Ways of goal setting and measurement for radical innovation

Jorge Peydro

Bachelor of Science Thesis
KTH School of Industrial Technology and Management
Integrated Product Development IPD-2015
SE-100 44 STOCKHOLM
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1 Introduction

This bachelor thesis is part of a research project that is being done in the KTH School of Industrial engineering and Management (ITM), more concretely, in the product innovation management department, a specialization of the Department of Machine Design. This project is based on collaboration between researchers and companies.

Nowadays, thousands of industries around the world are working under continuous changes in the environment that surrounds them. In order to build a dynamic competitive advantage and become the industry leaders, the firms have to develop different skills that allow them to adapt to these changes, explore new options and exploit the current situation.

However, this balance between efficiency and innovativeness is not easy to achieve due to the contrary skills that require each term, such as flexibility, teamwork and creativity for innovativeness or standardization, productivity and specialization for efficiency. This difficulty is making that firms want to have efficient methods that allow them to achieve these two competences.

Moreover, in (Locke, 1996) order to achieve a superior performance and ensure their future within these two different types of skills, companies have to define clear objectives and they have to be able to measure the progress that they are making in the accomplishment of these goals so that they are able to improve their performance. Currently, firms from all over the world, are studying and trying to define new ways and methods of goal setting that can ensure at the same time efficiency and innovativeness for them, but this methods are becoming outdated and they must adapt to the changing environment that surround the firms so it is becoming more and more important to find new ways of doing it.

Due to these considerations, the global objective of the research project is to define a methodology for goal setting and measurement of product development that allows both efficiency and innovativeness. Within this broad study field, one part of the research project is to identify and analyze these two terms especially for achieving radical innovation and this bachelor thesis will focus on it. In the part that concerns to radical innovation, having an efficient method for goal setting and measuring the radical innovation processes is so important due to the high uncertainty and risks that the firms take when setting goals for this type of innovation.

This part of the research project, will be based on a deep literature review. This will allow to expand the existing knowledge and to critically evaluate the existing methods of goal setting and measurement for radical innovation in organizations. Along with this, different firms with different ways of organizing for radical innovation be identified and analyzed in terms of goal setting and measurement. In this part of the project, a qualitative work will be done through interviews and face-to-face meetings to identify how they use goal setting and metrics for stimulating radical innovation.
2 Purpose
Considering the aforementioned information, we can conclude that the goal of the project is to identify and analyze the effects of different ways of using goal setting and metrics in innovation, especially for achieving radical innovation.

Then, the objective for the Bachelor thesis can be divided into two different tasks. On the one hand, this study will identify different ways of setting goals and measurements especially for radical innovation in literature that can be inspiration for companies to test. On the other hand, this thesis will aim to identify and make interviews in organizations that have different ways of organizing radical innovation and analyze and study how they use goal setting and metrics for stimulating radical innovation. A comparison between the findings obtained from both, literature and companies will also be made.

3 Research Questions
Having a clear overview of the problem that is wanted to be analyzed and understanding it, two research questions that are furtherly treated in this report can be defined.

*RQ1: How do companies work with goal setting and measurement for radical innovation?*

*RQ2: How does the innovation organization of the companies affect goal setting and measurement for radical innovation?*

4 Literature Study
4.1 Basic Background of Goal Setting
The aim of this section is to explain the goal setting in a general context, in order to get a broad overview about it before starting to relate it with innovation or R&D departments. Previous researches of goal setting such as the one performed by Locke (1996) and Zimmerman (2008), study the goal setting theory in relation to individual behavior (people). They study how the goal setting causes effects in the action or tasks performed by humans. In our study, firms, which are unified entities full of individuals, will be considered as these single individuals because all living organisms follow goal-directed action as a necessity of survival (Binswanger, 1991). Taking this consideration, a firm can be considered as a living entity. Therefore, all the different goal theories with an individual approach can be translated to a firm perspective. This reasoning allows establishing correlations between individuals and firms in terms of goal setting.

From long time ago, the process of goal setting has been a key activity in all the different types of business. It is a fundamental process that allows the different firms to think about their ideal future and to motivate themselves (Locke, 1996) to turn the vision of the firm into reality. This process helps the firm to choose the direction of their actions, which will define what they will want to reach. By knowing exactly what they want to achieve, they will know exactly where to concentrate their efforts in order to get it. The key part of the goal setting process is that firms have to know exactly how the goals and the goal setting process must be in order to achieve maximum level of success. To answer this question, general information about goal setting is analyzed in this part.
4.1.1 Concept of Goal setting

In order to understand the concept of goal setting, first the concept of goal has to be defined. In the research of Emsley (2003) the goal concept is defined as an unrealized state or condition that members of an organization do not possess but that is deemed desirable. So, understanding this definition it can be said that the goal setting process is based on identifying what is missing in an organization (desirable but not possessed) and describe it in the best possible way in order to make its reach as easy as possible.

The general concept of goal setting is defined as the process of establishing short- or long-term objectives, usually incorporating deadlines and quantifiable measures. This definition of goal setting can be referred to all kinds of goals such as personal, political, professional etc. If we look into a more specific definition applied for business, this process could be defined as a motivational technique based on the concept that the practice of setting specific goals enhances the performance of a firm (Locke & Latham, 1990).

4.1.2 Characteristics of Goals

There are several approaches or perspectives when talking about the different characteristics that goals must have. One possible approach is the SMART mnemonic, which also has plenty of variants itself. This approach was first published by Doran (1981) and further developed by Locke & Latham (2002). In it, each of these five letters stands for a characteristic of how goals should be in order to achieve the highest level of success. Many authors have used this framework to describe the goals such as Doran (1981) or Day & Tosey (2011) among others. In it, goals are described as:

S – Specific. The more specific or explicit the goal is, the more precise the performance is regulated (Locke, 1996). Therefore, the goals have to be clear and well defined so that the achievement of these goals and their progress can be measured. These characteristic is usually obtained by quantification (Locke, 1996). The opposite, vague goals, will not give enough direction because a vague goal is compatible with many different outcomes (Locke, 1996) and this direction is essential because it will define which of the possible outcomes the firm wants to reach.

M – Measurable. Include precise data, dates and quantities so that you can measure the progress and the degree of success that has been achieved. In order to measure in an appropriate manner, it is important that goals are specific because progress towards more specific goals is easier to verify (Bandura, 1997).

A – Achievable. The goals have to be possible to achieve but they also have to be challenging goals so that they create a motivational atmosphere and increase the attainment by carrying a risk of non-achievement. A balance must be found between the challenge and the attainability because the more difficult the goal is, the greater is the achievement (Locke, 1996) but of course, it has to be doable.

R – Realistic. The goals should be realistic and to do so, the goals have to be aligned with the mission and vision of the firm, which set the common direction of the goals. By keeping the goals aligned with this direction, the actions and decision making of the firm and employees will be more focused on what is beneficial for the firm.
T – Time-based. The goals must have a deadline or a timetable which can be followed. Doing so, the sense of responsibility increases and achievement will come much quicker. This deadline must be tangible; too far deadlines might diffuse the final objective of the goal and decrease the performance (Day & Tosey, 2011). If the goal is a long-term goal, it is better to set sub-goals to keep a track on the process that the firm is making.

However, there are other possible frameworks that describe the different characteristics of the goals such as the one stated by Day & Tosey (2011), which is more complex because it introduces a neuro-linguistic programming (NLP) perspective, or the eight criteria of Zimmerman (2008).

These are the basic characteristics of general goals. However, they might change or add new ones when trying to set a specific type of goal or try to set it in a particular context. This study aims to identify new characteristics, out of these basic frameworks, that goals should have in order to promote innovation in an R&D department of a firm.

4.1.3 Goal setting theory

Apart from these basic characteristics of the goals, there are some other findings related to them in the goal setting theory that should be highlighted. Locke (1996) made some conclusions that arose from the combination of some of these characteristics that help to the holistic understanding of the goal setting process in a firm. Also Locke and Latham (2002) developed the goal setting theory which was tested after by Zimmerman (2008) who suggested eight criteria that might guide the appropriate use of goal setting. Some of their conclusions are that, first, the goals that are both specific and challenging (difficult) lead to the highest performance (Locke, 1996) because effort is roughly proportional to the difficulty of the goal. However, commitment to this type of goals is more difficult because they need more dedication and the higher the commitment, the higher the performance and vice versa (Locke, 1996) so it is necessary to find what drives the firms to achieve a high degree of commitment in order to achieve the highest performance. Locke (1996) concluded that this commitment was achieved mainly by two reasons: because the individuals of the firm are convinced that the goal is important and attainable (or at least that some progress can be made towards it) and Zimmerman (2008) concluded that self-generated goals generally bring more commitment compared to goals that are set by others because these tend to be more realistic. So, by ensuring two characteristics of the SMART approach (Realism and Attainable), we ensure the commitment towards the goals and by ensuring other two (specific and challenging) we achieve the highest performance. Another way of ensuring the commitment is to provide additional incentives like supportiveness, rewards, participation of the sub employees or recognition.

Another relevant factor when trying to achieve the maximum performance is the self-efficacy. This is a term developed by Bandura (1997) in his social-cognitive theory that refers to the task-specific confidence that the individual has about the possible success (or partial success) towards the goals. The more self-efficacy that an individual has, the higher the performance of the task because people with self-efficacy tend to set or accept more difficult goals and commit themselves towards them. An increase of self-efficacy can be also achieved by participation (Seijts & Latham, 2012). Feedback is also a key factor of this process of goal setting because in order to pursue goals effectively and with a high performance, individuals must have a way of checking or tracking their progress towards their goal. The feedback will allow them to know if
they are moving fast enough and in the right direction (Locke, 1996). Feedback and self-efficacy are highly related because when the individuals receive negative feedback; just the ones that have self-efficacy under such pressure are the ones that are able to renew themselves in order to find different strategies to attain their goal. The others will tend to become demotivated and decrease their performance.

The goal setting theory also states that goal setting and planning are related (Locke, 1996). Goals stimulate planning in general and this planning can have negative or positive effects on the achievement of the goals. When planning to reach goals, the individuals use what they already know to make new plans so when individuals strive for goals on complex tasks, they are least effective in discovering suitable task strategies if they have no prior experience on the task or if there is a high pressure to perform well or in a short period of time (Locke, 1996) and they have a lack of self-efficacy because individuals with self-efficacy manage to work well under pressure. This statement shows that the individuals must find the balance between the challenging and the attainability in their goals because if they set too difficult goals in relation with their previous expertise, the result can be demoralizing and this line between stretching people and discouraging them is so fine (Locke, 1996).

Seijts and Latham (2012) also summarized all the studies that have been conducted on goal setting and suggested some evidence-based practices for improving employee’s performance that are important to highlight. Some of them have been previously mentioned, but others yet need to be stated in this study. First, if lack of ability is not an issue, focus on a specific performance outcome or target to attain. Second, if the task is likely to take a long time to complete, set sub-goals to maintain employees’ focus, and to ward off procrastination for attaining the end goal. Third, actively look for and remove situational constraints to goal attainment, such as a lack of needed resources, or support from key decision maker.

To conclude, it is important to mention that this process of goal setting can be trained and improved by the individuals by acquiring personal experience and testing it in different ways or fields. This training will try to standardize the process of goal setting in each individual so that the performance of this process increases. However, the goal setting process depends on the individual (Locke, 1996) and environmental (Day & Tosey, 2011) context so depending on variables of different types and the level of analysis (individual or group organization), the goal setting process might change due to the differences among the individuals but is obvious that some basis of the goal setting theory will stay firm in every process of goal setting.

4.1.4 Why Goal setting

If any firm wants to succeed in their industry, they need to set goals. Goals are powerful contributors to successful business growth in several ways. To begin with, if the process of goal setting is performed taking into account the previous considerations, it will increase the performance of a firm by defining the direction of the actions hence it forces you to think through what your business would like to achieve or accomplish in the mid-term or long-term future (vision statement) and it will also increase the degree of effort exerted and the persistence of action over time (Locke, 1996). The suggested directions by this process will help the firm to pursue this growth, which will greatly improve your chances of achieving the goals. It also gives a short-term motivational effect, because it sets small challenges in the day a day of the firm (Locke, 1996) and therefore, the desired performance of the firm increases. It increases the effort
of the employees because the more difficult a goal, the greater the effort and persistence to attain it (Seijts & Latham, 2012).

To end with, goals also give you a framework within which to work. This tends to focus your efforts by helping you to eliminate actions that will not contribute to achieving the goals that have been set (Seijts & Latham, 2012). They also bring a common understanding of the whole firm and help to organize and guide the employees’ time and the firm’s resources in the same direction and towards the defined objectives (Day & Tosey, 2011). Therefore, they focus the acquisition of knowledge of the firm, because all the actions of the employees, from which they gain knowledge, are guided towards the accomplishment of these common goals.

Despite all these positive effects, there are some other studies Ordoñez, et al. (2009) argue that goal setting has powerful and predictable harmful effects to the organizations so that it should be prescribed selectively, presented with a warning label, and closely monitored. These effects are that goal setting can reduce employee performance by omitting important but non-specified goals, motivating risky and unethical behaviors, inhibiting learning, corroding organizational culture, and reducing intrinsic motivation. However, this study is answered again by Locke & Latham (2009) Locke and Latham (2009). They argue against the statements claimed by Ordoñez, et al. (2009) about the drawbacks of goal setting. Their main argument is that the study done by Ordoñez, et al. (2009) is full of anecdotes, casual variables and irrelevant studies. This reflection shows that goal setting it is a difficult and complex task because after several studies and plenty of researches made, there is still being conflicts and different statements about it. This might be due to the differences between individual context (Locke, 1996), environmental context (Day & Tosey, 2011) and types of goals.

4.2 Basic background of performance measurement

In the previous paragraph, terms like goal accomplishment, progress towards a goal, attainment of objectives etc. have been described. All the actions related to these terms will determine the performance of the firm. In the goal setting theory (Locke & Latham, 1990), the goal setting process is a method to increase the performance of a firm. This performance will determine how good is the firm in terms of achieving the mission and vision of the company. However, in order to specify how good is our firm or how the goal setting process is affecting to the performance of the firm, we need to measure. If things are not measured, we cannot improve them or compare them to the ideal situation which means that we might have the beginning of knowledge, but you have scarcely in thought advanced to the stage of science (Neely, et al., 2005). This section will talk about general performance measurement, about the whole performance of the firm and its metrics, without focusing in any particular activity. Doing so, a broad perspective will be considered. This will allow later a better focus on specific activities such as measurement for radical innovation.

According to the marketing perspective of the performance measurement, the terms efficiency and effectiveness have to be used precisely in this context because these are the two fundamental dimensions of the performance of a firm (Neely, et al., 2005). Efficiency is a measure of how the firm resources are utilized whereas effectiveness refers to the extent to which customer demands are met (Neely, et al., 2005). These terms show that the performance of a firm can be focused towards both internal (efficiency) and external (effectiveness) objectives. Therefore,
Performance measurement can be defined as the process of quantifying the efficiency and effectiveness of action (Neely, et al., 2005).

The measurement systems developed in the late 1970s and 1980s expressed a general dissatisfaction with traditional backward looking accounting based performance measurement systems, identifying their shortcomings and arguing for change. In the late 1980s and early 1990s, this dissatisfaction led to the development of “balanced” or “multidimensional” performance measurement frameworks (Neely, et al., 2005). These new frameworks placed emphasis on non-financial, external and future looking performance measures (Bourne, et al., 2000).

As it has been shown, a firm’s performance is a quite general term. The level of performance a business attains is a function of all the actions of the firm that try to satisfy the mission and vision of the firm. To measure the overall performance of the firm, we have to divide it into more specific parts to get a better outcome of the measure. This division is will help to achieve more accurate measures because each sector will need different metrics and methods and it will avoid overlaps between them. Neely, et al. (2005) divided the performance measurement at three different levels: individual performance measurement such as manufacturing, innovation, meeting customer value, waste etc. the performance measurement system as an entity and the relationship between the previous one and the environment in which it operates. This division will give an overall view of the total performance of the firm because it goes from specific to general measures. It should be also considered that performance measures need to be positioned in a strategic context, as they influence what people do. Measurement may be the “process of quantification”, but its effect is to stimulate action.

4.2.1 Metrics for general performance measurement

This section seeks to expose the different measurement frameworks that were developed in the late 1990s by authors such as Kaplan & Norton, (1992), Fitzgerald, et al., (1991) or Dixon, et al., (1990) in order to find a more balanced view. These frameworks try to show managers of different organizations what to measure. One of the problems with finding metrics for the performance measurement is that the literature related to it is diverse. This means that this topic is so broad and that individual authors have tended to focus on diverse aspects of the performance measurement system design. In order to solve this problem, the current research will exemplify different metrics regarding the three different levels proposed by Neely, et al., (2005). The analysis of this section will provide a broad view of the possible different metrics that can be used to measure the general performance of a firm. After, this study will further determine metrics used for incremental and radical innovation and will compare the characteristics of the general metrics with the innovative ones.

4.2.1.1 Individual performance measures

First of all, all performance measurement systems consist of a number of individual performance measures (Neely, et al., 2005). The individual performances can be defined as the different actions that the firms carry to meet their “ultimate goal”. These can be so general and vary so much depending on the different functions and departments of the organization (manufacturing, innovation, meeting customer value, waste). This research will show metrics of the manufacturing performance as an example of the individual performance measures, which will
gather the common ones. Different authors have marked the generic terms quality, time, cost and flexibility (Neely, et al., 2005) as the key dimensions of manufacturing’s performance. However, they covered a variety of different dimensions. In this research, only a selection of the most common metrics will be shown.

Regarding to quality-based measures of performance, measures can focus on issues such as the number of defects produced (can include statistical process control and six-sigma concept), the cost of quality (prevention, appraisal and failure costs) (Neely, et al., 2005). The cost of quality is a measure of the extra cost incurred by the organization because it is either under- or over-performing. Apart from these two standard metrics for quality, we can find others such as reliability, technical durability, value, aesthetics, conformance, customer satisfaction etc. (Neely, et al., 2005).

Time has been described as the fundamental measure of manufacturing performance (Neely, et al., 2005). Within the just-in-time perspective generally adopted in manufacturing, all the deliveries of goods that are out of the exact time are seen as a waste and should be measured. Similarly, one of the optimizations that can be made in a firm regarding to time is to minimize the throughput time (Goldratt & Cox, 1986). Therefore, it is important to measure it. To do so, some metrics can be found such as manufacturing lead time, delivery lead time and frequency of delivery among others (Neely, et al., 2005).

In terms of cost, there are many reliable management accounting documentations, which are replete of costs metrics but as stated by Neely, et al., (2005), the main models, focus on visible costs, e.g. direct labor, direct material, selling price, manufacturing cost etc. However, in their study, Neely, et al., (2005) also point out that the majority of overheads are caused by the “invisible” transaction costs.

