two of the three open issues characterizing the literature about the ANT methodology.

The results from the questionnaires support the achievement of the thesis objective since the respondents often mentioned the quantitative approach as a successful way for adding "*some sense of numbers to ANT, which it always lacked. Lack of numbers means that you can't work around it and that you can't maneuver and play around with the variables that you have*." (Diji opinion)

A better understanding of the network and of the actors involved in a project is the main value added by the new framework according to 4 respondents that saw in the diagram a valuable tool for "*strategizing more successfully*" (Dave opinion) The black-box nature characterizing the traditional diagram looks finally open according to the respondents that identified in the new framework the possibility to analyze what the respondents consider essential (look at table 14) : the relationships among the actors!

In terms of positive impact, moreover, the new framework is seen as a way to force managers "to look deeper into the project and therefore avoid as much as possible the future conflicts"(Sara's opinion)

Although the theory looks validated by a pool of people that are pertinent, since they have dealt with project management, innovation management and Actor-Network Theory, there are problems that bring to the necessity to improve the model in further researches.

The most mentioned worst side of the new framework is the complexity of the instructions for building the new ANT House diagram. **The proposal of a video tutorial** by one respondent looks really interesting!

"*The complexity of the model is what works against it in most corporate environments. The complexity would potentially see it brushed aside for models that are more concise"* (Dave's opinion).

Another huge problem is linked to the use of the new model with big projects involving high number of actors. As underlined by Dimij, the model works really well with "small projects" but it looks not applicable to the bigger ones. An improvement suggested by a respondent that I considered essential for future improvements of the model is the **programmed version of the relationships tables** that brings to the electronic filling of them.

*"**Program it and then you are golden as far as** I am concerned. The worst feature is not embedded in this model, **it will depend on the person using it**. If a PM spends too much time and gets into analysis paralysis, then too bad for him. That's not the fault of your model. To err is human, but to err in Project Management is catastrophic. Your model adds to clarity and that can be threatening to some people. So all I can hope for is, that this model is not blamed if a PM makes a blunder by using up too much of his time on this model. **Up with his audacity to blame that on the model rather than with his mistake of over using it, we shall not put. "*** (Divij's opinion)

CHAPTER 5

5 Conclusions and Managerial Implications

5.1 Originality of the results and achieved objectives

This works aims at validating a **new framework for managing innovative projects**. The starting **objective** of making a further step in the management of innovative projects is, so, reached.

The **originality** of the work comes from the **application of a quality management quantitative tool to a sociological methodology, the Actor-Network theory**.

Going through the development of the new framework, I dealt with the **main current trends shared by business communities** that pushed me toward the development of a secondary model, the AssistANT database and toward a huge work of documents and books analysis that enriched me more than expected.

The management of innovative projects through this new theory won't be only a managerial matter but it will push toward **a cultural change** inside the company! The **fragmented nature** of the innovation management's methodologies **becomes a whole**, thanks to the **merging with the latest project management's methodologies** that complete the framework.

The empirical research underlined the need of a theory for unifying the **companies' willingness to be innovative and their effective approach with innovation.**

Comparing the prototypes of the diagram and the database proposed in this work, with people of different ages, nationalities, academic backgrounds and belonging companies' sector, allowed to validate the real flexibility of the new framework.

The **research questions were the *leitmotiv*** of this work **and increased inside me the curiosity already existent** about the innovation and project management.

It's now the time to provide an answer to these questions!

5.2 The answers to the research questions

The empirical research together with the analysis of the literature allowed me to figure out the three answers I was looking for during the development of this work. I start this thesis and I develop it around the following research questions already proposed in the first pages:

Table 17 Research Questions

1. *How do firms actually deal with the management of innovative projects?*
2. *Which objectives are being attempted to be achieved when Actor-Network theory(and mainly the related diagram) is exploited in managing innovative projects?*
3. *How managers could exploit the new framework for reaching these objective in an efficiently and an effectively way?*

Here I provided the answers resulted from this work:

1. How do firms actually deal with the management of innovative projects?

The current methodology for facing innovative projects is not unique since, through the literature analysis and mainly the interviews, it came out that often the approach among different companies is completely various! From the choice of the organizational structure to the last innovative methodologies usable, **every company has his own way to manage innovative projects.**

The confidence toward the **external sources** as precious sources of knowledge and learning, is often low or not existent and that sources are treated as a **dangerous** matter also in companies that declare themselves "innovative".

In the current days companies use to merge standard management methodologies together with some innovative approaches. The absence of training in innovation field, looks really strange since the **innovation and so the innovative projects are something that must be followed as a process in order to reach strategic objectives.**

2) Which objectives are being attempted to be achieved when Actor-Network theory (and mainly the related diagram) is exploited in managing innovative projects?

Applying the Actor-Network Theory to the management of innovative projects resulted the right choice since the results obtained overcame the expectations.

At the beginning of the research, the main objective was to develop a new framework allowing an agile management of innovative projects. Adding the quantitative side to this methodology was a winning strategy for making this methodology suitable to the innovative projects' field.

"*The best feature of this new framework is that it adds some sense of numbers to ANT, which it always lacked. Lack of numbers means that you can't work around it and that you can't maneuver and play around with the variables that you have*." (Divij, respondent's opinion about the model)

The ANT's choice and mainly the choice to be focused on its diagram, came from the analysis of the pillars of this methodology. The ANT, in fact, is founded on the main concepts on which lies also the potential successful approaches exploitable for dealing with innovative projects.

Example of these pillars are the sharing, the network of relationships, the external sources, the "antiprogramme" actors consideration, the evolution of a project In terms of actors involved, the user-friendly approach to management tools (avoiding complexity).

The application of the ANT aimed at being able to develop a **powerful and user-friendly support for managing innovative projects, characteristics that belong to the traditional ANT diagram.**

3) How managers could exploit the new framework for reaching these objective in an efficiently and an effectively way?

The application of the new framework developed in this work allows managers to develop innovative projects in **a more effective and efficient way** reaching the objectives for that the ANT was choice. The ANT House Model will provide to managers **a new point of view**, increasing the **level of confidence** in both external and internal actors, increasing the f**lexibility** of the company itself and the agility in managing projects. The support provided by the model will be **always next to the manager**

and its team, since the first steps, providing, through its **user-friendly help a lower level of risk and a higher value to both project and company.**

The analysis of the respondents answers (both questionnaires and face to face interviews) together with a **comparison in terms of sector** in which they work, **academic background** and **approach** to **innovative project** of the belonging company, provided an enough-complete idea about the potential impact of the tool on the real world.

5.3 Suggestions for further researches

The new framework developed in this work looks as a **potential successful approach** toward innovative projects. However, the model is **not complete yet**. The comparison with the respondents underlined some problems that now don't allow to the model to be a real successful approach instead of only a **potential one**.

The development of the House diagram resulted **too complex** and this is a very important problem since the easiness of the use is one of the basic idea of the framework.

Moreover, the **adaptability** of the House **to big project needs a "programmed version**" of it otherwise it won't be possible to realize it.

The same problem is related to the relationships' tables in which the **complexity will grow** even more due to all the possible combinations available.

Finally, going inside the model, the **AssistANT database** was found **not suitable** mainly **to startups'** environment so it should be improved maybe developing two versions with one specific for startups.

According to my opinion, due to the really **good reaction of the respondents to the prototypes**, it would **worth to continue work on this model** for improving it overcoming the mentioned obstacles.

In order to overcome the complexity of the **guidelines for filling in the diagram**, it could be possible to provide also a **video-tutorial** about it. In addition to the **electronical version** of the diagram (both House and relationships' tables) and the double version of the database, I propose another suggestion for further researches:

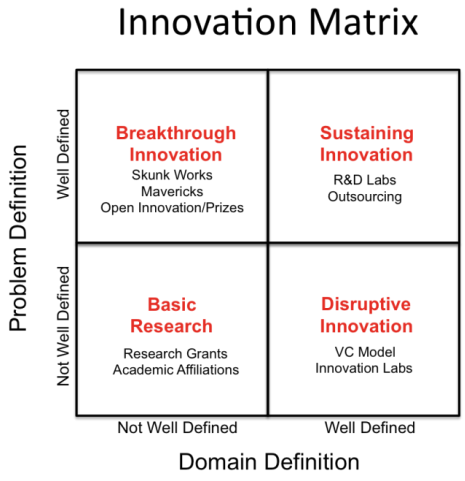
The development of a **database** in which are collected all the **controversies faced** in terms of couple of actors involved and conditions in which occurred. This database would save a lot of time to the manager since he (and his team) won't have to analyze already saw relationships more times.

6 Appendix

6.1 Table for innovation adopters[11]

Segment	Descriptive Label	Characteristics
Early Market Innovators	Technology Enthusiasts	Appreciate innovation for its own sake Motivated by the idea of being a change agent in their reference group Interest in new ideas leads them out of narrow circles of peers into broaders circles of innovators Willing to tolerate initial glitches and problems that may accompany any innovation just coming to market and are willing to develop makeshift solutions to such problems
Early Adopters	Visionaries	Look to adopt and use innovation to achieve a revolutionary improvement Attracted by high-risk, high-reward projects Because they envision great gains from adopting innovation, not very price sensitive May demand personalized solutions and quick-response, highly-qualified sales and support
Mainstream Market Early Majority	Pragmatists	Rather than looking for revolutionary changes, motivated by evolutionary changes to gain productivity enhancements Averse to disruptive change; want proven applications, reliable service, and results Want to reduce risk in the adoption of the innovation The bulwark of the mainstream market
Late Majority	Conservatives	Risk averse and technology shy; price sensitive Need completely preassembled, bulletproof solutions Adopt innovation just to stay even; often rely on a single, trusted adviser to help them make sense of technology
Laggards	Skeptics	Want only to maintain the status quo Tend not to believe that innovation can enhance productivity and resist new technology purchases Buy only if they believe all their other alternatives are worse and cost justification is absolutely solid

6.2 Innovation Management Matrix



Basic Research: When you're aim is to discover something truly new, neither the problem nor the domain is well defined. While some organizations are willing to invest in large-scale research divisions, others try to keep on top of cutting edge discoveries through research grants and academic affiliations.

Often, the three approaches are combined into a comprehensive program.