When talking about flexibility, the perspective that Neely, et al., (2005) takes can be accepted for this study. He observes that due to the lack of operational measures of flexibility, very little is known about the implications of flexibility for manufacturing management. To solve this problem, after identifying various dimensions of flexibility, he suggests the following measures: range of components characteristics handled by the equipment or ratio of the number of components processed by the equipment to the total number processed by the factory. Other possible metrics for flexibility is the number of component substitutions made over a given time period, range of product modification, ability to adapt to new products, range of volume etc. In all this kind of measures, authors such as Gerwin (1987) or Neely, et al., (2005) coincide that it is important to determine the degree of variation (in a specific range or in a given number) between the different components or products because there may be a low frequency of changes but they may involve very dissimilar components.

**4.2.1.2 Performance measurement system**

Secondly, when trying to examine the performance measurement system as a whole, rather than focusing on individual performance, many specific performance measurement system design processes of different authors have been proposed. For instance, Fitzgerald, et al. (1991) suggest that there are two basic types of performance measure in any organization; those that relate to results (competitiveness, financial performance), and those that focus on the determinants of the results or processes (quality, flexibility, resource utilization and innovation).
Another valid model is the one proposed by Kaplan & Norton (1992). It addresses some questions to the managers and establishes that any measurement system should provide sufficient information to answer those. These questions are: How do we look to our shareholders (financial perspective)? What must we excel at (internal business perspective)? How do our customers see us (customer perspective)? How can we continue to improve and create value (innovation and learning perspective)? However, Neely, et al. (2005), consider that this model contains a serious flaw because it does not analyze the competitor’s perspective.

Other authors, rather than proposing frameworks, provide criteria for measurement system design (Globerson, 1985). His study, for example, suggests some guidelines that can be used to select a preferred set of performance criteria. The criteria that he proposes must be chosen from the company’s objectives, must compare competitors, must be clear, must be clearly defined, ratio-based are preferred rather than absolute, should be selected through discussions with people involved, should be objective and should be under control of the evaluated organizational unit. Other studies such as the one performed by Dixon, et al. (1990) also included in the performance measurement system whether the firm encourages continuous improvements or not.

This section has illustrated the complexity of the performance measurement system due to the shown differences among the different previous studies. Therefore, to attempt to produce a single unifying framework at this stage seems unrealistic. However, with the aim of unifying all the perspectives and establish a standard process for developing a performance measurement system, Wisner & Fawcett (1991) propose the following nine-step “process”. The steps that they identify are:

1. Clearly define the firm’s mission statement.
2. Identify the firm’s strategic objectives using the mission statement as a guide (profitability, market share, quality, cost, flexibility, dependability, and innovation).
3. Develop an understanding of each functional area’s role in achieving the various strategic objectives.
4. For each functional area, develop global performance measures capable of defining the firm’s overall competitive position to top management.
5. Communicate strategic objectives and performance goal to lower levels in the organization. Establish more specific performance criteria at each level.
6. Assure consistency with strategic objectives among the performance measures used at each level.
7. Assure the compatibility of performance measures used in all functional areas.
8. Use the performance measurement system to identify competitive position, locate problem areas, assist the firm in updating strategic objectives and making tactical decisions to achieve these objectives, and supply feedback after the decisions are implemented.
9. Periodically re-evaluate the appropriateness of the established performance measurement system in view of the current competitive environment.

4.2.1.3 Environmental performance measurement
To end with, the last level where we have to identify metrics is the one regarding to surrounding environment of the firm. Here, the performance measurement system will consider the
interaction with a wider environment. There are two fundamental dimensions to this environment. The first is the internal one (organization). The second is the external one (market within which the organization competes) (Neely, et al., 2005). These will be discussed in turn in this section.

In the internal environment, the performance measurement system is seen as a part of a wider system, which includes goal setting, feedback, and reward or sanction (Neely, et al., 2005). Business strategists argue that the wider system has to match the business strategy such as Hrebiniak & Joyce (1984) or Lorange, (1982). Therefore, the main conflict in this measurement is the functional structure adopted by many organizations. This leads to different strategies in these different functional departments (marketing, manufacturing etc.) because they are evaluated on the basis of different criteria and receive rewards for different activities (Neely, et al., 2005). On the one hand, marketing is more oriented towards sales and market shares. On the other hand, manufacturing is evaluated on running the operations at a minimum cost. Marketers are encouraged to change, look for new markets and introduce new products to generate a competitive advantage. Manufacturers aim to reduce their cost while maintaining the quality or the products. This is why it is important having a common, agreed and stated mission and vision of the organization so that all the strategies try to reach the same objective, because the measure performance must be aligned with the organization strategies or goals (Bourne, et al., 2000).

In the external environment, competitors and suppliers must be analyzed. A proper performance measurement system should provide information to the managers relating to both of these (Neely, et al., 2005). Metrics related to customers can be used to evaluate the external environment but also they can measure the quality of the services or products of the organization (customer satisfaction) and those have been analyzed in the measures regarding to quality. When measuring the competitor performance, one technique that can be used is benchmarking (Neely, et al., 2005). Some authors such as Young (1993), see benchmarking as a means of identifying improvement opportunities as well as monitoring the performance of competitors. Here, the four basic types of benchmarking can be used to compare with competitors. Firms can compare their internal part to a corporation, the competitive part, where the data collection is very difficult, they can do a functional comparison with similar companies (not direct competitors) or they can compare the generic business processes (Neely, et al., 2005).

**4.2.2 Main characteristics of performance metrics**

To conclude this section, it is appropriate to recapitulate the main characteristics of the metrics for an efficient general performance measurement. Metrics should also be for long-term, take into account the firm’s strategy, seek continuous improvements, and include competitors and customer perspective. It is important also that the metrics are specific and well-defined to be able to understand what are the firms measuring and how. However, these characteristics are not easy to achieve and because of that, Neely, et al. (2005) address some questions related to frequent issues associated with the performance measurement for future research. This study will further analyze if these characteristics change when measuring radical innovation.

**4.3 Ways of organizing innovation**

The current chapter aims to explain the usual ways in which companies organize for innovation. This framework will be based on the PhD thesis of Lund (2015) which shows the different
perspectives of ambidexterity that companies usually have. This ambidexterity refers to the way in which companies divide the exploitation and the exploration. For this study exploitation is understood by the work that companies do in their core businesses to get improvements. If this work succeeds, it is considered to be an incremental innovation. On the contrary, exploration is understood by activities that aim to reach new markets, products or customers, moving away the companies from their core businesses. When these activities become commercialized, it is considered a radical innovation. These ways are analyzed to get a better understanding about their way of working with goals and type of measurements used. Moreover, this study tries to identify if there is any relation between the innovation structure and the way in which companies work with goal setting and innovation measurement. The main ways that are analyzed in this study are summarized in the Table 1.

Table 1. A summary of the different perspectives of ambidexterity; (Lund, 2015).

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<th>Temporal separation</th>
<th>Contextual ambidexterity</th>
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4.4 Established ways of goal setting for innovation

Goal setting has been studied in many cases and by many authors. Therefore, there are several opinions about the optimal process of goal setting when trying to be specific. However, a common broad guideline can be established. This part of the study will try to collect all the basic aspects about the usual goal setting processes in order to describe a general or standardized process of goal setting that can be used in most of the business situations, which also include the innovation practices. The aim of this process is to be used as a template of all the goal setting processes within an organization and, from this base, the template will be modified depending on the personal situation (context, business type etc.) of each goal setting process. The factors that will determine those changes will be following determined. Further on, in order to move forward to the research topic, this chapter will focus on this process applied on innovation activities and more concretely, the type of goals that are used in it.

4.4.1 General Process of Goal Setting

In order to define a standard process of goal setting, it is appropriate to distinguish between the large-scale goals and the small-scale goals. When talking about organizations or firms, the large-scale goals are the vision and the mission of the company. Both define what the firm desires to reach. These two large-scale goals will define the direction and the perspective of the decisions that the individuals of the firm will make. It is important to have them well defined to have always this “ultimate goal” clear in order to have a holistic understanding of the firm as a whole.

The process starts by identifying this “big picture” and setting the large-scale goals for the firm. Then, you break these down into smaller targets that you must achieve to fulfil your “ultimate goal”. This breaking down goes from goals with a further deadline until goals that must be achieved as soon as possible. It is important spending some time and thinking in detail which goals should be set and how, remembering that they should follow the characteristics mentioned by Doran (1981), Locke & Latham (2002) or Locke (1996) among others. A good method to do so within a company is through brainstorming because like that you ensure that every employee understand all the goals and agree on them so that all of them have the same direction.

The trimming process must be iterated until the firm has the appropriate number of smaller goals to focus on, depending on the time available, number of employees etc. Each smaller goal that is set should be based on the previous one so that an unbroken chain until the large-scale goals can be made. In this way, you ensure having the same direction in all your goals. After setting all the goals, it is always useful to review all of them and confirm that they are set in a proper way and improve them if possible (Locke & Latham, 1990).

Once the goals are defined and set, Rauch & Frese (2000) state that a systematic search for information that is relevant to the goals must be undertaken. Then, a plan must be developed, based on that search, for attaining the goals. Finally, feedback must be obtained on the progress that is being made in attaining the goal, as greater effort may be required, more information may be needed, or the plan itself may need to be scrapped and a new one developed. Therefore, it is important to adopt a continuous improvement perspective, where the smaller goals will be reviewed and updated on a daily basis in order to achieve the maximum efficiency of those. It is also good to review periodically the large-scale goals and if it is required modify them. These modifications can be caused by a change on the priorities of the firm or the growth in experience or knowledge that has been developed by the attainment of the previous smaller goals.
continuous improvement perspective it is important to consider the feedback that is received during the achievement of the goals and apply these lessons into the setting of the next goals.

Normally, in firms or organizations, goals are not isolated; they work with a considerable number of goals simultaneously so in a general process of goal setting, the relationship among the different goals and the number of them must be considered in order to avoid problems and achieve the “ultimate goal” of the company efficiently. Many previous studies (Locke & Latham, 1990) show how managers behave when working with goal setting. However, these studies are based on single goal setting and generalizing this research to multiple goal setting might cause some problems because multiple goals can cause an effect in the decision making by causing conflicts due to the relationship that different goals have (Emsley, 2003).

The main difference when dealing with multiple goals is that it is vital to set well-defined priorities among the different goals. It helps to avoid conflicts in terms of decision making. These priorities of course, can also be modified according to the continuous perspective previously adopted. However, goal setting is an emotional experience and these decisions about priorities and trade-offs that managers must take when dealing with multiple goals, increases a manager’s job-related tension (Emsley, 2003).

Furthermore, when the managers have to prioritize, allocate resources and make trade-offs due to the fact that the firm has to deal with multiple goals, they process more information than in single goal settings (Locke and Latham, 1990) and the process becomes more complicated. Therefore, if the managers don’t have the required skills or effort to cope with this increasing complexity, the performance of the firm will decrease (Emsley, 2003). In addition, the process of goal setting will require more time and effort in order to make these decisions, which will be translated in a decrease of the time used to achieve the actual goals. This will also lower the performance of the firm (Emsley, 2003).

With these considerations, Emsley (2003) concluded that to implement an efficient goal setting process with multiple goals it is important to control or decrease the job-related tension by completing tasks sequentially (one day work on one goal, second day in other etc.) to avoid overlapping and manage easily the complexity of the process so that the performance does not reduce. Moreover, this study showed a relative unimportance in terms of the “weighting” of the different goals, because at the end the bosses tend to evaluate the budget achievement so that the managers do not have a free trade-off (Emsley, 2003) so the goal setting process would not change when considering this aspect.

However, this process is so general and some other valid alternatives might be presented. These alternatives vary depending on the environmental context (Day & Tosey, 2011), the individual context (Locke, 1996) the type of goal that is being set and the number of goals (Emsley, 2003). For example, the research of Ordoñez, et al. (2009) also shows an alternative guide for the goal setting process, which can be complementary to the previous considerations about goal setting process (although Locke & Latham (2009) does not agree with this) and, depending on the situation, use one process, other or both. In this article, a table with ten questions to ask before setting goals is provided in order to get the right goal.
These different factors that might alter the usual goal setting process including environment context, individual context and the type of goals, suggest that goal setting can be set from simple set of rules (Locke & Latham, 1990). However since, as the situation in each firm is different, it has to be considered and developed individually. This may be accomplished by analyzing all the factors that surround the goal setting process (context). Even with the amount of previous research made about this topic, there are still conflicts and disagreements with it.

4.4.2 Types of goals for innovation

All the previous sections have focused on goal setting and performance measurement in a general context. This study has defined a set of characteristics for goals in general, a common process for goal setting and some basic background for general performance measurement to get a broad framework of these concepts. However, the scope of this project is to analyze these terms in an R&D department of a firm or when a firm performs innovation activities and how they can encourage radical innovation with them. Therefore, we have to see how these characteristics or processes change when trying to set goals for radical innovation because, stated by Locke (1996), Emsley (2003) and Day & Tosey (Day & Tosey, 2011), the characteristics of the goals and the way of setting them might change depending on the individual context, environmental context and type of goals.

From now on, this study will set the environmental context in the R&D departments or innovation activities of the firm. Therefore, if we have a fixed specific context, we can compare different types of goals and see how the process or the characteristics of these goals might change.

This section will analyze different types of goals that tend to encourage innovation, in order to determine in which situations they are useful, which is the specific process of goal setting that suits best for each type, the characteristics that are different, advantages and drawbacks etc. All this analysis will be further used to determine which type of goals and which processes increase the performance or promote radical innovation.

4.4.2.1 Learning vs Performance goals

In this section of the current research, learning and performance goals are studied. First of all, these two goals can be considered opposite because of the instructions that are given to individuals. Performance goals focus on attaining a specific action or a specific level of performance (Seijts & Latham, 2012), an output. The individual relies on the information or skills that he already possesses in order to attain the goal as Locke & Latham (2002) and Seijts & Latham (2012) state. Therefore, if the task is new or complex, that is to say, if the individual has to learn, performance goals should be avoided. Only after an employee has acquired the knowledge and skills necessary to effectively perform the task should a specific challenging performance goal be set (Seijts & Latham, 2012).

On the contrary, a learning goal thus focuses a person on discovering problem solving processes to draw upon when performing a task; the process. Therefore, it should be set when the necessary strategies, procedures or behaviors to perform the task effectively are not yet known. Such a goal explicitly encourages the search for appropriate knowledge and strategies for increasing one’s performance. So, if a task requires learning from experience, gaining competences or the
acquisition of skills or knowledge, learning goals should be set in order to encourage this learning and the subsequent (Seijts & Latham, 2012). This higher effectivity is due to the fact that in the learning goals, as the individuals are learning, they focus on discovering the best way to perform the task before they choose a specific challenging target (Seijts & Latham, 2012). However, in performance goals, they just focus on apply an already known way to attain a specific level of performance.

In summary, the focus of a learning goal is to increase an employee’s knowledge and skills; the focus of a performance goal is to increase the person’s motivation to use the acquired knowledge and skills. Moreover, performance is even higher when a specific high learning goal is set. This is because the setting of a learning goal focuses individuals on the discovery of procedures, processes, or systems necessary to master tasks that are complex for them. Hence, when a learning goal is used in the correct situation, it increases the acquisition of knowledge and subsequent performance because they make explicit the importance of learning first, and attaining a specific performance target second. They focus attention on formulating a successful strategy, process, or system. They require seeking feedback to determine which task strategies are effective and under which conditions. They involve searching for alternative strategies if prior ones are not effective and they help individuals avoid mindlessly changing strategies, or engaging in a mad scramble for attaining a specific performance outcome. All these factors, also increases the self-efficacy and the commitment of those who have learning goals (Seijts & Latham, 2012).

However, they do not conclude that the managers should not set specific high performance goals; they say that managers should allow their employees to spend time in a learning mode before introducing specific, challenging performance goals. They say that the solution is not to abandon performance goal setting; rather, it is to change the type of goal that is set. The solution is to set specific challenging learning rather than performance goals, so that the emphasis is on the discovery rather than the production process.

Locke & Latham (1990) recommended that “learning goals” be used in complex situations rather than “performance goals” because normally, in those complex situations you will have to learn in order to attain the goal. In practice, however, managers may have trouble determining when a task is complex enough to warrant a learning goal rather than a performance one. In many changing business environments, perhaps learning goals should be the norm (Locke & Latham, 1990). Later, Seijts & Latham (2012) go deeply about when to use learning goals. They conclude that learning goals are more appropriate rather than performance goals when the environment is constantly changing, when answers to emerging problems are unknown, when proven strategies are suddenly of limited, if any, use, and when there is a need for continuous learning because of frequent environmental changes, specific high learning goals can be invaluable for mastering a task. Moreover, adapting to a changing environment almost always involves setbacks, which means that employees receive negative feedback. Individuals who are assigned learning goals respond in a different manner (as a part of the learning process the leads to explore new alternatives) to this feedback than those who are assigned specific high performance goals (becoming upset and demotivated).

Innovation activities are immersed in changing environments, and the more radicals they are, the more changing will be the environment because these will provoke bigger changes. The aim of
the radical innovation is to break with the previous standards of the industry, triggering a big change that allows the firm to create a competitive advantage out of it. Therefore, innovation is surrounded by a high level of uncertainty, which creates changing and complex situations. So when you try to set goals to encourage innovation, you don’t know exactly the skills, knowledge, strategies or procedures that that will be required to attain them. This is why for innovation activities, learning goals tend to be more appropriate than performance ones.

### 4.4.2.2 Ambiguous goals

Nonaka (1994) stated that the only competitive advantage in a changing environment is to create knowledge. Create knowledge is not simply a matter of “processing” objective information. Rather, it depends on tapping the tacit knowledge and the subjective insights, intuitions and hunches of individual employees and making those insights available for testing and use by the company as a whole. The key to this process is the personal commitment of the employees to the firm and its mission. Therefore, making personal knowledge available to others is the central activity of the knowledge-creating firm. It takes place continuously and at all levels of the organization (Nonaka, 1991), so it happens also in R&D departments. This knowledge creation process is usually supported by ambiguous goals. These goals try to get the subjective insights of the employees and bringing them out to the organization so that they can be used by everyone.

When we talk about changing environment, we refer to major changes of the kind that is transformational, often entailing fundamental shifts in the way the organization sees its relationship with its environment (Gioia, et al., 2012). This context that surrounds strategic changing environment makes difficult to set goals that specific, challenging, measurable, achievable, and so on because those contexts usually involve radical change efforts where the paths and the goals of change are not straightforward and obvious (Gioia, et al., 2012). In fact, these changes lead to a high level of uncertainty and flux. So Nonaka (1991) and Gioia, et al. (2012) suggest that in these circumstances is better to set ambiguous and ambitious goals to adapt to those strategic changes.

The word ambiguous is defined as open to or having several possible meanings or interpretations. In terms of goals this definition must be adapted. When talking about ambiguous goals, we refer to goals that can be seen from different perspectives so that they give a broad indication that can be interpreted in several ways. These goals are set in an open way so that it encourages the creativity of the employees by making them to analyze all the possible interpretations of the goals. This opens for them a broad range of possibilities and an overall perspective. Hence, these goals usually lose one of the SMART characteristics cited in the research of Doran (1981), the specificity. To achieve this, figurative language such as metaphors or analogies, is usually used so that it suggests different interpretations and perceptions and triggers the knowledge creation process (Nonaka, 1991). Therefore, to set these types of goals managers must domain the use of images or symbols to express ideas and have a high cognitive abilities in order to frame changes in desired ways of being, seeing, and doing (Gioia, et al., 2012). The key to this ambiguity lies in its capacity for allowing employees to apply their own interpretations or to change their perceptions, conceptions, and actions in a fashion that they can view as being broadly consistent with the larger vision of the firm. Therefore, it gives flexibility (Gioia, et al., 2012).
Furthermore, Gioia, et al. (2012) revealed two important aspects of effective ambiguous language, no specificity and low emphasis. No specificity involves vagueness in descriptions of an actual position held and can take two forms: imprecision in describing outcomes and imprecision about the means by which general goals might be achieved. Both types of vagueness facilitate organizational leaders the attempts to initiate strategic change. The other aspect of ambiguous language, low emphasis, involves infrequent allusions to contentious concerns, a tactic critical to avoiding conflict among opposing sides of an issue. By avoiding specific stands and sensitive topics, then, organizational leaders alike can avoid starting a conflict.

These type goals might sound vague, but in fact they provide an extremely clear sense of direction (Nonaka, 1991). What vague goals do is insert a common behavior or thinking in the people of the organization. They are not set for clear specific outcomes; they focus more on the process or the performance of the people, how do they realize their actions or with which perspective. Hence, it can be concluded that ambiguous goals lose one characteristic of SMART goals; the specificity. However, intentionally injecting ambiguity into an organization’s environment can be a risky enterprise, so its use should be reserved for those rare occasions where major or strategic (not incremental) change is necessary (Gioia, et al., 2012). They are set like a slogan that tries to challenge the employees and encourage them to provoke changes on the previous standards looking for something different. Hence, it can be concluded that this type of goal supports the radical innovation but not incremental. Usually, the outputs that come from these goals totally contradict the conventional wisdom of the firm (Nonaka, 1991). This is how the knowledge creation process translates a firm’s vision into innovative technologies and products.

4.4.2.3 Superordinate goals
It is widely recognized that divergent interests and points of view are inevitable when individuals from multiple functional areas work together on projects due to their differing orientations toward goals, interpersonal relations and key external constituents (Pinto, et al., 1993). This is what usually happens in cross-functional teams. In their research, Pinto, et al., (1993) examine cross-functional teams through examining the dynamics of interactions for instance between marketing and one other functional area such as R&D. From this point of view, it can be stated that product development teams in R&D departments or innovation teams will work with other functional areas and hence they will have different perspectives and ways of working towards goals. Therefore, innovation activities are in the same situation. They conclude that superordinate goals, physical proximity and project team rules and procedures have significant direct and/or indirect effects on project outcomes through influencing cross-functional cooperation.

In this study, the superordinate goals will be analyzed with the goal setting perspective and relating it to the innovation of a firm basing on the findings of the research of Pinto, et al. (1993) about superordinate goals. In their study, superordinate goals refer to "goals that are urgent and compelling for all groups involved but whose attainment requires the resources and efforts of more than one group". Pinto, et al. (1993) made this distinction from common goals because they believe that in many organizations, overall goals are often broken down into specific functional objectives that conflict with each other. Consequently, in order for one functional area to achieve its goals, another functional area may be required to sacrifice, or at least compromise, its primary goals. Therefore, it is stated in their research, that a departmental goal must be
compatible with the activities of related departments so that it will not undermine the results of those activities or make them much more difficult. Aware of such conflict, organizations are continually looking for ways of developing goals that can increase rather than detract from cross-functional cooperation. And one way of doing so is by setting superordinate goals. Hence the acceptance of superordinate goals by team members transcends and mitigates the role of individual factors (Pinto, et al., 1993). So it makes the group work as a whole, not as different individuals because it facilitates the cooperation between them.

To conclude with, it can be said that superordinate goals help to increase the understanding among the different departments that perform different but related functions but not innovation activities by their own. However, innovation is an activity that must be understood by the firm as a whole, because it involves perspectives of the different functional departments (marketing perspective towards the customers, product development in R&D etc. so it can be concluded that this type of goals encourage innovation activities by aligning the thoughts of the different departments of an organization because they give a common direction and common objectives. With the done research, it cannot be concluded that this kind of goals enhance more radical or incremental innovation. They increase the cooperation among teams so that they work as a single individual and this fact is important in innovation activities but they do not enhance creativity or motivation towards radical changes. However, it will be appropriate to show if companies combine these goals with other types of complementary goals that encourage radical innovation through motivation or creativity.

### 4.4.2.4 Extreme or stretch goals

For this type of goals, this study will be based in the research done by Sitkin, et al. (2011). There, the mechanisms through which stretch goals can influence organizational learning and performance are analyzed. Stretch goals are defined in it as goals with unknown yet seemingly impossible probability of attainment (given current capabilities) but that truly have a nonzero probability of attainment (usually 10 percent). They are also set by the organization in terms of a specific level of performance or output as they have to make explicit a specific outcome. Therefore, they differ from learning goals in this perspective. They also differ from ordinary difficult goals due to their extreme difficulty (extraordinary difficult to attain) and novelty (none previous known paths to achieve the goal) in the firm’s context.

Previous research about ambidextrous organizations, have shown that organizations must balance short-term performance concerns with long-term learning objectives. These researches state that organizations must invest in activities that “exploit” their known current capabilities (implementation, execution…) to ensure the present of the firm, while also investing in activities that “explore” new and unknown possibilities (innovation, experimentation…) to ensure the future (Sitkin, et al., 2011). The exploitation is normally achieved by setting efficient SMART goals that Doran (1981) describes. However, organizations often have difficulty searching outside their current routines and processes in order to explore. Moreover, returns to exploration and learning are distant and uncertain which makes more difficult the willingness to achieve it (Sitkin et al; 2011).

To promote this exploration in a firm, Sitkin, et al, (2011) propose the use of seemingly impossible organizational goals. The main difference between SMART goals and stretch goals is that the last ones lose apparently the characteristic of attainability. They instigate attention,
energy, and action in the domain of alternative routines and capabilities. Without attention being channeled to alternative futures, new paths are not likely to be considered. Without energy and enthusiasm for major change, challenges to the changes are unlikely. Without coordinated action, trial-and-error experimentation is less likely to yield meaningful results. Moreover, they add that the imposition of such extreme goals can be similar to an intentional and internally generated crisis meant to trigger change. By forcing a substantial elevation in collective aspirations, stretch goals can shift attention to possible new futures. They thus can prompt exploratory learning through experimentation, innovation, broad search, or playfulness as organizational actors seek new or varied approaches to reach the target (Sitkin, et al., 2011). Moreover, stretch goals just don’t promote uncertainty; they can also enhance high tangible performance outcomes as gaps between aspiration and current performance and guide effort and persistence by mandating creativity and assumption-breaking thinking (Sitkin, et al., 2011).

However, Sitkin, et al. (2011) also states that stretch goals are not always beneficial for the organizations. Making difficult the goal attainability increases organizational implications because firms try to explore and learn while not sacrificing the performance (Sitkin, et al., 2011). As goals become extreme, there are organizational effects that are likely to be negative except under a limited set of specifiable circumstances. They propose a set of contingency factors that determine whether stretch goals will have positive or negative effects on learning (exploration of new practices and capabilities) and performance (tangible outcomes). These mechanisms are cognitive, affective and behavioral (Sitkin, et al., 2011).

Sitkin, et al., (2011) conceive the cognition as the ability of an organization to have attention and to be heedful to be open and able to scan, adapt and analyze different situations. Organizations will have to process the information from these situations to find new sources and types of information and new ways of processing it. This will allow them to redefine themselves if it is necessary when the old assumptions and information is outdated because they do not correspond anymore with the actual situations. This will facilitate the learning process. Moreover, under these conditions, organizations will need flexible thinking about alternative strategies for goal attainment. In this sense, stretch goals can be also beneficial for performance because it will help them to identify new opportunities (Sitkin, et al., 2011). The Facts that this research exposes that might damage the cognition are hypervigilance, inability to process new information or focus on external and uncontrollable factors.

The affective factor is understood by Sitkin, et al., (2011) as how the seemingly impossible goals can influence the collective emotion and the initiative infused into the organization. In their research, it is stated that stretch goals have positive effects on the performance and learning when they influence positively the emotions and initiatives. As stretch goals involve such high levels of ambition directed toward novel and unfamiliar opportunities, they can generate energy and greater initiative to learn by creating positive collective reactions, such as optimism, enthusiasm, curiosity, creativity etc. These positive affective drivers provide the collective initiative to explore and learn (Sitkin, et al., 2011). The positive collective emotions also elevate aspirations of the organization, which is critical for ensuring that organizations strive to increase performance. The main challenges that might arise to accomplish this organizational implication are fear, aversion to change, defensiveness or low commitment to goal (Sitkin, et al., 2011).
The last organizational implication of Sitkin, et al., (2011) is the behavior. The extreme demands of stretch goals could stimulate broader and more active search for ideas and solutions. Therefore, stretch goals can prompt search and experimentation behaviors traditionally associated with learning. However, stretch goals can also instigate actions that have positive effects on performance because once the organization has identified and focused on a stretch target, they will have to break it down into specific and measurable goals and to select the right strategy to increase the performance of it (Sitkin, et al., 2011). Here, the organizations will have to avoid threat rigidities, bad coordination or chaotic changes. If these three organizational implications are not achieved, setting stretch goals have a high risk of decreasing the organization’s capacity to perform and learn.

Therefore, this type of goals enhances exploration of new possibilities by setting goals that trigger a big change in the firm. If the firm is able to convert this change into a business by creating a competitive advantage from it, radical innovation activities will be achieved through the setting of these goals. Stretch goals search for more radical, discontinuous advances involving actions such as making contacts with unfamiliar sources of ideas, imitating innovative techniques (Sitkin, et al., 2011). With this conclusion, we can state that stretch goals focus more on radical than incremental innovation because pursuing goals that are seemingly impossible might stimulate exploratory learning specifically because radically new approaches are required so they will generate radical changes. This is due to the fact that when an organization lacks the skills, knowledge, or practices to attain a stretch goal (extremely difficult to attain with current capabilities) and does not have knowledge of any feasible approaches, it is effectively forced to search outside of its normal routines and knowledge to attain it (Sitkin, et al., 2011). This is how radical innovation occurs. Once the stretch target is identified, it is useful to remember that to achieve a better performance from it, organizations will have to break it down into smaller goals. In order to achieve better outcomes, these goals should follow the characteristics explained by Doran (1981).

4.4.2.5 Efficiency goals

Another different type of goal that is analyzed in this research is the efficiency goals. To do so, the study of Linderman, et al. (2005) will be used as a base. This type of goals is those which are helped by the quality tools of Six Sigma to be efficient and achieve a higher performance. In their study the tension between goals and quality management in the Six Sigma context is analyzed. They find that empirical support that goals can be effective in Six Sigma improvement teams when teams adhere to the Six Sigma tools and method. Also, their research remarks the differences between quality management and goal setting theory (Locke & Latham, 1990) by showing that the Six Sigma tools and method interact with goals. Linderman, et al., (2005) believes that from the quality-management perspective, goals differ in some aspects from the goal setting theory to achieve higher performance. In other words, as Six Sigma is implemented in project groups, it is stated that individual goal setting theory is effective on performance but the effects of goals on group performance are still emerging. Hence Linderman, et al., (2005) investigates the relationship between group goals and group performance.

Goal setting theory, as mentioned in previous chapters, states that setting challenging group goals can promote team effectiveness (Locke & Latham, 1990) because goals tell teams what needs to be done and how much effort to expend. Linderman, et al. (2005) argue that nothing is radically new in Six Sigma so Six Sigma does place also a strong emphasis on challenging
specific goals. However, in goal setting theory, if goals are viewed as unattainable, individuals may exert less effort, which would decrease performance (Locke & Latham, 1990). Linderman, et al. (2005) add that this characteristic is also common in Six Sigma project teams but if quality improvement tools and methods are used, the task’s complexity should be reduced by guiding the search for solutions to complicated problems which, in turn, facilitates goal achievement. Six Sigma advocates rigorous application of the quality tools in each step of the problem-solving methodology. So, using Six Sigma tools and method provides a mechanism for improvement teams to achieve their goals, especially for challenging projects (Linderman, et al., 2005).

Linderman, et al. (2005) takes another conclusion about quality tools in project teams. This is that the appropriate use of quality tools can lead to improved performance from the decision making perspective. To the degree that improvement teams follow the Six Sigma tools and method they can make better decisions, which improves project performance.

In their research, they empirically test the previous statements and they conclude that the method supports fully that the quality tools of the Six Sigma teams help to decrease the difficulty of the task. However, this method just partially supports the other two statements. The method also showed that Six Sigma Tools/Method result in higher performance except when goals are low. Then, the performance becomes lower. Finally, they conclude that goals can have a positive effect on performance when using Six Sigma Tools/Method and that these tools can be generalized to other quality tools.

To end with, it can be stated that this type of goals do not encourage explicitly innovation. What they do is improve the efficiency of the standard goals established by the goal setting theory (Locke & Latham, 1990) by using quality tools. This efficiency does not affect the creativity or the explorative parts of the group. However, it is also true that these tools are applied to goals that do not enhance innovation by themselves. It would be good to see that if companies apply these quality tools to goals that encourage innovation activities (stretch, ambiguous etc.), these innovation activities will be more efficient or not.

4.4.2.6 Innovation or creativity goals

Creativity is often considered an important source of competitive advantage for organizations. This is why many organizations are becoming aware of the importance of enhancing individual creativity in order to increase their creative and innovative potential (Shalley, 1995). Therefore, another type of goal of interest for this study is the innovation and creativity goals. To analyze those, we will use the approach taken by Shalley (1995). In her research, she analyzes the relation between creativity and productivity. To do so, three factors are analyzed: working in presence of coaction (others working independently on the same task), expected evaluation and the use of a creative goal setting. Due to the relevance in this study, the analysis of the third factor will be our main target.

To be clear about the types of goals to which are referred when talking about creativity goals, it can be stated that creativity goals are those who encourage the creative behavior of individuals. The creative behavior is defined by Shalley (1991) as the behavior that results in identifying original and better ways to accomplish some purpose. Shalley (1995) defines it as developing solutions to job-related problems that are judged as creative, novel and appropriate for the situation. For this research, both definitions can be considered valid but since the second one
seems to be more related to the organizational field (job-related problems), we will state it as the most appropriate. Just as productivity goals affect the quantity of performance, creativity goals might induce individuals to perform at a desired level and also serve as a standard against which task behavior could be self-evaluated (Shalley, 1995). These goals have to encourage the individuals to explore because in order to produce creative responses, an individual must search a number of response pathways and generate a variety of possibilities before settling on a final response. The more possibilities explored, the greater the chance that a creative response will be generated. The assignment of a creativity goal should make individuals to spend more time thinking about a task and trying to expand the range of potential solutions considered (Shalley, 1995).

Shalley (1995) realizes two quantitative studies that show how the three previous stated factors (interacting among each other) affect individual creativity and productivity. To do so, it is assumed that the individuals have the enough ability, engagement in cognitive activities and motivation, because if not, the individuals will fail when trying to accomplish any type of goal with high performance. In her research, six hypotheses are formulated by using these factors individually in order to see how they affect to the individual creativity and also presents potential interactions among the factors to examine.

The hypotheses that were supported by the results in Shalley’s (1995) research and were related to creative goals (the other supported hypotheses are not considered relevant for this study hence they do not mention creativity goals) are the following ones: The first study reveals first that individuals assigned a do-your-best (non-specific) creativity goal on a complex-heuristic task will have higher levels of creativity than those with no creativity goal. Secondly, the study revealed that individuals assigned a do-your-best (nonspecific) creativity goal on a complex-heuristic task will have lower levels of productivity than those with no creativity goal, probably because they are focusing in creativity rather than productivity.

The only significant differences that the second study shows and are related with creative goals were that individuals with a creativity goal who worked alone under the expectation of evaluation had significantly higher creativity than those with no creativity goal who worked alone and expected evaluation and those with no creativity goal who worked in the presence of cofactors and did not expect evaluation. This indicates that assigning a creativity goal has a significant, positive effect on individuals' creativity. Moreover, if individuals had a creativity goal and worked alone under the expectation of evaluation, the highest levels of creativity are achieved. Shalley (1995) believes that this is because individuals in this condition, the intrinsic motivation of individuals, directed all their attention and effort toward generating novel and appropriate responses. Therefore, expectation of evaluation and cofactors do not necessarily decrease creativity. However, Shalley (1995) also states that several studies have come up with different conclusions regarding this topic and she believes that this due to external factors in the studies that are not being analyzed such as type of task, type of evaluation etc.

To conclude, it can be stated that creativity goals enhance creative behavior and creative individual ability and hence, they enhance also innovation because creativity is a key skill when performing innovation activities. This increase of creativity will make the employees of an organization to explore and look for new and appropriate alternatives or solutions for a business. The creative behaviors thus increased should contribute to the long-term productivity and
innovativeness of organizations (Shalley, 1995). Moreover, it can be concluded that the specificity of the goal and the creativity of the output tend to be inversely proportional. The less specific a goal is, the more radical that the innovation will tend to be because the individuals consider a wider range of options hence the outputs can have a higher level of creativity.

4.4.2.7 Negative feedback goals

Along all the innovation processes in the organization, lots of different information has to be considered and analyzed in order to achieve the best possible outcome of these innovation activities. One specific type of information that must be considered in these processes is the feedback that comes from them. This feedback information is important to adopt a continuous improvement perspective in the innovation processes because if this information is analyzed in the proper manner, it tells you what the organization is doing correctly and what could be improved. Within this area, there is a type of goal that is related to the feedback, that is, negative feedback goals.