[11] "Successful Development and Commercialization of Technological Innovation: Insights Based on Strategy Type", by Stanley F. Slater and Jakki J. Mohr- Journal Product Innovation Management (2006;23:26–33)

Breakthrough Innovation: Sometimes, although the problem is well defined, organizations (or even entire fields of endeavor) can get stuck. For instance, the need to find the structure of DNA was a very well defined problem, but the answer eluded even Linus Pauling, the most talented chemist of the day. Usually, these types of problems are solved through synthesizing across domains. For instance, Watson and Crick solved the DNA problem by combining insights from chemistry, biology and X-ray crystallography. In a similar vein, many companies are learning to embrace open innovation in order to pull in diverse resources.

Sustaining Innovation: Whatever you do, you always want to get better at it. Every year, our cameras produce more pixels, our computers get more powerful and our household products become "new and improved." Large organizations tend to be very good at this type of innovation, because conventional R&D labs and outsourcing are well suited for it.

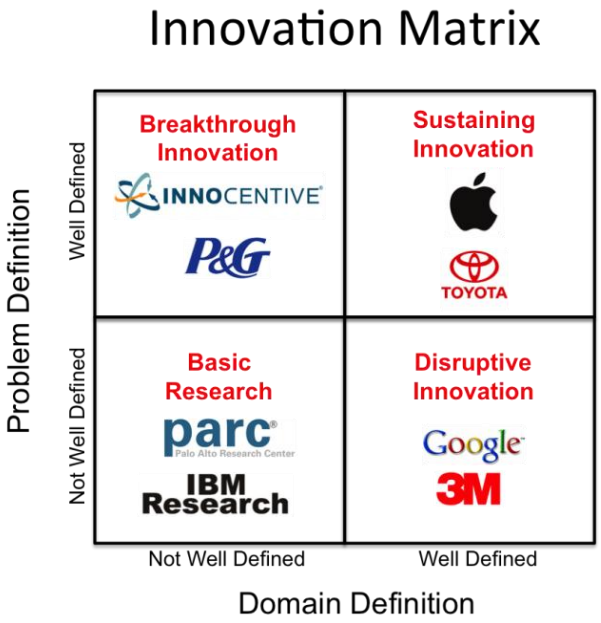
Disruptive Innovation: The most troublesome area is disruptive innovation, because its value isn't always immediately apparent. Notably, Yahoo and Blockbuster had the opportunity to invest in Google and Netflix early on, but missed the opportunity because they didn't see the potential.

Disruptive innovations generally target light or non-consumers of a category so require a new business model and therefore have high failure rates. Venture capital firms who focus on disruptive investments expect to that most will fail. One growing trend is for companies to establish innovation labs, where they can test and learn without excessive risk.

World Class Performers

One thing that is especially confusing about innovation is that great innovators tend to be quite diverse and different from each other. Anybody seeking to define best practices by talking to successful companies would find much of the advice contradictory.

The Innovation Management Matrix can help here as well, because upon a little reflection it becomes clear that successful innovators tend to focus on one area of the matrix.



Basic Research: While most basic research happens in academic institutions, some businesses can excel at it as well. IBM research is one that truly focuses on pushing the boundaries of science. In 1993, for example, they accomplished the first quantum teleportation; a technology that isn't likely to result in a product until after 2020. They continue to lead in patents.

Xerox's PARC division, on the other hand, shows both the potential and the pitfalls of basic research. Major innovations such as the ethernet, thegraphical user interface and the mouse were developed there, but Xerox failed to commercialize them. They have since spun off the division, which now operates as a high-end research outsourcing contractor.

Breakthrough Innovation: There are those rare souls who are capable of making breakthroughs, but usually only earlier in their career. However waiting for a maverick genius to come along isn't a viable business model.

That's why many firms are turning to open innovation platforms such as Innocentive, which allow outsiders to solve problems that organizations are stuck on. Procter and Gamble has built its own Connect & Develop platform which allows them to benefit from expertise in a variety of domains across the world.

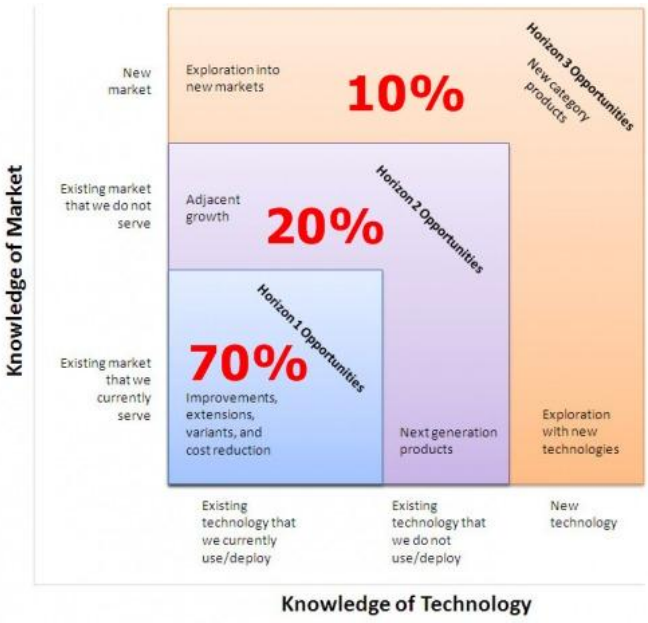
Sustaining Innovation: While everybody agrees that Apple is a superior innovator, the truth is that they rarely produce anything truly new. They didn't invent the digital music player, the smartphone or even the tablet computer. However, they improve on earlier versions to such an extent that they seem like they're something completely new.