This type of goal is mentioned in the research performed by Van de Ven (1986). In it, four main problems that emerge when an organization tries to manage innovation are analyzed. These problems are: developing ideas into good currency, managing attention of the ideas, part-whole relationships and institutional leadership. The first problem tries to answer the following question: how and why do some new ideas gain good currency while the majority does not? That is, how and why some ideas are implemented (invested and with people’s attachment) and other not. The problem here is that while the invention or conception of innovative ideas may be an individual activity, innovation (inventing and implementing new ideas) is a collective achievement of pushing and riding those ideas into good currency. The second refers to what leads people to pay attention to new ideas, that is, how the individuals will recognize a need for change or pay attention to innovative ideas. The problem here is that organizations tend to protect existing practices rather than developing new ideas and this limits innovation. The third one reflects the problem that emerge when considering that multiple functions, resources, and disciplines are necessary to transform innovative ideas into reality so that individuals involved in specific parts of the innovation lose sight of the whole innovative effort. Due to this, individuals will design impeccable microstructures for the innovation process that often result in macro nonsense. To end with, the fourth problem states that innovations must not only adapt to existing organizational and industrial arrangements, but they also transform the structure and practices of these environments. The strategic problem for institutional leaders is that they usually have difficulties in creating an infrastructure that is conducive to innovation and organizational learning and is able to adapt to these changes.

To face these problems, Van de Ven (1986) proposes some solutions that have to be considered when doing innovation activities in the firms. He suggests four holographic principles (self-organizing groups, redundant functions, requisite variety and temporal linkage) to design the innovation process in such a way that more of the whole is structured into each of the proliferating parts. However, he believes that these principles require the creation of an institutional context that links these self-organizing innovative units with the mission and strategy of the organization. This macro context for innovation must be developed to solve the fourth problem mentioned above. To solve this problem, an infrastructure with three cybernetic principles is created. One of these principles is the use of negative feedback goals. It suggests
that a clear set of values and standards are needed which define the critical limits within which organizational innovations and operations are to be maintained (Van de Ven, 1986).

With this type of goal, organizational members can develop a capacity to control and regulate their own behavior through a process of negative feedback, which means that goals are achieved by avoiding achieving the goal. In other words, deviations in one direction initiate action in the opposite direction at every step in performing an activity so that in the end no error remains. This is due to the fact that first, it is known what is wrong so that after the proper direction is discovered. In order for learning through negative feedback to occur, an organization must have values and standards which define the critical limits that the innovative ideas have to focus. Whereas technical processes focus attention on clear-cut goals and targets to be achieved, institutional processes define the constraints to avoid in terms of values and limits. Therefore, he believes that the management must choose these limits. As a result, a space of possible actions is defined which leaves room for innovative ideas to develop and to be tested against these constraints (Van de Ven, 1986).

Therefore, this solution helps to the firm to build an infrastructure that is conducive to innovation and organizational learning, facilitates it and makes it able to adapt to the changes that innovation brings to the organization (Van de Ven, 1986). These goals also give a common direction to the unit that is working with innovation, so it helps to focus the attention of the individuals (by revealing the right direction) and at the same time, it makes them work as a whole (because all the individuals realize the right direction together). However, it is important that the managers have clearly defined the constraints of the innovative actions because if not, a right direction might not be found (Van de Ven, 1986). Moreover, negative feedback goals promote exploration because the leaders are more focused with it to build organizational learning because you are always exploring at a first attempt the apparent wrong options so that after you know the right ones.

To conclude with this section, it can be said that it seems that negative feedback goals encourage more the incremental innovation by creating a learning environment because it avoids all the disruptive or big changes by showing the right directions of the innovations. This is because the information analyzed feedback will hardly reveal that a big change is needed, it will focus more on building on existing capabilities. This right direction will focus more in incremental changes rather than radical ones. Therefore, these goals encourage some exploration but not through all the possible alternatives because the methodology makes discover a right alternative as soon as possible.

### 4.4.2.8 Other types of goals

The previous sections of this research analyzed the most commonly used goals by firms when they try to be innovative. However, the literature contains other types of goals that might support innovation and might be also useful for this research. Therefore, the aim of this chapter is to briefly analyze and synthesize different types of goals that are found in literature and might encourage innovation.

The first approach that has been considered useful for this research is the one taken by Daan Van Knippenberg (2014). In their research, a goal orientation perspective to pursue radical innovation is taken. They propose a novel goal setting approach for managing team motivational states that
involves adapting or shifting team goal preferences at key points in the innovation process in order to achieve radical innovation success. In this novel approach, Daan Van Knippenberg (2014) develops a model that outlines how shared team goal orientations (motivational orientations in achievement situations shaping the goals that teams prioritize as well as how they regulate their behavior in goal pursuit) may guide a team’s pursuit of more radical innovations. This shifting ability is believed to be important in radical innovation teams due to the fact that the teams have to switch from idea development and idea promotion many times, which requires dynamism. The goal orientation framework that they develop empathizes on motivational behavior towards learning, successful performance, and the avoidance of failure and learning from it.

Daan Van Knippenberg (2014) defines goal orientations as goal preferences in achievement settings. They serve as cognitive frameworks for interpreting feedback, reacting to challenges in goal attainment, and responding to performance outcomes. Team goal orientations concern shared goal priorities for the team (not for individual members) in relation to an achievement situation; in radical innovation, goal orientations thus concern goal priorities in pursuing the development and implementation of a team’s innovation. Therefore it can be considered similar to a learning perspective that might mix learning and negative feedback goals although they do not focus on the goal’s characteristics; they focus on the people’s behavior relating to goals. To do so, he proposes four types of goal orientations among which, the innovation teams must shift depending on the situation in which they are involved. These four propositions shift among learning perspective, performance or efficiency perspective, adaptive perspective (fast change between perspectives) and superordinate perspective (global perspective).

A similar approach to the one taken by Daan Van Knippenberg (2014) is the one taken by Montani et al. (2014). In their research they also argue that learning goal orientation is the solution to improve innovation in firms. Therefore, they do not focus on the characteristics of the goals itself, what they aim is to create a psychological climate in the organization that encourages innovation with task variety to shape the innovative work behavior. In order to increase employees’ motivation to engage in proactive goal generation tasks, managers should thus promote the development of a change-oriented work environment by emphasizing skill development and the use of flexible approaches in the execution of plans and tasks, ensure an adequate amount of variety in the execution of work activities, and retain and develop a learning-oriented workforce. In the orientation that is proposed in their research, challenging change-oriented goals are the most effective to challenge uncertainty.

Moreover, also other authors, such as Magnusson & Lund (2015) divide the innovation process into parts to treat those from different goal setting perspectives. He argues that teams that pursue innovation deal with two different types of processes: idea generation and idea implementation. Therefore, goal setting in innovation teams has to be divided into idea generation and idea implementation processes because they aim for totally opposite things. For the first one, the goal setting process has to be more creative and exploratory, in order to consider all the possible alternatives, hence the goals explained above will be used (learning, creativity or stretch). However, in the second type of processes, efficiency and exploitation should be attained in order to achieve the maximum advantage from the innovation ideas. Therefore, traditional performance goals that is, SMART goals that support the goal setting theory or efficiency goals are more adequate in this process.
Other relevant literature that can be found in this field is for instance, the one developed by Hammer (2014). In his research, prevention measures for entrepreneurs are proposed. Some of his advices are related to goal setting and as entrepreneur initiatives are similar to radical innovation initiatives that the firms might have, the same advices can be applied on a radical innovation perspective. The data was collected by interviewing two entrepreneurs that had failed and other than did not. In the research it is stated that all entrepreneurs had full commitment to the goal set, did not expected that the goal was so difficult to achieve and had only a sort of financial feedback system on the goals. In respect to the specificity, the not failed entrepreneurs had set a measurable goal, the failed ones did not. In terms of strategy, the firm-failed entrepreneur had only one strategy. The personal-failed entrepreneur had an exit strategy from the start. The not-failed entrepreneur showed flexibility in the strategy to aim his goals. Therefore, this study shows that it is important for innovation activities and to the goals set in them to be measurable and to have flexibility because those were the only differentiators in the three cases. This suggest that according to Hammer (2014) all the goals that want to encourage innovation should be measurable and they should not lose the specificity in order to create an external reference of the goals, which seems to be against the ambiguous goals to support innovation.

Sailer, et al. (2014) focused more in collaborative innovation, which can be also radical or incremental. In their work, it is concluded that the key factor to implement complex innovation successfully is to achieve a shared vision with the partnership. This vision can take very different forms, as claim, contract or prototype, helping to identify concrete goals and outcomes in the end. Therefore, it is remarked not only the importance of goal setting but also of goal finding, which is a dynamic process leading to a shared vision that leads to the setting of common and agreed goals. Goal setting also affects the shared vision, but unlike to traditional management, goal setting becomes part of the collaboration process as a recurring task which leads to concrete execution of the goal finding (Sailer, et al., 2014). With this, they conclude that successful innovation management in partnerships does not depend on attainment of ultimate initial targets but much on the coevolution of goals and partnerships around critical changes and events.

Therefore, it can be concluded that no totally new goals are discovered in this theory chapter. The new part is the different perspectives taken by the authors of this chapter. These perspectives aim to enrich the further analysis having a broader point of view. However, as no new type of goal has been identified in this chapter, the analysis will base on the goals described in the preceding chapters but considering these new perspectives. These perspectives differ in the expected behavior of the employees, the focus point of the goals or the part of the innovation process that they affect. All this is considered in the discussion chapter.

4.4.3 Ways of goal setting for radical innovation

In this chapter of the current research work, the aim is to collect, summarize and briefly compare the established ways that support radical innovation and have been mentioned in the current chapter in order to have a clear overview of all the types of goals. The goals that have been described in detail and that are said that are the standard goals that support innovation are the following ones: learning goals, ambiguous goals, superordinate goals, extreme or stretch goals, efficiency goals, innovation or creativity goals and negative feedback goals.
The first distinction that can be made about these goals is that there are some of them such as learning, stretch, ambiguous, innovation or negative feedback goals that clearly encourage innovation by themselves by creating a learning and explorative environment. With learning goals, individuals that have a low cognitive ability, explore all the different possibilities to attain the goal and these will include the creative ones. Stretch goals create an explorative approach because they force the organization to search outside of its normal routines and knowledge to attain the goals due to the fact that they cannot attain an extremely difficult goal with the current capabilities. Ambiguous goals insert a new common behavior in the organization. They try to provoke changes in the way in which individuals perform in order to trigger changes in the organizations, therefore they promote also innovation. Innovation goals enhance creative behavior and creative individual ability. This increase of creativity will make the employees of an organization to explore and look for new and appropriate alternatives or solutions for a business. Negative feedback goals promote also exploration by testing the wrong decisions first so the feedback of the process reveals the right ones. Therefore, this exploration is not as broad as stretch, creativity or learning goals but still encouraging innovation.

However, there are other types of goals that do not enhance innovation by their own but they improve other mechanisms that benefit innovation and are usually needed for it. These goals are efficiency and superordinate. The first one aims to make the innovation process more efficient but it does not encourage the innovation itself or the radicalism of it. The second one makes to consider the innovation as a whole process inside the company which is understood by all the individuals involved in it. Therefore, it can be said that these types of goals work as complementary goals for innovation activities by making them more efficient. It is further analyzed in this research if companies use these goals in this way.

Among those goals that encourage innovation by themselves, there are some that tend to encourage more radical than incremental innovation. If learning goals are set to individuals with low cognitive ability they will tend to encourage more radical innovation because the individuals will spend more time in considering all the alternatives. However, if they are set for individuals with high cognitive ability, they will encourage more incremental than radical because they will select a feasible alternative as soon as possible. Ambiguous goals should be reserved for occasions where major or strategic changes are necessary because injecting ambiguity into an organization’s environment can be a risky enterprise. They are set like a slogan that tries to challenge the employees and encourage them to provoke changes on the previous standards looking for something different. Therefore, they enhance radical innovation. Stretch goals focus more on radical than incremental innovation because pursuing goals that are seemingly impossible might stimulate radically new approaches to attain the goals so that radical changes will be generated. Creativity goals depend on the specificity of the goal to determine if they enhance more radical or incremental innovation. The less specific is a goal, the more radical that the innovation will tend to be because the individuals consider a wider range of options hence the outputs can have a higher level of creativity. The author of this research assumes that negative feedback goals encourage more incremental than radical innovation because they avoid all the disruptive or big changes by showing the right directions of the innovations. This is because the information analyzed from the feedback will hardly reveal that a big change is needed, it will focus more on building on existing capabilities.
Other perspective from which these goals can be compared is to see if they affect in the idea generation or in the process of implementing the innovation. Learning goals affect in both, idea generation and process because they develop a learning cycle between the implementation and the generation of new ideas. Creativity and stretch goals, affect mainly to the idea generation by increasing the number of alternatives considered. Ones because of the increase of the creativity and the others because the organization must consider them in order to attain them. Ambiguous focus more in the process, by changing the way of working of the employees to trigger radical changes. Negative feedback goals focuses more on the process also because is the process (the analysis of the feedback) the one that reveals the direction of the respective innovations. To conclude with, it is obvious that efficiency and superordinate goals affect more to the way in which the organizations implement innovation, not in the idea generation. All these aspects mentioned above are summarized in the following Table 2.

<table>
<thead>
<tr>
<th>Type of goal</th>
<th>Direct effect on Innovation?</th>
<th>Radical o Incremental</th>
<th>Part of innovation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning</td>
<td>YES</td>
<td>Depends on the cognitive ability</td>
<td>Idea generation and implementation</td>
</tr>
<tr>
<td>Ambiguous</td>
<td>YES</td>
<td>Radical</td>
<td>Implementation</td>
</tr>
<tr>
<td>Superordinate</td>
<td>NO</td>
<td>-</td>
<td>Implementation</td>
</tr>
<tr>
<td>Stretch</td>
<td>YES</td>
<td>Radical</td>
<td>Idea generation</td>
</tr>
<tr>
<td>Efficiency</td>
<td>NO</td>
<td>-</td>
<td>Implementation</td>
</tr>
<tr>
<td>Creativity</td>
<td>YES</td>
<td>Depends on the specificity of the goal</td>
<td>Idea generation</td>
</tr>
<tr>
<td>Negative feedback</td>
<td>YES</td>
<td>Incremental</td>
<td>Implementation</td>
</tr>
</tbody>
</table>

Table 2. Types of goals for innovation.

After this analysis and comparison, some similarities can be also established. As creativity goals make individuals to spend more time thinking about a task and trying to expand the range of potential solutions considered, in this sense it can be stated that the aim of this type of goal is so similar to the learning goals for individual with low cognitive ability because as previously stated, the aim of the last ones is to spend more time in thinking adequate strategies before performing a task. The result of stretch goals will be also the same but with other methods (forcing the organization, not enhancing the individuals).

To end with, some combinations of the different type of goals can be proposed in order to solve some problems that might arise from innovation activities. These combinations are set forth below with the purpose of identifying those in the further analysis. These are treated as hypotheses that are investigated in the analysis part. As creativity goals enhance creative behavior but they lower the productivity, maybe if those are combined with efficiency goals, the productivity and even the efficiency of the creative solutions become higher. Creativity goals
also enhance individual creative behavior, which is hard to be understood by the organization as a whole, that is, to transform it from individual to common. Therefore, if these goals are combined with superordinate goals, it might be easier to adapt the individual creativity to the organization and therefore implement the innovations. The risk that can be detected from stretch goals is that they might misalign too much from the existing capabilities of the organizations so that they are not able to build the new ones. In order to be able to build them, the “old” and the “new” business must be merged; otherwise the changes will not be absorbed by the organization. With learning goals the problem might be the lack of efficiency of them because the individuals might spend too much time considering all the possible option hence combining them with an efficiency goal might be a good alternative. This will not happen with stretch goals because as soon as they find a feasible option the individuals will go for it. Ambiguous goals the challenge is that the individuals might understand the ambiguity in different ways so the new way of working does not have a common direction. Therefore, it might be useful to combine superordinate goals with ambiguous. The problem that might emerge from negative feedback goals is that they might have lack of efficiency because first go against what is known that is bad (within the limits). The advantage is that once you do this, you know the right way for the innovation if the feedback is well analyzed. Problem might be caused in understanding and interpreting the feedback. These goals could be also combined with efficiency goals so that the organization spends the least possible time analyzing the wrong directions.

4.5 Established ways of innovation measurement

Innovation is a key activity in a firm in today’s changing environment, where the only chance to acquire a sustainable competitive advantage is to develop dynamic capabilities that allow the firm to become innovative and efficient. Moreover, innovation also needs to set goals to achieve the maximum efficiency, as it has been shown in the previous chapters. However, innovation is a quite intangible activity in a firm. It involves terms such as creativity, change, development etc. and these terms are quite difficult to measure. Therefore, the aim of this section is to gather and analyze the standard ways that are used to measure innovation activities, for instance, in an R&D department. Previously in this research, the general performance measurement and the metrics used in it have been analyzed. Hence, this current section will permit further on in the research, the identification of similarities and differences between general performance measurement and innovation measurement.

There have been several previous researches about innovation measurement, many of them with different metrics and ways to measure this activity. However, the majority of the authors agree on that in order to see how good the goals encourage innovation or how good the innovation is being managed, the measurements of the innovation activities have to focus not only in the outcome but also on the progress that the firm does towards the goals. This perspective is for example supported by (Fitzgerald, et al., 1991), who suggest that there are two basic types of performance measure in any organization; those that relate to results (competitiveness, financial performance), and those that focus on the determinants of the results or the process (quality, flexibility, resource utilization and innovation).

However, this research will focus on the review done about innovation measurement by Adams, et al. (2006), which also states that this measurement has to be focused not only in the inputs and outputs but also in the process. This study bases on the research of Adams, et al. (2006) because it is considered to be a complete recapitulation of innovation measurement management. They
believe that the process of innovation measurement is disaggregated into separate studies hence it causes a lack of holistic framework among the activities required to turn ideas into useful and marketable products. They cover this gap by reviewing the literature pertaining to the measurement of innovation management at the level of the firm by many authors and creating a common model. Therefore, they bring together disparate suggestions for innovation management measurement made in various parts of the literature and summarize the commonly used measures at different stages of innovation management. To attain this objective, Adams, et al. (2006) divide the innovation management process consisting into seven categories: inputs management, knowledge management, innovation strategy, organizational culture and structure, portfolio management, project management and commercialization. After dividing the process, they remark significant factors of the innovation process in each category and show possible measures for each category.

Adams, et al. (2006) conceives inputs management as the resources of innovation activities. They include factors ranging from finance, to human and physical resources, to generating new ideas. In this field for instance it is concluded that while there has been a concentration on financial measurement of inputs (investments, facilities, or physical resources etc.), there is less emphasis on measuring other aspects of the category. Even within financial measures, there are few that attempt to determine the adequacy of funding for the innovation project. Further, most measures reflect a preoccupation with R&D and NPD (measuring expenditure in R&D, R&D employees...) rather than other forms of innovation (e.g. process, business model). Use of systems and tools is also an important input to the innovation process. In particular, the softer inputs of skills and knowledge are poorly represented by measurement instruments. Tacit knowledge input appears not to be well captured by extant measures (the propensity of an individual to innovate etc.), and no measures of appropriate skill levels have been developed.