In a similar vein, Toyota makes cars just like any others, except better. What both companies have in common is that they are masters at adapting breakthrough innovations for existing markets (it was, after all, Steve Jobs who most benefited from PARC's work). In essence, great sustaining innovators are great marketers. They see a need where no one else does.

Disruptive Innovation: While every new Apple product turns heads, when Google comes out with something most people won't even understand what it is much less how they'll make money on it. From Google Maps to autonomous cars, they manage to fill needs we didn't even know we had.3M, the company that pioneered scotch tape and post-it notes, derives up to 30% of its revenue from products launched in the past 5 years. Both companies use a version of the 15% / 20% rule, where employees are required to devote a fixed portion of their time to projects unrelated to their jobs. While that's not a viable solution for most companies, many firms are trying to achieve the same effect on a smaller scale with innovations days, hackathons and innovation labs, where employees are encouraged to think beyond existing lines of business."[12]

6.3 Three Horizons Approach[13]

The developing innovations for each horizon requires different approaches and types most companies co-mingle all three in a single innovation organization. This may explain why many organizations are not satisfied with the results of their innovation activities, as they are confusing their goals and their approaches to innovation.



Horizon 1 Innovations. These types of innovations are incremental by definition. The vast majority of innovation projects fall into this category. This is not surprising since if you ask 100 of your current customers, "How can we improve our product?" probably 90 of them will answer by saying, "Make it better, faster or cheaper." There is nothing inherently wrong in pursuing Horizon 1 innovations, since they are exactly the types of innovation which will make your current customers most happy. They are also the most achievable ones. Companies need to consider how to best identify and implement Horizon 1 innovations.

A crowd sourcing model which solicits ideas from employees and customers through an idea management system is highly effective for Horizon 1 innovations. The people most familiar with the needs of the existing customers and deployed technologies are in the best position to identify

[12] Forbes Article http://www.forbes.com/sites/gregsatell/2013/03/07/how-to-manage-innovation-2/
[13] http://timkastelle.org/blog/2010/08/innovation-for-now-and-for-the-future/

opportunities for incremental improvements. The Toyota model of innovation operates this way. Toyota employees are encouraged to submit their improvement ideas and thousands do. Toyota claims they have implemented tens of thousands of these innovations over the past decade. Our own experience here at PwC supports this. Our idea management system (iPlace) had sourced over 2,000 ideas over the past year from our staff of which over 20% are under consideration for implementation.

Horizon 2 Innovations. According to Terwiesch and Ulrich, Horizon 2 innovations are next generation products serving existing or adjacent markets. Depending on employees and customers to define new products is probably a risky proposition. Employees and customers, in general, may not have the time or skills necessary to evaluate new technologies and determine their potential for new product development. Nor would they have access to the market research and competitive analysis which are a part of any product development process.
There are many formal and informal techniques applicable to the new product development process. Whether you use brainstorming, detailed market research, or hire an outside product development company is based on the particular situation of your firm. However, it is important to note, that in most cases, the development of new products (Horizon 2 innovations) is most effective using different techniques from Horizon 1.

Horizon 3 Innovations. These innovations are often described as "breakthrough" innovations, or discontinuities. They are not directly related to existing markets or technologies, but represent totally new products or services which are not extensions of existing ones. These are the "out of the box" types of ideas that many business leaders seek.
R&D labs have historically focused on these types of innovations. There are many successful R&D models but there are some common characteristics. They often involve both people from within a business with deep experience in the business and researchers with limited specific business experience but deep knowledge of the new technologies. Successful R&D incorporates failure as a normal event, with the expectation that not every idea or even prototype product will be successful.

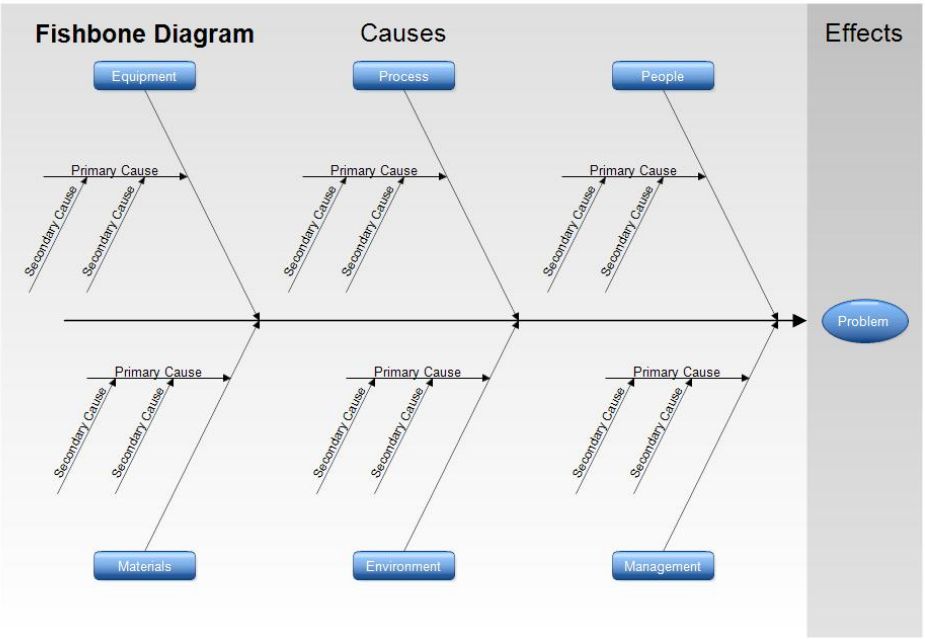
Again the key point here is not what specific R&D techniques your firm chooses to apply, but that they are substantially different from the techniques of Horizon 1 or 2 innovations.