For knowledge management they suggest that as it is quite an extent term, three areas within knowledge management that have importance for innovation management, are identified. These areas are: idea generation, knowledge repository (including the management of implicit and explicit knowledge) and information flows (including information gathering and networking). In their research, different measurements within these areas are proposed. For idea generation, measures tend mostly to be quantitative (count the number of ideas generated in a period, number or types of generative tools), inexpensive and rapid. For knowledge repository, they try to measure the firm’s ability to absorb and put to use new knowledge, that is, the “absorptive capacity” for the firm, which leads to a better innovative performance. Several quantitative approaches have been developed for the measurement of imported tangible knowledge. The most frequently used approach counts numbers or value of patents brought in. But this is just valid in some industries where the patents make a differentiation. In terms of measuring tacit knowledge, he concludes that tacit knowledge input appears not to be well captured by existing methods. According to information flows three measurement approaches to information flows can be identified: first, measures of the linkages that the innovating group maintains with external organizations and sources (ie. participation in research projects, university links or attendance at trade shows); second, measures of internal information gathering processes (i.e. project reviews and the use of technical reports); third, measures of customer information contacts (Adams, et al., 2006).
Within the field of innovation strategy, Adams, et al. (2006) define it as an articulation of the organization’s commitment to the development of products that are new to itself and/or to its markets. Here, many different approaches are collected by them and the main ones are summarized below. One possible approach is that innovation orientation can be deciphered from quantitative interpretations of new product and market activity. Also, metrics related to top management decisions like risk-taking, proactivity and persistent commitment to innovation, are considered. Another good indicator of the innovation strategy is to measure the link between innovation strategy and overall business goals (strategic orientation) and the provision of leadership to make innovation happen via a strong vision (strategic vision). On the one hand, the strategic orientation can be evaluated by measuring first whether the organization has an explicit innovation strategy or not and second by measuring if the strategy shapes and guides innovation in the organization (if innovation goals match strategic objectives etc.). On the other hand, the usual measures to measure the strategic vision are the managerial attitude towards innovation, tolerance to change, support for innovation, and commitment to it etc. Therefore, these measures are more qualitative.

The fourth aspect is the organizational culture and structure. Adams, et al. (2006) make this distinction because there are dimensions of culture and structure that have been identified to differentiate between innovative and non-innovative organizations and they have to be measured somehow. Here, the organizational culture can be measured with the perceived work environment (i.e. freedom to allow the exploration, enhancing of creative behaviors, organizational and production flexibility, organizational complexity, deconcentration of decision making, rigidity in rules and procedures, propensity to risk etc.). All these will show if individuals perceive innovation to be a desired and supported organizational objective (TCI method). Moreover, the different factors that have to be measured to determine the structure of a team with an innovation task are: multidisciplinarity, dedicated project leader, inter-functional communication and cooperation, qualifications and know-how of the project leader, team autonomy, motivation and responsibility for the process.

According to Adams et al (2006), the portfolio management approach refers to the rapidity at which resources are consumed in the innovation process and the need for these to be managed, that is, all the strategic, technological and resource choices that govern project selection and the future shape of the organization. The earliest models used return on investment as the primary decision criteria. They use economic tools like internal rate of return, net present value and return on investment. However, other measurements are added to this field such as balance in terms of quantity of projects (short- and long term-projects, high and low risk projects or large and small projects), appropriateness of project selection, evaluation and alignment with business objectives.

The sixth field is the project management perspective. In Adams’, et al. (2006) research, it is concerned with the processes that turn the inputs into a marketable innovation. In this field, it is important to measure the factors that make this previous statement possible. They argue that having an efficient innovation project management depends mainly on four factors: project efficiency (project costs, project duration, revenue forecasting, speed, number of activities, duration of the process, performance against schedule), tools used for quality control (i.e. stage-gate, phased development etc.) which can be measured by project process evaluations, internal and external communications (numbers of committees, numbers of meetings, contacts, frequency
of meetings, degree of involvement etc.) and internal and external collaboration (guest engineer, projects in cooperation with third parties, cross-functionality in decision making etc.).

To conclude, the last category that Adams, et al. (2006) analyze is the commercialization, which is defined in their research as the implementation of the innovation process; that is, taking the innovation to market. For this part, issues such as marketing capabilities, sales, distribution and joint ventures are significant. The identified metrics for this category, which are all related with the previous concepts, are: market reviews, organizational commitment, numbers of launched products, post-launch or post-projects reviews etc. In this research, it is also claimed that this area of commercialization appears to be the least developed of the issues involved in innovation management.

5 Methodology

The aim of the research project was to identify, interpret and analyze the effects of new ways of using goal setting and metrics for innovation. To do so, two different activities, which were performed consecutively, were carried out.

Firstly, this study identified different ways of goal setting and measurement especially for radical innovation in literature that can be inspiration for companies to test. This was performed by reading and understanding different peer-reviewed articles with a recognized influence in the studies field. This activity allowed constructing a solid theoretical framework that was used as a base for the further analysis. As a basis for this analysis, a general approach was firstly taken by first considering the goal setting theory developed by Locke & Latham (1990) among other authors. This model was selected because it is a commonly accepted model that explains how goal setting works. To build firstly a broad background, the general performance measurement was analyzed taking into account the perspective of Neely, et al. (2005), among other authors. This provided the basic knowledge about general goal setting, its process, the characteristics of the goals themselves and the common performance metrics, that is, the previous needed background. In order to move forward to the actual research topic, different goals that encourage innovation were identified and studied (learning, ambiguous, superordinate, stretch, efficiency, creativity and negative feedback goals). This permitted to build the sufficient knowledge that was needed after about goals for innovation. In this way, a comparison between these goals and the ones that are not set for innovation or the ones that are used in companies was also possible. Moreover, specific metrics and measurement ways for innovation were analyzed in a literature review by reading the recapitulation made by Adams, et al. (2006) about innovation measurement.

Secondly, this thesis aimed to identify and perform interviews in innovative companies that have different ways of organizing radical innovation. Therefore, a qualitative approach was taken in this part. The interviews were semi-structured, which allowed new ideas to be brought up during the interviews. They were developed by considering the adopted theoretical framework and making relevant questions about innovation. The questions were varied, they started with broad and open question about innovation and its processes and progressively, these questions focused towards goal setting and measurement for radical innovation. This interview format matched the explorative perspective adopted when developing the questions. These interviews were used to analyze and study how these companies work with goal setting and metrics for stimulating
radical innovation. This approach was taken in order to extend this study beyond literature reviews and get an insight in different companies.

The companies selected to be part of the current study were SGS, Metrics Salad, TeliaSonera, ÅF and Sandvik Materials Technology. Due to the differences in size, working field, knowledge management, and procedures of the companies, the study achieved a broader overview and enough perspectives of goal setting and measurement for radical innovation. Before the interviews were performed, a small guide plus the interviews questions were sent to the respondent. This was done so that the interviewees could get an insight of what the study covers and also being giving the possibility to read and search for information about the topic. The same questions were asked to all the respondents which gave us the possibility of creating an interview flow chart. The research used a theoretical coding, which means that it used the previous theory, clearly and explicitly explained, to understand the answers from the interviews and interpret them. Therefore, with this coding, the previous research of the study was used to build the existing knowledge framework that allows analyzing and interpreting the answers.

It was an iterative linear process among theory, interviews and results, and findings. After the first answers were analyzed, the increasing knowledge about the research question triggered the need of having other questions answered hence new contacts with the companies were established or new research was done in order to get more information. After the interviews, the given information was interpreted and analyzed according to the theoretical framework developed in the literature review. This leaded to the consequent conclusions and further research questions.

6 Results

In order to actually identify and analyze how real companies work with radical innovation and more concretely, with goal setting and measurement for it, five interviews were performed in five different companies. These are different sized companies that work with different business areas or industries and in varied locations so that a broader perspective could be attained. All the persons interviewed have great experience within innovation in the companies and high positions in some specific sector of the company that are relevant for this research (R&D, product development or innovation departments/units).

6.1 SGS

The first interviewed company was SGS, a multinational that provides inspection and quality control services to industrial clients. It has around 4000 employees in Spain and over 40,000 worldwide. The interviewed person was David Fornells, the innovation coordinator of SGS group Spain. SGS does not have an own innovation department, it has two people who are the shifters of the company’s innovation and organize its processes and the interviewee is one of them. By working in this way, SGS wants to support innovation in a way that people is the main asset. This is done firstly by making them see that the company is so interested in innovate. When you do so by showing them the innovation slogan and you inviting them to propose new things, people start to breathe and come up with ideas. It was added by the interviewee that then, people start not to feel closed and realize that they can do different things for the company’s benefits. Instead of growing vertically in their fields they start growing transversally by broaden themselves and be more open minded towards new perspectives.
6.1.1 Organization and type of innovation

The interviewee defined SGS as a traditional company in terms of innovation. He defined innovation as a way of doing new business to ensure the survival of the company, to make it sustainable. The innovation strategy of SGS is to sustain innovation in people. In order to generate ideas, they define clearly which ideas are they looking for and what is a valid idea for them (idea that can generate more than a million of euros per year or saving costs or money in half million). The next step is a clear communication of objectives to the employees so that they know which ideas they are looking for. Therefore, they aim to generate ideas with specific financial characteristics and with a strategic direction. SGS aims for the quality of the ideas, not quantity.

To avoid killing their creativeness with these strict conditions, SGS helps them to create these ideas through education to become more observers and critical. With it, SGS aims to create an innovation mindset or culture to make innovation mature in the organization. The interviewee tries to do so by dedicating the maximum possible amount of time to the employees to motivate and encourage innovation on them and making people feel that SGS cares about innovation and SGS is going to listen to them. For the idea creation, the interviewee believes that having a heterogeneous group of people is the best way for having valuable ideas because in this way, all the perspectives are considered.

SGS does not organize differently incremental or radical innovation, what makes it one or another is the outcome of the process. The interviewee remarked also that SGS innovation is limited by rules and legislation so SGS can only innovate radically with the voluntary business by offering new services and giving an added value to the companies. The main barrier that people find when trying to achieve radical innovation, is the economic and brand risk that it takes. The main challenges for him are the creativity of the employees and the implementation of some ideas that have to be industrialized, because it is not their competence. To achieve this radicalism, he considers vital the recuperation of discarded ideas and he adds that there is where SGS has found the most radical initiatives. Other important aspects that the interviewee highlights in the innovation process is that employees must have feedback, otherwise they will feel demotivated and also that employees must invest some time in thinking about innovation. This could be achieved by provoking situations to happen, relaxing the monthly objectives a little or that the innovative spirit is in the person itself. Moreover, to innovate and handle the uncertainty that it carries, it is important people’s mentality towards the changes. SGS must provide changes opportunities and people must be ready to take them. Transversal characteristic is necessary to innovate although this is promoted in a reactive form with speeches from management etc.

6.1.2 Innovation process

The innovation process of SGS is divided into different parts. The first one is the idea generation, which is the creative part. It is mainly here where the employees participate. This is the part in which SGS focuses more, by coordinating groups through the interviewee in order to generate ideas. The aim is to find as many ideas as possible and with the best quality and to create an innovation network among the employees. After it, there is a validation or evaluation part, where
the ideas are validated or cut. Here the ideas are more seriously evaluated by analyzing the revenues, the market, the business line of the idea and the provided strategy with it. This is done by an innovation committee. The important part here is to have some established processes, evaluate them with a holistic perspective and be fast and constructive when doing so.

Then it can be found the development part, where the ideas grow, acquire shape and are tested. A prototype of the idea is normally constructed to test it, in order to adapt it to the real world. In this part, usually is where you find unexpected results. Therefore, an important part here is to give feedback of these results and improve the idea from this given feedback. This is the other part in which the creativity is vital because when you identify the mistakes you have to be also creative to solve them. The purpose is that the idea has to be realizable and with the maximum guarantee of success. Finally, there is an implementation part, where SGS mainly focuses on the efficiency and the quality of it.

Therefore, each part has different challenges and purposes. However, in each phase there has to be a critical and observant spirit. This is a common fact. For the whole process, the interviewee remarks the need of synchronization among all the parts and a well-established procedure in order to move forward in each phase (how much time etc.). SGS is basically trying to coordinate this whole process from a generic perspective where they see how everything evolves. This looks like the classic innovation funnel, where you have all the ideas and they keep falling etc. and at the end just a percentage is implemented.

6.1.3 Goal setting process
Regarding to goal setting, the objectives are set together with the general director (CEO) and the innovation department. The CEO here says what he wants to get and how much will he invest. However, the interviewee believes that these goals are more in a generalist way. He would not break down goals into creative groups; he prefers to speak about challenges. However, in innovation activities, two different types of goals were detected. One more focused towards social benefits (motivation of people, education, creating groups, notoriety etc.) and other more focused towards business goals (revenues etc.). The goals related to social benefits are achieved by working with the employees in the innovation processes, mostly in the creative part. The business goals are attained by setting filters to the generated ideas, validating and developing them along the other parts of the processes. When SGS works with people, the employees first go through an educational pre-step about innovation. Here is explained to them what is innovation, how is its process in SGS, talks about creativity etc. After, it is defined to them which is the challenge of the workshops, which is the objective (generate ideas) etc. However, before start working, the barriers of shame among the employees must be broken down. When the ice is broken in an informal way to open their minds, is where some tips about creativity, brainstorming and other creativity tools are given to them. This is how the social goals are attained.

6.1.4 Goal setting for radical innovation
The interviewee also stated that the creativity needed for radical innovation never itself is efficient. The efficiency can be achieved in the whole innovation process but not in the creative part. The efficiency has to do with the results, how quick an idea is implemented since it is generated. However, if more time is dedicated to think in a disruptive manner, maybe better
results are obtained. Here, with “less” efficiency in the creative part, the results of the whole process are way better. Therefore, the interviewee believes that in the creative part is better not to focus in the efficiency. Time must be dedicated to open minds, think and be more creative in order to get better ideas. Apart from this creative education, SGS tries to limit the scope of the ideas, set some specific challenges, encapsulate the ideas etc. in order to focus the direction of the ideas and get what they are looking for. This helps them to be more efficient in the creative part. In the other parts of the process it is always good to be efficient but it is hard to achieve because the innovation process has lots of loops.

To achieve this creativity and make the employees provoking changes, SGS mainly focuses on making people able to adapt to changes, making them critical observers and change their way of working. When you get this, is when you can set difficult things without demotivating them. The interviewee stated that the bigger the challenge, the bigger that the benefit can be but also the risk is bigger so the balance must be found. SGS tries to promote this critical observant environment in the workshops through education. However, it is difficult that this creative and explorative dynamic that you set them in the workshops keeps in their daily life, that is, a big challenge for them. Another important fact that was identified in the radical innovation projects is the holistic understanding needed about the company. Radical ideas are usually transversal and affect too many business lines. To deal with them, heterogeneity and diversity are key factors because a wider perspective of the idea is attained.

6.1.5 Innovation measurement

In the innovation process, SGS has some KPIs, key performance indicators, which according the interviewee are the most logical and not complicated, like time, money and volume. These measures are done usually by experienced people in the respective areas, who are selected by the CEO. In each step, they measure the time. This shows the bottleneck of the process and where to invest resources to improve it. In terms of volume they measure the generated, processed, validated and implemented ideas. Once SGS succeeds with the idea is when the economic aspects such as revenues, costs, benefits, revenues, investment, break even etc. can be measured. Moreover, if the money KPIs are evaluated the creative part, the employees’ creativeness will die. A key factor when measuring innovation is to decide when to set the measures and to identify which value they give to you. It is also important that these metrics do not overlap. For instance, time is not important in the creative part but it is so important in the validation. The money for instance is most important in the production part but in the creative part it is not that important.

These general metrics were told to be for the overall innovation process but of course you can break it down into specific projects and you will find specific ones (time/task, cost/task etc.). This would be more detailed into the projects. Apart from these clear metrics, the interviewee remarked that there is the social part, which is the most difficult to measure because it is so intangible. You can do surveys, environment measures etc. but nothing accurate. Also things like how many ideas have been proposed in a non-structured or spontaneous way show SGS that its purpose is being attained. As innovation is an internal activity that tries to sustain the business, the main challenge for the interviewee when measuring innovation is the long time that requires from when the idea is created until you start watching the revenues. This long term makes it hard to deal it like a business.
The interviewee also measures the input resources of the innovation activities like how many
people does he involves in the workshops, how much does it cost etc. This is the investment part
in motivating and educating. They also try to measure the knowledge that emerges from the
groups like new talents, reusable people in other groups as leader etc. However, analyzing the
return of this part is so difficult because it is intangible. SGS also measures which ones of the
business lines are most innovative. In this line, one objectives of this year is to get a partner than
can give to us a more objective review of our innovation process. Another thing that was
identified to be measured and evaluated in SGS was all the strategic, technological and resource
choices that govern the innovation projects. Finally, the implementation of the innovation
process is measured in the respective business line where the innovation is applied.

6.2 Metrics Salad
Metrics Salad is a company that also participated in this research project. This is a B2B startup
company that works with cyber metrics (big data), by measuring relevant things in the internet to
provide accurate data to companies. This provided data aims to create a competitive advantage
on their clients by knowing facts that their competitors do not know. The interviewee was Jorge
Serrano, the innovation director of Metrics Salad. He argues that the business itself is totally
innovative, because they do not know any other company that provides the same service.
Furthermore, he considers that this business will provoke huge changes in some industries,
where they will be able to get market information from the users of internet, products,
competitors, suppliers etc. This will allow them to grow horizontally by allowing them to
discover that they need other competences. The big data has always been there, but no one has
measured it before to create a business. Therefore, the majority of the work that they are doing
has a radical perspective.

6.2.1 Organization and type of innovation
They are roughly fifteen employees and as the company is a SME (Small and Medium
Enterprises), they do not do innovation in an organized way. Therefore, they do not have any
innovation department although Jorge is the person in charge of managing the innovation
projects. This is because the communication among all the employees is quite immediate. He
argues that “innovative genes” is a shared characteristic among all the members of Metrics Salad
so he considers themselves totally innovative. The interviewee defines innovation as a way of
making marketable a new invention. He also points out that nowadays, it is extremely important
because in this time of change where everything is developing, an innovation can be a
competitive advantage that allows a business to survive.

The interviewee considers their innovation strategy quite simple. It is based on competitive
intelligence. The basic principle in all projects is to analyze what is in the market, see what the
competitors are doing, how the industry is changing etc. This is carried out by doing an accurate
and deep research. After, Metrics Salad tries to look beyond. The interviewee believes that
people usually do not know that there is data out there that can help them to answer questions
that they even do not have. Metrics Salad tries to create needs where there were no needs. Then,
from this analysis, either the company tries to add some new functions to some existing business
for the incremental or they try to change the thinking or working way for the radical projects. In
both cases they start in the same point; observing. Metrics Salad tries to be the first of the
markets and give to the clients a competitive advantage. He states that it is not only important to focus technologically but also, and even more, in the business model that the idea offers.