Conclusion. Companies need to recognize that they need different approaches, techniques and even management styles for each Innovation Horizon. It is not necessary to pursue all three types of innovations, but it is necessary to define which Horizon(s) you are focused on, and apply the right techniques for each Horizon.

6.4 The Ishikawa Diagram (Fishbone Diagram)

The analysis of the root cause is carried out exploiting the fishbone diagram developed by the professor Kaoru Ishikawa of Tokyo University that allows to figure out a cause effect analysis on a specific issue. The name of the diagram comes from the shape of it, similar to the skeleton of a fish (picture 24).

The aim of the diagram is to understand the root causes of a problem that will be clearer to all people involved. The implementation of the solution will be possible after the removing of that causes, action that helps in creating a consensus of a team around a problem that will be permanently remove (or at least the delay will be reduced). The effect in the diagram is the problem on which the team is focusing and the tool beyond the main cause's identification allows to define the most productive areas for further investigation.



Picture 25 Fishbone Diagram-Template[14]

The first step to use it is to identify the problem, putting it in a box. Then draw an arrow that points toward the box and start analyzing the problem more in detail identifying, where appropriate, the sub-problem with the related information about people involved, place and time of occurrence.

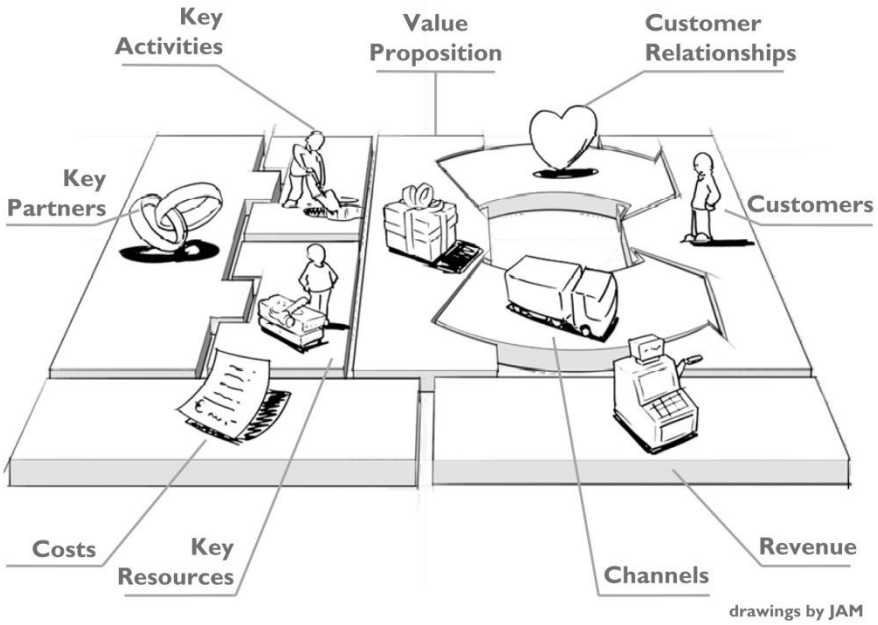
[14] http://www.rff.com/fishbone-template.htm

7 Innovation Glossary

7.1 Business Model

The Business Model includes the **flows of revenues** that the firm generates exploiting profitable activities, the functionalities and the components of the business **together with the related costs.**

Developed by Alexander Osterwalder, the Business Model consists of a Canvas that groups nine blocks.In order to provide the same help to these kind of business was created a different plan called Business Model



Picture 26 Business Model Canvas[15]

The nine blocks[16]:

Customer Segments: An organization serves one or several Customer Segments.

Value Propositions: It seeks to solve customer problems and satisfy customer needs with value propositions.

Channels: Value propositions are delivered to customers through communication, distribution, and sales Channels.

[15] Business Model Generation -A Handbook for Visionaries, Game Changers, and Challengers", written by Alexander Osterwalder and Yves Pigneur

[16]" Business Model Generation -A Handbook for Visionaries, Game Changers, and Challengers", written by Alexander Osterwalder and Yves Pigneur

Customer Relationships: Customer relationships are established and maintained with each Customer Segment

Revenue Streams: Revenue streams result from value propositions successfully offered to customers.

Key Resources: Key resources are the assets required to offer and deliver the previously described elements…

Key Activities: …by performing a number of Key Activities.

Key Partnerships: Some activities are outsourced and some resources are acquired outside the enterprise.

Cost Structure: The business model elements result in the cost structure.