It was also stated in the interview that, the key factor for a company to be innovative is the people that form it. The interviewee claims that they must enjoy being adventurous, researching and discovering things. As they are a SME, small and medium enterprise, every individual is different but this open mindedness is a common characteristic among them. Moreover, their own business makes them having a research culture so it makes it simpler. All the employees innovate in some way or another. The company works in an innovation environment where everyone explores and answers questions and this promotes the innovation. An example about this mindset is that they are currently trying to change their business model, from a business model that changes depending on the projects that you get (measuring for the clients) into one more stable, where they offer a tool (the client measures himself) to the clients. This will increase the benefits and save time and resources. With this change the objective is to be more efficient, work less, work better, and this is why Metrics Salad is trying to change the business model. Because as the company works a lot with innovation, the efficiency is hard to get because you work with so new technologies that are not optimized yet. The idea is that these technologies feed themselves and become more efficient with their use.

6.2.2 Innovation process

As Metrics Salad is a quite small company, they do not have a defined innovation process. The interviewee states that the company does not need anything that organized due to their size so all the decisions are done by a consensus. However, it could be roughly defined in three parts. The first one is investigation and idea generation, where they perform all the previously described activities. Here, the interviewee states that the main challenge is to avoid thinking useless things, be fast and effective. Then there is a validation process, where they “play” with the ideas to make sure that they will work and discard the ones that have no sense. In this part the company has to consider all the business facts (business plan, business model etc.) associated to the idea. Finally, the last step is the implementation part, where you try to develop fast and get the revenues as soon as possible. Here, the main challenge for Metrics Salad is to find a good work distribution when implementing them. This is because as the ideas are radical, they need to be developed and require lot of time and effort from everyone.

6.2.3 Goal setting process

When moving into goal setting questions, the interviewee explained the goal setting process in Metrics Salad as a horizontal process because they have a CEO but the rest are at the same level. The objectives related to innovation are mainly focused on some specific aspects of their business and in a concrete order. First, on their method of idea exploration and right after the idea emerges, there is a focus on the business model (how will it generate the money, which market, which clients). These objectives were set by the CEO and then told and agreed by everyone. They are large-term goals. On the one hand you offer the actual services to your clients and on the other hand you prepare things for the future. the interviewee identifies also two different types of goals in Metrics Salad. Some are so incremental, because they aim to improve on the existing services. These can be attained with extra formation and a little experimentation. The others are more in large-term, more radical (product transformation) where you dedicate lots of time in work with it and investigate it. The first ones try to satisfy and promote loyalty on the
client by giving them a more complete service. The radical ones try to anticipate the changes in the market and give them an answer before they happen.

### 6.2.4 Goal setting for radical innovation

It was also found that one objective for Metrics Salad is to find a blue ocean space, where they will have time until the rest adapt to it. This will allow them to develop and have the guide of this new market. Here, not only the research, analysis and competitive intelligence, but also be opened and have flexibility are important needs. To achieve this blue ocean, the interviewee mentioned some other objectives that they have such as an increase of clients with the product that they are developing and that this product substitutes other tools that the clients currently have. After, as the clients realize what they can do with Metrics Salad, they request more things and in this way, Jorge thinks that Metrics Salad uses the clients to innovate. This will allow them to stay in the blue ocean spot. To find it, they bet for a challenging mentality of the employees and lot of research of the current situation to ensure that they are in the good line of innovation.

the interviewee believes that the key aspect for this is to be able to manage the tacit knowledge of the company in order to bring ideas to the surface. He adds that this is a current challenge in big organizations, where they educate employees in a formal way to do so. However, as Metrics Salad is a small company they manage the tacit knowledge fast enough in an informal way through interactions, conversations etc. From his position, the interviewee tries to provoke or impulse this kind of situations that lead to an innovative environment. This innovative environment that they provoke is enough to generate ideas. To handle the uncertainty and risk of these projects, Metrics Salad mainly focuses on the funding part and on making business with clients that bet for the innovation also. There were also detected some ambitious goals such as becoming internationals and change their way of working to make things easier for themselves.

### 6.2.5 Innovation measurement

Metrics Salad was found not to be a company with a strong focus in the innovation measurement. However, they have some KPIs related to innovation. These are number of clients and how they respond to their services, new questions, number of hours dedicated to some tasks and new services that our clients ask. They also measure the user requests of our potential clients in the web to look for new needs and the new data that is available in the internet and is significant for them. The main challenge that they face here is that the information in the web is so dis structured so it is no easy take conclusions, it is not enough with analyzing quantitatively but also qualitatively. The company does not measure the knowledge management due to its informal nature. The measures are done by the interviewee together with the technicians.

### 6.3 TeliaSonera

Another company that participated in this research project is the company TeliaSonera. TeliaSonera is a multinational company which has around 26,000 employees worldwide. TeliaSonera works in the communication field by providing network access and telecommunication services to more than 70 million users. The company tries to do this in an easy, efficient and environmentally friendly way, betting for the sustainability. The interviewed person was Dusyant Patel, head of the innovation unit Purple+ at TeliaSonera. This is a small unit which has been recently created by the company. They are less than ten members in this unit so it is more like a startup inside the company. TeliaSonera has created this unit because they
realized that they had been lacking in provoking revolutionary changes or adapting to them. The objective of this unit is to try not just to focus inside the box of their core business but also try to observe outside the company, get some ideas and try to get that into our businesses. Therefore, they just focus on radical innovation. It is the statement of that even a big company can think differently, faster, speedy. The unit works by gathering ideas from the company’s employees and from the outside and making them work inside the company.

### 6.3.1 Organization and type of innovation

The interviewee considers TeliaSonera as a quite innovative company and he believes that this is shown through the initiatives that they are taking such as the unit that he is heading, which focuses in bringing new and revolutionary ideas to the organization. However, one of the challenges that any big company has is keeping the pace with the development in all areas, of course it is innovative but depending also on the area that you look into. He defines innovation a way of making sure that the company can keep the pace with the changes outside by adapting the company to the changes that are outside it. He considers this activity important because as things are moving faster, we as a company have to move in that direction by making sure that we follow the market dynamics outside and satisfying the customer.

To be successful in this kind of job, which focuses on radical innovation, the interviewee considers a key factor something that he calls “magic” and “money”. The money part is to put the ideas on a business plan and see how much money they can get; if the idea does not make money, they will discard it. The magic part is this kind of people that say, we can do everything, do not think about the money. An innovative company has to find a balance between both, and this is hard for him. The innovation strategy of the company is to create a movement in the whole company, bringing everyone into it, create innovative environment. Apart from this, they have an innovation agenda, where they write down what they have to achieve in the coming three years. Here they have to encapsulate innovation in all the areas (marketing, human resources, financial etc.).

### 6.3.2 Innovation process

In his unit, the interviewee works with innovation by looking for ideas and testing them. They gather ideas and test from ten to twenty in a month and see which ones could succeed in the company. Therefore, the innovation process is quite logic. The company divides it in four areas.

First, they identify ideas that may emerge from the company or from outside. Then they incubate these ideas, that is, they give shape to them. Later they accelerate the idea, where they put some more effort on the idea to make sure that it can be in the company and that it fits with it. Finally, they execute the ideas, where they bring them out to the bigger organization. The interviewee claims that in all the areas the challenge is to find competency. In identify, you have to find understanding, networking etc. When it comes to incubating, they need people who can incubate projects very fast. It is the same thing when they accelerate and execute, so it is more about finding the right people. Dynamic people, fast and that know about different areas. He believes that in the radical innovation work, all is about moving fast, and with innovation you must be creative, but also see that if something does not work, just move to the next and do not lose time on it. This fail-fast mentality, which is the key factor of Purple+, was told to be highly embedded in all the parts of the process of the unit that he is working with. Therefore, in every part what they are trying to ensure is a fast execution.
6.3.3 Goal setting process

In the goal setting context, they work with a rolling goal setting system in a six months calendar. This means that they set goals every six months and try to achieve those until the next six months, where they update them. The CEO is the one that sets the goals for the different units, then, in his unit, the boss sets them. Basically, the goals try to follow the innovation agenda that was previously mentioned. However, every unit has their own goals. In a small unit like Purple+, they also have like small things that they have to deliver and meetings to tick them off. For their work, the interviewee states that the most important things related to goal setting is to have a clear definition of what the goals are and then execute them in the proper way. With the goals, they also try to encourage even more this fast dynamic of fail-fast. This provocation to the employees is done by testing the ideas, where they show their way of working. The unit identifies and incubates an idea. If it works it goes to the next level. If it does not, they kill it. They also use this mindset to handle the uncertainty and risk that this projects carry. In this way, when they see the first hint that it is not going to work, they reject the project and in this sense the risk is avoided. The main challenge in the goal setting process that the interviewee identified is actually to find the next goal. That is the search of new good ideas to execute. They usually recollect these ideas from tools that the company has, from innovation submits or activities and from “innovation champions”, which are people that have been found to be very innovative in the company. But select the ideas that might be good to test is difficult. These tools, processes or projects try to create an innovation movement in the company. For this movement, the interviewee says that their CEO plays a key role by saying to the employees that they need to be innovative.

6.3.4 Goal setting for radical innovation

The hidden objective with their unit it is about changing the behavior of all the employees. It is an innovation boost that consists of putting a boost in the organization about the innovation so that people can think more creatively in the organization. There are also other initiatives such as innovation laboratories etc. The final shift is about creating a movement about innovation in the organization and we do it by small initiatives and create a viral. Everyone must be part of this movement. The interviewee adds that this will create a learning and explorative environment among the employees. For being successful in this, they need a holistic understanding about the innovation in TeliaSonera and they aim to get it by involving everyone in the process. Moreover, TeliaSonera has three values in the organization, which are simplify, care and dare. The last one can be associated with the innovation work in TeliaSonera by promoting a challenging mentality among the employees. In this unit, they aim to follow the right direction of the innovation with an observation of the changes that occur outside. The company is flexible so that they set targets and they modify them according to the changes.

The interviewee believes that creativity and efficiency are contradictory. But that they try to achieve both as much as they can with their rapid mentality by not dedicating time to things that might fail. However, he claims that in the idea generation there is a strong need of creativity and they cannot focus on being efficient there. If so, they would lose the charm to be innovative. Therefore, they do not try to find a balance between efficiency and innovation. In their unit, they have to be daring. The unit might test twenty ideas and none of them is successful so this is not efficient. The unit is supposed to do something very agile so efficiency is not their focus.
6.3.5 Innovation measurement

Regarding to the metrics in this innovative unit, they basically measure the number of successful deliveries, proposed initiatives, incubations, the amount of tested and failed ideas and in which part of the process it happened, partnerships, companies invested in etc. the interviewee states that all these KPIs are important. In innovation all the metrics are like a chain, if one has more weight than the other the chain breaks. They mainly focus when measuring on the execution of the process, by measuring the quantitatively the outcome in every step of it. The measures are set by the unit together with the management and the same ones are the ones who measure. The main challenge when measuring is to have a crystal clear definition of what we are measure as it is kind of intangible all of this. If the interviewee’s manager wants something measured, he has to make sure that he understands exactly what he means.

The interviewee also remarks that as radical innovation it is about faster iterations where the measures come very quickly, they have to be fast when measuring. Therefore, the unit does not have time to measure all the strategic, technological and resource choices that govern project selection, because their projects are too fast. Other facts that were told to be measured are the input resources (people, money, hours) and the idea flow by creating a pipeline which they track after. The unit where the interviewee works, does not measure the risk-taking because they do not want to limit it. Human resources is who measures the organizational culture to determine work environments, creative behaviors etc.

6.4 ÅF

ÅF Group was also interviewed for this study. ÅF is an engineering and consulting company for the energy, industrial and infrastructure markets, whose clients are found all over the world with a strong base in Europe. Today the ÅF Group has around 7,000 employees divided worldwide. By connecting technologies they aim to provide profitable, innovative and sustainable solutions to shape the future and improve people’s lives. The person of ÅF that participated in this research project is Tor Ericson, who is Manager of Electronics Design, Product Development & IT at ÅF. He argues that during the development processes at ÅF, they focus more on incremental and small improvements and after a while, with all these improvements put together, they have a new implementation. This new implementation might be considered to be radical for them or their clients. But the work is quite incremental. Therefore, they do not differentiate in the way of working, they try to work with the same mentality and what changes is the radicalism of the outcome which can be from more incremental to more new for them or their clients. The radicalism of ÅF relies on the way in which the businesses are done. By including some services, through collaborations or partners they try to provide added value to their customers.

6.4.1 Organization and type of innovation

The interviewee states that the slogan of ÅF is innovation for experience. In ÅF, they do not consider innovation just about the technical product. It is more about how it is used and its interaction with the market. With their innovation, they aim to be a little bit lean forward in the way that you develop new products and services. Due to the nature of ÅF, Tor sees the company from two perspectives. One is considered to be innovative and the other not so much. The innovative part of ÅF is that they have a great knowledge in their field, with a big R&D department located in Sweden and a connected business model that pushes their market in some way. In ÅF, they have a mix of all the business models, this is quite rare and the interviewee
believes that this gives them a competitive advantage that might be considered innovative. However, part of the innovation comes from product ownership and defining it how it should look like in the future and in this sense, they do not have any. The interviewee believes that they are more a company that takes you from A to B, but we do not define B. In this aspect they are not innovative.

The innovation work in product development is based on the education of all the engineers, sharing knowledge among them etc. The company educates them in a way that they are able to develop new things by broaden their knowledge and their way of working is more focused towards the customers. For this education, they use value models and other tools, which educates them in lean models with system ideas, how to evaluate stakeholders, aspects to develop new things etc. Often the designs after going through this process are quite radical. For the interviewee, the key factor for an innovation work is to know the purpose of the products or services that the companies are using and be able to meet the stakeholders’ requirements. To do so, there is a strong need of managing the information in a good way. To collect the useful information and get a good flow of it, they use a competence network. This competence network is the basis of their innovation strategy. It leads to more information and more knowledge hence it is easier to find new tools and services for the clients. The interviewee adds that they want to build the innovation through networking, connecting everyone, sharing the knowledge and building a competence-based company. This will allow to identify and gather together new ideas. Management structure is also so important to handle people and take decisions. This also helps the information flow. The interviewee considers these activities of managing the information and building a competence network as a key factor in innovation initiatives.

### 6.4.2 Innovation process

In projects where ÅF has to develop something new, an innovation process that can be divided into three different parts was identified. These parts are idea generation, prioritization and implementation. In the work group of the interviewee, first, they generate and gather as many ideas as possible through the different tools that the company has such as intranet boxes etc. It is important to be fast in this part. Then, they prioritize them in the most beneficial way for the company. They mark as urgent some, they put others in the dust and others are kept for the next generation etc. After this priority, they select one idea and the development team starts working on it, when it is finished, the next one etc. Therefore, if you are in the last stages of a product and you have an idea, you do not have to include it in this product, you will have to wait until the next loop and finish the product. Working in this way, they aim to be more focused towards the goal, to be faster and to avoid new ideas that might dislocate them in the development task. In this way they ensure innovation and efficiency. In this process is vital to discard clearly the bad ideas and implement the good ones because if not they will emerge again and it will be a waste of time. The interviewee claims that the key factor of this process is to have a good project management in order to know what they are doing in each part, the time that they have to use and the tools that they have to implement.

### 6.4.3 Goal setting process

On the subject of goal setting, the interviewee argues that usually the big goals go from up to down through the company although there are more specific goals within a project or a minor organization which are set together and with the manager of the group/area. This is more bottoms
up. However, if the goals are set in a unit, you have to align them with the company. Therefore, the goals are set by management teams in the different levels. The interviewee claimed also that to attain the goals, he prefers to set them and then break them down into activities or improvements, small tasks that helps to achieve them. This is normally done through strategic plans in each unit.

In ÅF, there are also some strategic or big goals. These goals/visions push the organization forward, because they are quite big so that you need to do something different. Therefore, these high level goals set some pressure in the organization and influence the way of working of the employees. The interviewee also identifies other different type of goal that is more focused towards the competence network. Here, the employee together with the manager decides which skills or competences he should develop to broaden the employee’s knowledge. Finally, they have a net of year-term goals which go from up to the bottom and are called Tempo. In this model, they set up goals for 5 different aspects: economical goals, market goals, organizational goals, recruitment goals and competence development goals. To set all these types of goals, they focus in aspects such as revenues, profit, number of days, how many employees are going to be assigned etc. Another thing that the interviewee considers to be important is the prioritization of goals. A unit cannot have too many targets otherwise they become overloaded. To avoid this, you have to make choices and select only the most important goals.

### 6.4.4 Goal setting for radical innovation

When relating this process of goal setting to the innovation activities, the interviewee claims that they work in the same way and with the same mentality when working with incremental or radical projects. That is, competence oriented projects and breaking goals down into activities. Moreover, as radical innovation involves long-term and big goals or ideas, it is even more important to break them down to implement them successfully. Tor adds that to get these activities from the goals, accomplish them and manage successfully the time, it is important to assign some clear responsibilities. If there is any responsibility and there is a bad foundation, when the manager sets a goal, nothing will happen. Breaking the goals into specific activities to reach them better, reduce the uncertainty and the risk that the innovation projects entails. There are also other things such as risk analysis, competence network, customer observation and information flow that are important for handle these. The interviewee strengthened also the need of a self and critic observation, to be aware of all the mistakes and failures in different areas and projects to reduce risk. He argues also that the revision of old ideas is fundamental in innovation processes because in ÅF, around 90% of the ideas come from old things that they were doing and they are just forgotten.

A part of the general education that has been commented in the preceding paragraphs, the interviewee mentions that ÅF also educates the employees in innovation so that they know that the company bets for it. The company encourages a lot that people must know each other in order to work better although in a big organization this is a challenge. Here, methods or tools that the interviewee names are workshops, improvisation theater plays, painting classes, creative exercises before brainstorming so through it, they try to enhance mostly creativity. With their goal setting, ÅF also tries to approach the employees to the customers in order to come up with better ideas. ÅF also tries to share this customer service’s knowledge so that it can be used for other customers. This creates again, a network. To follow the right direction of the innovation, goals must be simple, practical, easy to understand and clear for everyone. When talking about
efficiency in innovative activities, the interviewee believes that the efficiency does not decrease generally if you have a good organization. However, if too many people is just thinking in ideas all the time it might do hence it is important to have responsibilities to avoid this decrease of efficiency. It is part of project management task to assign and distribute the tasks during the time.

6.4.5 Innovation measurement

The interviewee identifies as the best way of measuring innovation through persons and impressions from innovation activities due to the difficulty of measuring innovation. However, in all these activities related to innovation, ÅF has some KPIs that help to measure them. These KPIs are delivery time, project time, creativity by new ideas, flow and knowledge transfer. However, the interviewee insisted in that due to the nature of their services, in many projects, they have a consultant in the customer’s office so they cannot measure innovation directly. Then, they measure competences, skills etc. He remarks that it is almost impossible for them to measure innovation since they do not own a product. The metrics are set by the management and also they decide who measures but it is normally a person that knows the area quite good.