7.2 Serial Innovator

Defined as "people who develop and bring to market at least two breakthrough innovations in established company"[17], they are really not common, from one in 50 members of an R&D and engineering staff at a smaller organization to one in 200 at a larger organization — and perhaps as few as one in 500 at most Fortune 200 companies.(Vojak)

They possess an unusual combination of skills — a track record of technical excellence; a strong focus on solving important problems for customers; a willingness and ability to "cross the bridge" from merely inventing a good solution to taking on the organizational politics required to convince others in the company of the value of their innovation.

Serial innovators also invest a lot of time in the very front end of innovation, identifying an important problem and understanding it from multiple perspectives. [18]

An example is Chuck House, who developed a number of new products for Hewlett-Packard, was awarded a "Medal of Defiance" by Hewlett-Packard's then-president, the authors write, "as a reminder to all the firm that breaking the rules can be associated with great reward"(Vojak).

[17] "Serial Innovators", by Griffin, Price, Vojak
[18] Finding serial innovators", by Martha E. Mangelsdorf, Special to Financial Post (November 20, 2012)

7.3 Lead User

The term "Lead User" was coined by Von Hippel in 1986 to define a user whose needs are precursors of the ones that the market globally will have later and these needs can be strong till the point that they come out with an innovative solution in order to satisfy them.

They can be defined as a source of novelty and understanding their behavior provides an advantage in terms of development of innovative concepts and products, services or processes especially in fast-moving fields.

Since the products conceived by lead users are often the base of a later commercial version, among companies arose a "Lead user methodology" that relies on identifying these people and involving them in the innovation development' process.

Lead users are characterized as users who (1) face needs that will become general in a marketplace much earlier before the bulk of that marketplace encounters them; and (2) are positioned to benefit significantly by obtaining a solution for those needs (von Hippel 1988).[19]

Lead users originally have been seen as being motivated intrinsically to innovate, performing the innovation process autonomously and without an interaction with a manufacturer. It then is the task of the firm "just" to identify and capture the resulting inventions. In recent years, however, a lead user method has been established that allows firms to systematically utilize the input of lead users for a given innovation problem (Thomke/von Hippel 2002; Churchill et al. 2009)[20].

7.4 Innovation typologies

The impact of the innovation on the market and also on the society can assumes different shapes according to the degree of novelty of it and the reaction of the customers.

[19] *Von Hippel, E.* (1988): The sources of innovation. New York.
[20] *Thomke, S./von Hippel, E.* (2002): Customers as innovators: a new way to create value, in: Harvard Business Review, Vol. 80, No. 4, S. 74-81.
Churchill, J. et al. (2009): Lead User Project Handbook. A practical guide for lead user project teams, http://web.mit.edu/evhippel/www/tutorials.htm

In literature the main typologies of innovation are the ones that follow.

Architectural or **Design innovation**:

As the name says, it involves the already existing technologies acting on the components' layout and the reconfiguration of the linkages

Revolutionary innovation :

This is that type of innovation that brings the current products to be obsolete.

Radical innovation:

This innovation exploits new technologies in order to improve the existing products, services or processes in terms of benefits for the users. "A radical innovation combines the technological novelty of technology breakthroughs, and the dramatic improvements in customer and user benefits evident in market breakthroughs (Chandy and Tellis 1998; 2000).

A technological breakthrough is a product, service, or process that involves scientific principles that are substantially different from those of existing products, services, or processes (Chandy and Tellis 1998). An alternate label for such an innovation is platform innovation (Tellis and Sood 2008, p. 153). An innovation that is a market breakthrough, instead, provides substantially higher customer benefits per dollar than existing products, services, or processes but is based on the same core technology as existing products, services, or processes (Chandy and Tellis 1998)."[21]

Incremental innovation

This is the type of innovation with the lower impact on technology and generally the lower results in terms of users' benefits. This comes from a series of incremental changes without any radical ones.

Disruptive innovation:

This kind of innovation is a "long-term" impact. During the introduction on the market, since it brings on the market an existing product with a new set of performance-price-characteristics, at the beginning the level of performance will result lower than the previous product and/or the price too much high.

[21]" INNOVATION TYPOLOGIES" by Rajesh Chandy and Jaideep Prabhu

This set of attributes, however, will succeed in satisfying the customers' needs thanks to the subsequent development that will attract more customers than before.

Discontinuous innovation:

The impact of this innovation typology is directly on the behavior of the customer that, as a result, will change in order to exploit the innovative product. "It alters existing patterns of use or creates new patterns of use (Gatignon and Robertson 1986)." (Rajesh Chandy and Jaideep Prabhu)

7.5 Co-design: the user-driven innovation

The concept of Co-design relies on the assumption that merging the roles of users and designers encouraging them to figure out a solution together, the final result will be more valuable for the user himself.

"The basic fundament can be described as a social constructive pragmatism where it is possible to design an infinite numbers of views of reality. Such collective, or individual, process of challenging existing views, designing new views and choosing the best one for re-implementation is called co-design." (Lars ALBINSSON, Olov FORSGREN, Mikael LIND)

The involvement with interest of the users in the design process is a source of quality improvement and their perspectives and expectations will be hold during all the process.