6.5 Sandvik materials Technology

Sandvik Materials Technology (SMT) was the fifth company interviewed for this research projects. SMT is a part or a business area of the Swedish company Sandvik Group. SMT is a world-leading developer and producer of advanced stainless steels, special alloys such as titanium and other high-performance materials, as well as products and systems for industrial heating. SMT counts on around 7,000 employees. The person who was interviewed for this study is Mattias Klockars, head of R&D processes (Strategic resources, Technology processes and Development processes) and Site Manager R&D at Sandvik Materials Technology. In order to accomplish their job, SMT has a strong tradition in innovation and extensive investments in R&D with a continuous focus on sustainability. SMT considers the R&D to be a central part of their organization. It is divided in different departments that focus on the different activities that they carry out (new alloys development etc.), where they develop new things. Then, they have another isolated department that works with strategic research and building knowledge.

6.5.1 Organization and type of innovation

The interviewee claims that SMT is an innovative company because they develop some products that are new for the market, and they have a strong focus on the development of new things for creating value for the customers. He adds that hence, innovation is a key activity on their business due to the need of developing new solutions for their customers. The interviewee defines innovation as a way for finding solutions for current problems with the customers. It is also when they put knowledge into practice for practical applications that benefits us or our customers. This is so important for SMT because this is what determines their growth. The innovation work of SMT is mainly focused on R&D, where they have three different departments of which the interviewee is responsible. The first one is Strategic resources, which is based on fundamental research, gathering knowledge is needed, increasing the existing knowledge, doing strategic research etc. The second is Development processes, which focuses on the development of new materials etc. The last one is Technology processes, which is more like short tasks to find support for our activities.
The interviewee believes that this structure is the key factor for any company to be innovative. This is due to the fact that companies have to ensure that there is room for building knowledge which is then transferred to the organization by developing projects. SMT achieves this with their Strategic resource department. This department was created because SMT constantly had problems of assigning time for research so we decided to break the number of persons, experts, specialists into a separate group. This was a real way to show that they really need to make room for innovation and that they need to work with basic research and knowledge building. The other important aspect that the interviewee considers is the innovation culture, which is more about having freedom to interact and to respond to the ideas of the engineers. As SMT has worked in the first one, building a culture that encourages innovation is a further focus for the company.

Moreover, SMT does not only focus on incremental innovation but also radical innovation is considered to be necessary. The interviewee states that radical innovation projects are related to the development of new alloys or new materials and incremental is more related to twist an existing alloy composition to make little improvements. When working with these two types of projects, the difference is that for radical innovation projects, they always start in their strategic research department, where they build knowledge. Then when the knowledge is built SMT switches to the development area and executes this new alloy or product. For incremental projects, SMT already has the knowledge that is needed so they start directly by developing it and make the improvements. Their innovation strategy is to have a very clear definition of research platforms. These platforms are aligned with the strategy of the company and with the strategy of the group. With these platforms, they divide the research and the development areas.

### 6.5.2 Innovation process

The innovation process of SMT is also based on the structure that they have created for innovation. SMT starts by finding interesting areas of research, this is where they can or need to develop things. Then they research about it in the strategic resource department, in order to gain the knowledge. After this research is developed or implemented in the development departments. Inside these parts, SMT has a process for strategic research which is defined in different parts. First the employees of R&D select the idea and then there is a business case and some other phases through which they have to go. They have decision points for each phase, which is also very good to really continue or stop the idea. Basing on these platforms, SMT prioritizes the ideas that are more important for each department, and which resources are available for each one. This clear strategy is the key factor of all the innovation parts. The interviewee believes that dividing the different stages in the innovation process (strategic research and development process), is a very efficient way of going from the idea to the product.

### 6.5.3 Goal setting process

Regarding to their goal setting process, the interviewee states that the managers of each product area define the different targets related to new products and markets that they want to approach. Then they break them down into R&D and see which kind of work should be done to attain them, that is which kind of development they must do, which kind of research or knowledge they must gain. After, they draw the roadmap to attain them. Outside the product areas, they have the strategic research department which adds the task of looking for future trends. The summary is that this process of drawing the roadmap is a combination of the product area needs and the needs of the strategic research platform. Within this process, SMT also counts with different type
of targets. Ones are related to the profit projects, other to operational excellence, others to internal work, others targeting innovation (i.e. number of patents). The difference among them is the purpose. The main factors when setting these goals are the customer needs and also their own business intelligence about the future.

### 6.5.4 Goal setting for radical innovation

When focusing on the previously mentioned innovation targets, the interviewee argues that when SMT wants to develop alloys in a specific direction or develop some needs for a specific area, the employees try to define which kind of product they will need and they set targets on specific development initiatives. SMT decides the direction of their research in the strategic resource department and this is how they follow the right direction of the innovation. With this, SMT tries to set new standards or find new innovations that really will increase the efficiency or the environmental aspects of the customers. In the past, the goals aimed to create an efficient structure for R&D and creating time for strategic research. Nowadays, as this is already achieved, SMT the goals try to create a good culture for idea development and generation to promote innovation. Due to the need of building knowledge before SMT faces the radical innovation projects, the goals differ between incremental and radical projects. This is because when doing strategic research the end result is not a product, it is knowledge. Therefore these targets are more related to execution of activities that should give us knowledge to solve the problem, which will end in new products in later stages. The incremental projects we have targets mainly of cost, time and quality because we are working with supposedly known knowledge.

The biggest challenge for the interviewee when setting goals for radical innovation is the uncertainty that this process entails because they do not know the result or where will they end when they start a project. In these projects is sure that the R&D department will gain knowledge but the result can be to find the border of something where you cannot develop. To balance this problem, SMT does risk assessment in lots of projects, where the risk and the potential of the projects are analyzed. In this way, they have a good picture of the risk when we start projects. If the risk is very high, then the potential needs to be also very high. What the interviewee considers to be a key factor in the goal setting process for radical innovation is that as they work hard to find areas of research, they must have a very good understanding of the current state of these areas, market etc. The intuition of what is possible is also important so that TeliaSonera does not waste time in developing impossible projects.

Apart from this focus on the structure to provide strategic research for their projects, SMT has a current initiative where they actually aim to encourage the creative part of the organization. They want to develop good conditions for the creativity and innovation climate at the organization. That is, to embed an innovation culture. This is due to the fact that they have detected a little lack of creativity when generating ideas. With this culture is how SMT will try to provoke the big changes and new ideas needed for radical innovation. In order to create a learning and explorative environment, the interviewee states that SMT uses activities such as seminars, presentations and discussions in workshops etc. In this aspect they do not have specific targets for it but they have these activities to encourage knowledge sharing. In them, they try to spread the dialog and awareness of innovation in the R&D. This also helps them to generate more ideas for innovation. In this line, they have one initiative where SMT will look to the right conditions for the engineers to be creative and try to establish a working structure to promote innovation.
Furthermore, the interviewee thinks that if a company has the right structure for innovation, efficiency is not a problem for radical innovation. They also have regular meetings to follow up in their initiatives or projects, reviews to make sure that we are working in the right projects etc. He adds that of course they could be more efficient but in this work is important to have some degree of freedom. He also remarks that it is important to work as a group with innovation and they try to enhance this by encouraging teamwork.

6.5.5 Innovation measurement
In the innovation process that SMT implements, some KPIs are identified by the interviewee. The main ones are ideas generated and number of patents and based on that we try to identify activities that we must do to increase them. Therefore, SMT mainly focuses on the outcome when measuring. As they mainly focus on the outcome, the interviewee claims that for them is easy to measure the innovation. However, what is hard is to find the actions to improve the situation. The measurements are set and done by the R&D management team. Moreover, they control the resources that are spent on innovation, on development and on the strategic research. SMT measures the implementation of the innovation process by defining what is a new product, which is a product that is 5 years or younger. Then, the sales of those products are analyzed. They have also a target in this area, where they want to measure the number of the strategic research that should lead to a development process.

7 Discussion
In the following sections, the interpretation of the results obtained from the interviews is described. This is done by relating the findings to the previously built theoretical framework.

A general observation that should be remarked is that none of the companies seemed to break the goals down into the innovation activities on a daily base. It seemed that when talking about goals they reflected more their way of working or mentality, but it was not embodied in the goals themselves. The interviewed companies preferred to talk about challenges, activities or small targets that they had in the units where the interviewees were working instead of talking about goals, which were more considered in a strategic dimension. However, even though the companies did not show a thorough analysis of their own goals, their behavior and mindset towards innovation will have at least an indirect effect on them so that an analysis can be performed.

7.1 Ways of organizing for innovation
As expected, the different companies that participate in this study have different ways of organizing for innovation according to Lund (2015).

In this section the ways of innovation organization that the interviewed companies have are reasoned and after classified. In the following chapters, it is analyzed if there is any relation between the types of goals or measurements that each company uses and the organization for innovation. The classification of the interviewed companies is summarized in the following Table 3.
Table 3. Classification of organization for innovation.

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<th>Structural separation</th>
<th>Temporal Separation</th>
<th>Contextual ambidexterity</th>
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<td>Sandvik Materials Technology</td>
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SGS is identified to have a contextual ambidexterity, due to the fact that they do not differentiate between radical or incremental projects. This means that SGS tries to achieve both exploration and exploitation within the organization. The ideas go through the four steps of their innovation process and while doing so, SGS identifies if it is radical or incremental. This reflects that the units or employees that are in charge of innovation are trained in both, exploration and exploitation and can confront both types of initiatives.

As Metrics Salad is a radical startup company that is developing, it does not match any of the ways mentioned in the theory chapter. This company seems to be a company mainly based on explorative activities, with some small support for exploitation ones. Even though this company does not have a defined innovation process, a pre-development phase before the implementation of the radical and incremental projects is identified. In this phase, which is based on strategic research, Metrics Salad develops the previous knowledge needed. This knowledge allows them to analyze how to face the incoming innovation projects and to decide which to take and which not. However, this phase is not structured nor organized, which the author of this research believes that it is effective just for SME companies.

TeliaSonera and Sandvik Materials Technology use a structural separation to support radical innovation because they enable the exploration through the separation of a unit with a deep innovation culture. With this, they also achieve a pre-development phase before introducing the radical projects in the whole organization. This is carried out through the Purple+ unit in TeliaSonera and through the Strategic resource department in SMT. However, although they organize it in the same way, different methods in are used each company. SMT focuses more on the research through a knowledge building base for only the radical projects by separating the research from the development (R&D), which is more similar to Metrics Salad. TeliaSonera bases their pre-development phase in a fast implementation and execution of the ideas by testing them before introducing them in the organization.

ÅF is considered to have a temporal separation because they work with more incremental or more radical initiatives depending on the projects. Some projects might be focused towards more explorative enterprises (new software development) and some others with a more exploitative focus (service accomplishment). Therefore, the radicalism of the projects changes during time by following the environment in which ÅF is immersed. For implementing this kind of structure, the
business model developed by ÅF seems to be essential. This structure also shows that as in a contextual ambidexterity, the employees must be able to perform both exploration and exploitation activities in any given point in time.

7.2 Goal setting for radical innovation

In these following chapters, the findings related to goal setting are discussed and analyzed. On the one hand, the goal setting processes identified in the companies are compared with the one described in the theory chapter by Emsley (2003), Locke and Latham (1990) and Rauch & Frese (2000). This is done in order to see if there is any important change when this process is applied in innovation activities. It is also analyzed if this process depends on the way of organizing innovation.

On the other hand, another objective is to identify if the types of goals that appear in the theory chapter are implemented or not by the interviewed companies. If so, this section tries also to analyze how are they implemented and with which purpose. In case some type goals are not used, the author of this research aims to identify which behaviors or activities performed by the companies act as a substitute of these goals. Correlations among the different ways of organizing innovation and the type of goals used by the companies will be also analyzed.

7.2.1 Goal setting process

The basic guidelines of the goal setting process, which are defined by Emsley (2003), Locke & Latham (1990) and Rauch & Frese (2000) among others, are identified in all of the interviewed companies. These are that the goals are set from larger to smaller goals, that there has to be a plan or a strategy to attain these goals and that the feedback from them must be considered. However, as each company is embedded in different individual and environmental contexts and use different types of goals, the process of goal setting in each company differ in details (i.e. some more horizontal than others like Metrics Salad or ÅF). This means that each company gives more importance to some patterns than others, creating different but valid goal setting processes. This analysis of the findings coincides with the information given in theory chapter of goal setting process.

In all of the big companies (SGS, TeliaSonera, ÅF and SMT), are identified strategic or big goals that are similar to the vision and mission of the organizations. These goals, as stated in the findings, need to be understood by all the employees of the company and set the direction of the companies by guiding the acts of the individuals. These goals were set by the top managers of the respective companies and then they were broken down in smaller targets or challenges when they were introduced in each department or unit. This shows that in this aspect, the goal setting process for radical innovation coincides and is aligned with the goal setting process for any other type of business. These type of goals were more perceived as a culture or a mentality in the SME that is, Metrics Salad. The author of this research believes that this might be because due to the small size, there is no need of making these strategic goals explicit. However, this might be true as long as there is a strong and shared culture among the employees.

Moreover, these smaller goals that resulted from the strategic goals were even broken into strategic plans, roadmaps or activities in some companies such as ÅF or SMT. This is done in order to make them more achievable and gain execution. This is believed to be beneficial for ÅF
because this will help the companies to handle the uncertainty and risk that radical projects carry. However, the author of this research agrees with this statement as long as these strategic maps will also have to have enough flexibility in order to redirect them when needed. This is believed due to the turbulent environments in which the radical projects are immersed. For this roadmap, SMT adds that they take into account the characteristics of the products areas and the strategic research department. This shows that a holistic understanding is needed due to the high connection required between the research part and the development part in order to attain the innovation goals.

TeliaSonera offsets this division into activities with a strong focus on the execution. However, the author of this research understands that this might succeed only in small units or companies, where there is a shared culture and lots of interactions among the individuals. In bigger units, there might be needed some strategic plan, as in ÅF or SMT, in order to guide people towards the goals and avoid pulls in different directions.

It was also found that the feedback from the goals is also considered vital in radical innovation for companies such as SGS and TeliaSonera due to the uncertainty of it and the constant changes from outside. Rauch & Frese (2000) agree also on this aspect. When interpreting this feedback, it is important to be flexible and adapt the goals if it is needed in order to follow the right direction of the innovation. Therefore, it can be concluded that this continuous improvement perspective is a key aspect not only for general business but also for innovation activities; radical or incremental. As stated in the theory chapter, this is done in order to achieve the maximum efficiency in the goal setting process.

All of the interviewed companies worked with multiple goals. In this aspect, ÅF remarked the importance of not being overloaded with the goals and setting responsibilities and a clear prioritization to make the goal setting process for radical innovation more efficient as Emsley (2003) states in his study. In this line, Emsley (2003) adds that this will avoid conflicts in the goal setting process. However, the author of this research believes that the responsibilities must be clearly set but the prioritizations should not be too strict in order to maintain certain degree of flexibility that might be needed due to environmental changes.

Both, SGS and ÅF, big multinational companies with a business focused towards a production of services to their clients, coincided in the importance of the recuperation of old ideas. This could be a complementary activity to the general process of goal setting described by Locke & Latham (1990), Emsley (2003) and Rauch & Frese (2000) that might be necessary when dealing with radical or incremental innovation, at least in the services business.

### 7.2.2 Learning goals

The main characteristic of these type of goals is that they aim to create a learning and explorative environment, this is that they focus on discovering the best way to attain a target before the individuals try to do so. They encourage the search for appropriate knowledge and strategies and the learning in order to gain competences or acquire skills. This is done in order to increase the performance.

This type of goal was only explicitly mentioned by two of the organizations (SGS and ÅF) although the author of this project believes that this type of goals is used unconsciously in all the
organizations. This is because all the interviewees remarked the importance of either the research or the education of the employees for radical innovation. This leaded to conclude that the companies tend to separate the exploration from the learning part. On the one hand, it seemed that the research activities were more associated with an explorative environment in order to gather knowledge. On the other hand, the education was compared to the learning environment that is used to develop new competences or skills. The companies attained the research or the education through activities, structural separations or speeches hence no goals supported them. However, there must be some goals that enable the performance of these activities or the previous separations mentioned. Therefore, these goals will unconsciously aim to create these environments.

In companies such as SGS or ÅF, it was seen that the education of the employees was considered to be a key aspect to be successful with innovation. In these companies there were identified some goals focused towards the education of the employees that make them learn and hence can be considered as learning goals. These goals were in ÅF the competence network goals and in SGS the social goals. This learning aims to broaden and share the knowledge of the employees and gain holistic understanding. Through this education, both companies want to provide the employees a critical observation. SMT also mentioned activities that encouraged knowledge sharing such as seminars or workshops. Therefore, these companies create a learning environment through innovation goals and activities.

The research activities were more obvious in Metrics Salad and Sandvik Materials technology, where they separate R and D from R&D. This is more like a pre-development phase, where the companies gather the required knowledge and explore all the alternatives, before the innovation activity starts. TeliaSonera was also seen with a pre-development activity but instead of basing it in research, it was based in a fast implementation of all the ideas. In this way, TeliaSonera does not promote an explicit learning environment. However, they also remarked the importance of the observation of the changes that occur outside, which might be considered from a research perspective.

This type of goals was considered vital for all of the companies even though ones focused more in research and others in education. It is curious that the companies that work with a structural separation for radical innovation and Metrics Salad, which is an SME, are more focused towards a strategic research perspective. However, the companies that work with contextual ambidexterity or temporal separation have preference for the education of their employees. Here some patterns can be identified. On the one hand, in SGS and ÅF, the employees that work with innovation can do it radically or incrementally any time. On the other hand, TeliaSonera, SMT and Metrics Salad with the structural separation assign a certain number of employees only to radical innovation. This might be the reason of which ones are more focused towards a learning environment that allow the employees to face both challenges and the others dedicate just to encourage a explorative environment through strategic research.

To conclude with, it can be said that the performed analysis in the preceding paragraphs is aligned with the theory developed by Seijts & Latham (2012). The importance of both research and education for radical innovation coincides with what Locke & Latham (2002) suggest. This is because Locke & Latham (2002) recommend the use of this type of goal in complex situations. Therefore, the author of this study believes that they are so optimal for radical projects because
they should be set when the necessary strategies are not known. This is usually the case in radical innovation project, which are immersed in changing environments with a high uncertainty.

### 7.2.3 Ambiguous goals

As stated in the theory chapter by Nonaka (1994) and Gioia, et al. (2012), the ambiguous goals lose intentionally the specificity of the goals in order to change the way of working of the employees and encourage them to provoke changes on the previous standards, looking for something different. They do not have a specific outcome; they are more like a mindset or a perspective. In this line, they insert a common behavior or thinking in the people of the organization.