The user-centered nature is pretty clear as the base of participatory design and co-creation however, it differs from both of them for two reasons:

1. Co-design differs from participatory design in that it does not give a higher importance to some stakeholders
2. It differs from various user-centered design approaches in that the design client cannot use the artifact itself

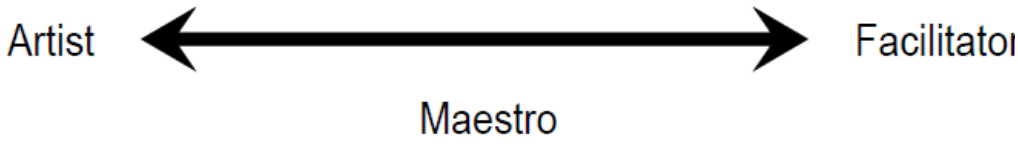
The choice of the users with who developing solutions is pretty important, mainly when the approach chose is the one of open innovation. In this case, the users' selection becomes a dynamic process that

involve people with different background that need to communicate in the "same language" and need to be guide by the figure of a leader.

The topic of the Co-design leader was faced by Mc. Kenney, Copeland and Mason during a study of IS development in which they identified the figure of the leader in the one called "Maestro[22]".

Maestro is a person that deals with the management of **different perspectives** and their flowing into a coherent design developing or finding a **unique "language**" that allows the different people involved in the process to communicate.

The authors mentioned, in the same study, proposed the Maestro as a figure between the "artist" and the "facilitator" representing this concept with a picture (picture 27).



Picture 27 The Maestro range of roles in co-design

The left hand end borders the archetypical artist, someone that forms ideas from a strictly personal perspective, more or less in solitude. Of course single persons can make significant contributions, but today there are many areas where a single person cannot have sufficient knowledge or impact. The other hand is the extreme facilitator who facilitates a discussion without entering a single personal idea or opinion4. The Maestro's behavior is somewhere between the end points, s/he will both contribute ideas and help other to contribute. (Lars ALBINSSON, Olov FORSGREN, Mikael LIND)

A tool that can be used in the co-design process is the already mentioned Actor Network Theory that:

- It's a descriptive tool supporting social investigation, design research and design processes,

[22] The term Maestro was coined by Arthur Squires (Squires, 1986) as "Maestros of Technology"

- It allows to re-think the traditional notion of design and participation and participative and collaborative design methods
- It sees design as translation/composition/instauration implications for design and the design of designs,
- It allows to rethink the ontological status of the design object/subject

(C. Storni, T. Binder, P. Linde, D. Stuedahl)

7.6 Co-creation

A co-creation process involves the customer in realizing products and services value. The reason that push him to be part of this process must be detected by companies, being a potential source of value creation. Usually the organization used to build value and develop innovation focusing only on the internal resources and treating customers as passive actors but, nowadays, the situation is totally different.

The co-creation paradigm positions the source of value within the co-creation experience, which is actualized through the company-customer interaction events. By co-creating with the network, the customer becomes an active stakeholder in defining both the interaction and the context of the event, including their specific personal meaning. The personal nature of the interactive experiences enables new dimensions of value which are based on the quality and the personal relevance of the interaction events, as well as on the opportunity for customers to co-create their own unique end products, services, and experiences. These dimensions are critical for the emergence of experience-innovation networks putting the individual at the heart of co-creation experience through the development, access, and dynamic reconfiguration of appropriately designed technological, business process, and human resource infrastructures. In this sense, the value co-creation paradigm represents a specific, market-driven approach to the adoption of an open innovation business philosophy. It provides a dynamic understanding of firms' innovation boundaries, which opens the possibility for a better competitive positioning through a better articulation of their innovativeness.

(…) As a note on the future of the value co-creation business and innovation paradigm we could summarize a somewhat prophetic view of Prahalad and Krishnan (2008). According to them, there is a fundamental transformation of business under way, which is supported by two basic pillars:

i) value is based on unique, personalized experiences and firms have to focus on one consumer experience at a time (N=1), even if they serve 100 million consumers;

ii) no firm is big enough in scope and size to satisfy the experiences of one consumer at a time, therefore, all firms will focus on acquiring resources from a wide variety of other big and small firms, i.e. the focus will be on access to "R"esources on a "G"lobal scale (R=G).

As Prahalad and Krishnan state: "We believe that the traditional sources of competitive advantage, such as access to capital, physical location, and raw materials or technology, will become table stakes. These factors are diminishing in their importance as sources of competitive advantage. Access to these factors is becoming easier. As we move to an N=1 and R=G world of value creation, we believe that competitive advantage will depend on a firm's approach to business processes that can seamlessly connect consumers and resources and manage simultaneously the needs for efficiency and flexibility."

(Marco Seppa and Stoyan Tanev , 2011)

Recently, the term co-creation has been established to denote special methods and strategies applied by firms to engage customers and users into their innovation process (Prahalad/Ramaswamy 2004). Customer co-creation describes as set of methods that establish an active, creative and social collaboration process between producers and customers (users) in the context of new product development (Roser et al. 2009; Piller/Ihl 2010). It denotes a paradigm shift

The term customer co-creation denotes a product development approach where customers are actively involved and take part in the design of a new offering (Wikstroem 1996; Piller

2004; Prahalad/Ramaswamy 2004). More specifically, customer co-creation has been defined as an active, creative, and social process, based on collaboration between producers (retailers) and customers (users) (Roser et al. 2009; for extended reviews of the active role of customers in the innovation process refer to von Hippel 2005; O'Hern/Rindfleisch 2009; Piller/Ihl 2010). The idea of co-creation is to actively involve customers in the design or development of future offerings (Ramirez 1999), often with the help of tools that are provided by the firm.

Co-creation activities are performed in an act of company-to-customer interaction which is facilitated by the company (Frank Pillar, Alexander Vossen, Christoph Ihl)

7.7 Crowdsourcing

The name, created the journalist of "Wired" Jeff Howe, comes from mixing together the terms:

- Crowd
- Outsourcing

This is a collaborative methodology through which firms ask for the active help of the network (crowd) giving to a limited group of people (outsourcing) the work accomplishment.

"The principle of crowdsourcing is that more heads are better than one. By canvassing a large crowd of people for ideas, skills, or participation, the quality of content and idea generation will be superior" (what-is-crowdsourcing, s.d.).

One of the main example of Crowdsourcing is the on-line encyclopedia "Wikipedia": the founders, instead of realizing an encyclopedia by themselves, gathering the knowledge of people from each part of the world, created the best encyclopedia ever.

"Until recently, "traditional" corporates have watched open innovation and crowdsourcing initiatives from the sidelines with very few getting directly involved. There are signs that this is changing; with the economic downturn in recent years, more and more businesses have been turning to outsourcing as a cost-saving measure.

Outsourcing to a cheaper labor force has its advantages (and disadvantages), and crowdsourcing can often also save businesses money. However, where crowdsourcing excels is in opening up a large workforce with a diverse set of skills and experiences, as within the crowd you'll find domain experts that are notoriously difficult to tap into by "conventional" means. Having access to that kind of diversity and micro expertise at scale can only be a good thing for business." (How crowdsourcing and open innovation could change the world)

"Collectively, a crowd offers scale and diversity of thinking that provides faster problem-solving with more knowledge and expertise infused in the process. There are more ideas to choose from, and more powerful ones than when they originate and end with a limited group of people.

Another benefit is the engagement crowd participation drives. By providing transparency and visibility within your organization, employee morale and customer loyalty stand to improve significantly.

Five Crowdsourcing practices are:

1. Set goals

   Articulate the problem and give your audience a specific challenge or clarity around the end goal. Framing the questions is vital to success.

2. Practice cross-fertilization

   Executive sponsorship is important at the onset to gather crowds, but don't limit participants to a single area of expertise or department within a business. Bringing together different thinkers results in bigger, better ideas.

3. Make it fun

   There needs to be a social recognition and a game quality to make what is ultimately a problem-solving task attractive to participants. Integrate game mechanics and voting, or prizes to motivate the crowd.

4. Be committed.

   Be prepared for a continuous feedback loop – to provide an answer, take action or just simply acknowledge the crowds contributions.

5. Allocate back-end resources.

   On the front-end, things like communication and motivation are critical. Once the ideas start rolling in, there needs to be curation and filtering, along with plans to put the contributions into action." (Interview to Paul Pluschkell, CEO and founder of Spigit)

8 Open Innovation: P&G Case study

P&G Case Study

In the late 1990s, their innovation program had lost its way. Successful product innovation was at the center of their competitive strategy, but their performance had been slipping. P&G had reviewed their Research & Development strategy and increased their budget for the five years leading up to 1999, even though they already had one of the largest R&D budgets in the world.

The problem was that the increased R&D spend didn't improve their performance – a classic case of Innovation Commitment increasing without an equivalent increase in Innovation Competence.
By 1999, R&D expenditure as a proportion of sales had increased from around 4% to nearly 7%, new product success rates were stuck at 35%, P&G had developed a huge collection of patents, but **fewer than 10% of them were being used in actual products**. The last one is the fact that still blows me away. The outcome of this was a drop in the P&G stock price from $118 per share to $52.. They were sinking a huge amount of resources into innovation, but they were not getting a very good return at all on this investment.
They, in response, initiated the Connect & Develop program, which was designed to use open innovation to improve their innovation outcomes.
The interesting thing here is that this wasn't just another increase in Innovation Commitment – P&G's first move was actually to *decrease* their innovation infrastructure. They significantly reduced their R&D spend, they changed their innovation metrics and they cut back on activities that weren't leading to the kinds of outcomes they needed.
The next step was to use Connect & Develop to get more ideas out into the world – one of their major weaknesses previously. As they did this, they moved into the Fit for Purpose category. P&G got better at executing ideas, and they were learning about how to use their resources more effectively within the new open innovation approach. The end result is that Procter & Gamble is now considered to be one of the most innovative companies around, and is certainly a world leader in using open innovation. (Kastelle, 2012)

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10 Biography

Eva Vincenti

Student of the Master of Management Engineering, I took a bachelor degree in the same course in 2012 at the Politecnico di Milano.

The aim of studying brought me to move from a little village in the South of Italy to the big city of Milan in 2009.

The change was huge and enriched my life from a lot of different perspectives. The choice of Management Engineering comes from my passion for a pool of areas - from the economics, marketing to the mathematics and physics- that the course allowed to cover.

The Master opened me a bigger panorama of possibilities including the main areas of interest, Management of Innovation and Project Management.

The choice of writing the thesis abroad is, instead, a result of another passion: knowing new languages and cultures. The same reason that brought me to do the Master at the International branch of "Politecnico di Milano", in the city of Como that collects students coming from all parts of the world.