All the companies mentioned the clarity, specificity or good definition of the goals as an indispensable characteristic for them. Everyone must understand them and they have to be so clearly defined in order to attain them correctly and avoid conflicts among the employees. However, the author of this research believes that this fact is only true when the companies break the goals down into smaller goals but not for all the big ones. Then, in the smaller goals, this clarity is indispensable in order to attain the bigger goals in an efficient way. This belief is aligned with Gioia, et al. (2012), who state that the strategic changing environment in which radical projects are immersed, makes difficult to set goals that are specific. This is because those contexts usually involve radical change efforts where the paths and the goals of change are not straightforward and obvious. Therefore, even though the interviewees stated the importance of the goals’ clarity, a common ambiguous big goal that shares these previous characteristics was identified in the majority of the companies.

The ambiguous goal was that all the big organizations (SGS, TeliaSonera, ÅF and SMT) stated the need of an innovation culture in the whole organization to support radical innovation. Moreover, these three companies stated that it is a big challenge in big organizations. SGS specified that this culture will try to change the way of working of the employees. TeliaSonera stated that it will create a learning and explorative environment among them, which can be related to the previous type of goal analyzed and considered in this sense as a secondary learning goal. SMT believes that this culture will encourage the creative part. Therefore, this is considered to be an ambiguous goal because it aims to insert a common behavior in the organization since they create an innovation mentality.

The only company that did not claim this was Metrics Salad, which affirmed to have a solid innovation culture due to the nature of its employees. The unit Purple+ from TeliaSonera was identified to have also a strong innovation culture although it was stated the need of spreading this culture to the whole organization. It can be seen as a pattern that small units or companies that focus on radical innovation work have a better tendency to develop an innovative culture. This might be due to their smaller size and the innovative nature of the employees. Therefore, the solution that TeliaSonera shows, which is to create small units to trigger the innovation culture and become viral, might be a good way to introduce this culture in big organizations.

Furthermore, all the other companies (SGS, SMT and ÅF), consider essential to introduce an innovation culture in the big organization that supports all the innovation activities. The ways to achieve this appear to be varied, that is from informal activities and speeches from the management to the innovation activities itself by acting as a model for the rest of the employees.
This seems to be a slower process compared to the process of TeliaSonera but more structured. However, it is obvious that in both cases, this intention of setting an innovation culture among all the employees will have effects on the goals in all levels of the organization in order to change the mindset of all the employees.

To conclude with, the author of this research states that in terms of the innovation culture, only one pattern was identified. This pattern was that the big organizations have more troubles when introducing an innovation culture in the organization than the smaller ones. Moreover, according to ambiguous goals, no pattern was identified with the organization of innovation because all big companies had set the previous mentioned ambiguous goal. Therefore, having an innovation culture is considered to be necessary in any organization that has an innovation focus.

### 7.2.4 Superordinate goals

Superordinate goals are explained in the theory chapter by Pinto, et al. (1993) as goals that are urgent and compelling for all groups involved but whose attainment requires the resources and efforts of more than one group. These goals are usually goals that affect different departments and that are broken down in the different departments. Here, it is important to have a whole understanding in order to avoid conflicts among the minor goals of each department. This makes the group work as a whole, not as different individuals because it facilitates the cooperation between them. Innovation activities usually involve interact with other functional areas such as marketing or production. These areas have different perspectives and ways of working towards the goals. This is why this type of goals is useful in innovative tasks.

There were detected some goals in the interviews that affect the whole organization and involve the work of different departments in order to attain them. These goals were usually the strategic goals that were set in each company. This is due to the fact that to achieve these goals, many business lines must cooperate and work as a single entity. To do so, the different perspectives and ways of working of each department must be understood by everyone. Apart from these goals, the companies emphasized aspects related to the effects of those, which shows the importance of these targets in innovation.

SGS stated the need of a holistic understanding and they try to achieve it with the formation of heterogeneous groups. It was stated also that the transversality is needed in this groups and that SGS has to enable it. TeliaSonera stated that a complete understanding of the whole company and the innovation process important set a common innovation culture in the company. The Base of ÅF on knowledge sharing and networking also encourages the holistic understanding of the employees. SMT also believes that a whole perspective is needed for radical innovation and they try to achieve it through the encouragement of teamwork. Finally, Metrics Salad did not mention the need of an overview of the innovative activities. This might be due to the fact that in a small company, is easy to have a joint perspective.

Therefore, all the companies remarked the importance of a whole understanding of the company or the innovation processes when innovating. This is important because the innovation ideas might affect many business lines since they try to provoke big changes. Taking this into account, it can be concluded that a holistic understanding is vital for radical innovation. The interviewed
companies encouraged it unconsciously through setting superordinate goals that involve different departments for their accomplishment.

Furthermore, it can be stated that this is true for all the different innovation’s organization and that the only factor that affects to the need of this kind of goals is the size of the company. Big companies will always need this whole point of view although small companies either do not need it or it is easy to achieve and hence there is no need to encourage it particularly. Other factor that the author of this research intuits that will affect this type of goals but was not proven in the interviews is the structural separation that SMT and TeliaSonera have. This structure will strengthen the need of setting these superordinate goals due to the separation itself. This separation makes harder to achieve an overall perspective due to the loss of rapport that might exist between the unit and the rest of the organization. Moreover, apart from the promotion of it through goals, also other activities such as teamwork and knowledge sharing were used to gain this understanding.

7.2.5 Extreme or stretch goals

Stretch goals are defined in the theory chapter by Sitkin, et al. (2012), as extraordinary difficult goals with an unknown path to attain it but with a small probability of achievement. These seemingly impossible goals are set to promote the exploration of a firm by losing apparently the attainability of them. In this way, they challenge the employees to look for new or alternative paths and make them to provoke changes.

The organizational or ultimate goals that the companies set seemed to be the stretch ones because they challenge the employees from above and try to change their behavior or way of working. All the companies that participated in the interviews used this type of goals, either as the vision of the company or strategic and ambitious goals. These goals are considered as stretch by the author of this study because to attain them, the organization must do something different than the previous defined standards. As stated in the theory chapter, these goals are later broken down into specific and measurable smaller goals that allow you to set the right strategy to increase the performance of the firm. This was also done by the interviewed organizations.

However, it is true that the challenging level varied from one company to another, depending on the daring nature of itself. For instance, Metrics Salad showed a quite ambitious goal which was that they want to become international, when they are starting up the business. They claimed that having a distant and clear point to reach is the way in which they emphasize radical innovation. This is seen as a high-challenge goal by the author of this research due to the fact that they are still settling down the business and they are already thinking about internationalizing. Other companies, such as SGS, were more focused towards revenues, which makes it more achievable even though they still need to change established procedures or ways of working in order to attain it.

Moreover, some companies such as SGS, TeliaSonera, and Metrics Salad stated that to challenge the employees and having a challenging mentality is necessary for radical innovation practices. However, SGS added that for this challenges to have a good outcome and do not demotivate the employees, the employees must have a previous education and be able to adapt to changes. This seems to be important due to the fact that not all the personalities face challenges in the same way. This education and preparation of the employees that SGS proposes, could be a way to
ensure that the three contingency factors that Sitkin, et al. (2011) propose in the theory chapter are fulfilled so that the learning and the performance of the organization increases.

ÅF was the company that set this type of goals more consciously. For ÅF, these goals, which are similar to visions, push the organization forward because they are quite big so that you need to do something different. In this sense, the author of this research concludes that these goals encourage radical innovation by setting ambitious and difficult things. These goals set pressure in the organization and force the organization to find new ways of doing things to avoid this pressure. ÅF also remarked that breaking them down into activities to make them more tangible. The author of this research believes that this could be a complementary advantage given to the theory chapter when breaking stretch goals into smaller ones.

When relating the use of this type of goals to the way in which companies organize for innovation no clear pattern was identified. It seems that this kind of goal is commonly used by every company not only for innovation practices, but also for the rest of the business lines because they are set in the top of the organization and hence affect to all of them. The author of this research believes that more than innovation organization, the use of this type of goal depends of the challenging nature of the top managers or the organization itself. However, it is true that they were used in all companies in some extent.

The structural separation in companies like TeliaSonera and SMT might decrease the influence of these goals due to the fact that they are not perfectly linked to the rest of the organization. With the other organizations, as the innovation activities are embedded in the company itself, these goals produce a stronger effect. This fact is deduced by the author of this study due to the fact that these two companies showed a slight less focus on these goals than the other three companies.

Usually, these strategic goals that are associated with stretch goals are also the ones that were mentioned in the preceding chapter; that is the superordinate goals. These both types are usually mixed in the companies and there is not a clear line that differentiates them. This is why the author of this research believes that this type of goals encourage both, a holistic perspective and big challenges to encourage creativity. Therefore, this type of goals are seen as a really beneficial type of goal for radical innovation due to the fact that they aim to provoke big changes in the organization but without losing the overall perspective of the firm.

### 7.2.6 Efficiency goals

The efficiency goals that are analyzed in the theory chapter are focused in the perspective taken by Linderman, et al. (2005). He uses Six Sigma quality tools to increase the efficiency of the goal itself. However, no goals that used the Six Sigma tools to be efficient were found. Therefore, it has to be taken into account that the goals proposed by Linderman et al. (2005) are considered only as an example of efficiency goals. For this study, other techniques or tools that are found in the interviewed companies and aim to increase the efficiency of the goals are also considered as efficiency goals.

Apart from this consideration, there was not detected a strong focus on goals that try to increase the efficiency by themselves even though some goals were found in all of the companies. The goals that aimed to be more efficient were the smaller targets or the activities that come from
breaking down the bigger goals. The author of this study states that this is because these smaller goals aimed to reduce the uncertainty that the bigger goals carry. This was done by applying the SMART characteristics mentioned in the theory chapter 4.1.2 to the goals or using the classic performance goals developed by Locke & Latham (1990) in the Goal Setting Theory. Therefore, this efficiency is not achieved by using any additional tool or technique related to innovation goals; it is achieved by using the classical type of goals that do not encourage innovation.

Some companies mentioned the need of being fast or efficient in some parts of their innovation process (validation and implementation in SGS, TeliaSonera and ÅF in the whole process, Metrics Salad in the investigation and implementation etc.). This shows a clear concern towards the efficiency in the radical innovation processes of all the companies. Therefore, a common pattern is that all the companies wanted to be efficient in the implementation but they did not achieve it exclusively through setting standard goals. They do it through an efficient way of working, norms, standardized processes etc. Examples of this can be the focus on the execution and the fail-fast mentality that TeliaSonera shows, which aims to achieve the efficiency in radical innovation projects, a good organization and set responsibilities in ÅF or the structure for innovation of SMT.

Therefore, an efficient implementation of the innovative ideas is considered a great advantage by all the companies even though in some parts of the implementation, the creative mindset is still needed (when proposing new solutions to the problems). However, it was agreed among all the companies that the efficiency in radical innovation activities should not be a thing to consider in the idea generation part. SGS and TeliaSonera claimed that this part, which is the creative part of the innovation, cannot be efficient in terms of time and open mindedness. Therefore, other types of goals are used by the companies in this part of the innovation process, not goals or methods that aim to be efficient. However, SGS for instance limits the scope of the ideas to be more efficient in the creative part by trying to get the type of ideas that they are looking for. All coincided that in innovation is good the efficiency but that there always has to be space for creativity and a certain degree of freedom.

To conclude this chapter, it has to be said that no pattern was found that relates this type of goals with the organization for innovation. All the companies centered more or less on the same aspects even though they achieve the efficiency through different methods. Moreover, it is important to remark that no efficiency goal rather than the standard performance goals defined by Locke & Latham (1990) were found. Therefore, it can be conclude that this type of goals might be used only in an academic perspective.

7.2.7 Innovation or creativity goals

In the theory chapter, it is stated by Shalley (1995) that the creativity goals are those who encourage the creative behavior of the individuals. This behavior results in solutions that are both novel and appropriate for the situation. These goals have to encourage the individuals to explore because in order to produce creative responses, hence the assignment of a creativity goal should make individuals to spend more time thinking about a task.

Taking this into account, a similarity can be associated between the learning goals that are focused on the exploration and the creative goals. The author of this research does not identify a practical (not theoretical) clear cut between them. This is considered because both of them aim to
encourage the exploration; one aiming to select a creative response and the other aiming to consider all the possible alternatives, which include the creative ones. Therefore, some of the conclusions that arose from the Learning goals can be also dragged to this chapter because the companies showed that the explorative learning goals include part of the creative goals.

However, there was also detected some aspects related to creativity which might influence the way in which the goals are set. This creative behavior that the creativity goals intend to provoke was usually tried to attain by companies like SGS and ÅF through activities such as workshops, brainstorming etc. but not with the goals themselves. The author of this study believes that it might be a more efficient and natural way of achieving this rather than setting specific goals to encourage the creativity. For instance, ÅF enhances creativity mostly through methods or tools such as improvisation theater plays, creative exercises or painting classes. It can be deduced that even though ÅF does not focus on the goals themselves to produce creative responses, the goals that are set to accomplish these activities aim to enhance the creative response of the employees so they can be considered as creative goals.

SMT wants to encourage the creative part of the employees by embedding the previous mentioned innovation culture in the organization. They believe that this ambitious goal will have a creative effect on the employees hence from this point of view, the previously mentioned goal of setting an innovation culture that all the companies share, could be considered as a mix of a creative and ambiguous goal. SGS focuses on a creative education to open the minds of the employees and states that encouraging creativity to the employees is a challenge for them. SGS adds that it is even more difficult to do so in a permanent state rather than in a single occasion through workshops etc. Therefore, this innovation culture might be also the solution for SGS to end with the lack of creativity of the employees permanently rather than activities to enhance it from time to time.

Unlike the rest, Metrics Salad believes that they do not need to encourage the creativity of the employees because they have it in their genes. The business itself gives them creativity needed. This might be again due to the size and the entrepreneur nature of the business. The author of this research believes that all the previous conclusions together with this one, show that it does not take the same amount of work to change a standard business into an innovative one than to set up directly an innovative business. In the first case, the organization has to put more effort to attain it.

Moreover, TeliaSonera and SGS stated that in the idea generation part, the creativity should be strongly enhanced. To this, SGS adds that the development of the idea also must be creative to propose adequate solutions to solve the problems that might arise. None of the companies mentioned any creative aspect needed in the implementation part; considering the development part as a different part as stated in the innovation process of SGS. Therefore, the information analyzed in this chapter together with the information analyzed in the previous chapter (Efficiency goals) is totally aligned with the perspective taken by Magnusson & Lund (2015). In his study it is claimed that the different parts of the innovation process must be treated from different goal setting perspectives. They add that for the idea generation, the goal setting process has to be more creative and exploratory, in order to consider all the possible alternatives; hence the goals explained above would be recommended (learning, creativity, stretch etc.). However, in the implementation part, efficiency and exploitation so efficiency goals, which were found to be
traditional performance goals, are more adequate in this process. The author of this research coincides with this perspective after the realized study.

To end with this chapter, it can be seen that big organizations that do not have a separate unit to do radical innovation practices, such as SGS and ÅF, need to explicitly enhance the creativity of the employees through the activities mentioned above. This is a difference that can be detected in terms of innovation organization and it might be due to the stronger innovation cultures that the smaller units acquire with the specific focus on radical innovation. The other possible conclusion that could be drawn is that this is due to the fact that SGS and ÅF are service providers instead of products owners. This approach can also be taken because as these companies deal with services, employees might see the creative part more abstract so that is has to be enhanced by the previous complementary methods. In this perspective, the difference would not be due to the organization of the innovation but for the nature of the company.

7.2.8 Negative feedback goals

This type of goals mainly focuses on the feedback that comes from the innovation process. When using these goals, the goals are achieved by avoiding attaining them. In other words, starting each activity in one known wrong direction, gives feedback that makes initiate action in the opposite direction so that in the end no error remains. Therefore, the negative feedback goals aim to look for the right direction of the innovation by taking the first steps in the wrong one. To use those successfully, a space of possible actions should be defined by the manager in order to set limits for the actions and at the same time letting room for innovative ideas (Van de Ven, 1986).

Before analyzing these goals, it has to be stressed that almost no information related to this type of goal was found in the interviews. The companies used totally different methods to identify the right direction of the innovation and keep the pace of the market but no company mentioned intentional negative feedback as an option. This might be due to the fact that apparently, the way of working with these goals seems inefficient for the interviewed companies.

The ways of aiming for the right direction of the innovation activities are varied although the most common were to rely on research or observation. For instance, TeliaSonera bases on the observation of the changes that occur outside and the research based perspective of Metrics Salad and SMT shows them the appropriate direction of the innovation. The writer of this study agrees on that this is a well-structured way to analyze feedback from the outside. However, he would suggest to these companies not to investigate only the external changes but also to extend this research to internal innovation processes to get feedback from them.

In this sense, TeliaSonera mentions the need of analyzing the feedback that comes from the innovation process due to the constant changes that the innovation practices carry. In order to analyze in a proper way the feedback, the company needs to be flexible to adapt to the required changes. SGS agreed with TeliaSonera in this but SGS strengthened the need of the feedback in the development part, which gives the final shape to the idea. The better that this feedback is analyzed, the less changes that are needed in the implementation part. SGS states that this makes the innovation process full of loops, which complicates the innovation process and requires a high interaction among all the parts.
Another perspective is the one taken by ÅF, who relies on the characteristics of the goals themselves to identify the right direction of innovation. The goals related to it must be clear, practical, simple and understood by everyone. It seems that here ÅF focuses on the SMART or classic performance goals to innovate in an adequate way. The author of this research believes that this is a good way to attain the targets that are set but it has to be taken into account that these targets might not show the right direction of the innovation. If this is the case, the analysis of the feedback would be a key aspect.

SGS limits the scope of the ideas, which can be associated with the space that the manager must create to hold negative feedback goals. With it, the managers try to get ideas that are going to be useful for the organization and in this sense; they use this limitation to innovate in the proper direction. However, SGS creates this space for the ideas with the opposite mentality; that is that SGS limits the ideas in order to get directly the ones that are valuable. The company does not look for wrong ideas in order to finally get the useful ones hence no negative feedback is analyzed in this case. This strategy might be a good alternative if the managers that create these limits have enough knowledge about innovation and manage to avoid useless ideas without limiting the creativity of the employees.

It can be concluded that aiming for the right direction and analyzing the feedback obtained from the innovation process and from outside are important activities for companies that work with innovation. However, intentionally trying the wrong ways in order to determine the good ones through an analysis of the feedback is not a commonly used option among the interviewed companies. It seems a better option for the companies to intuitively aim for the appropriate direction of the innovation and then analyze the feedback to redirect the activities if necessary. The author of this research believes that the use of negative feedback goals might be a good option when a company does not have any knowledge about where and how to innovate. However, if the companies have enough innovation knowledge, they know the markets that they can reach and they have good ideas, they can intuitively aim for the right innovation without spending time on discovering the proper way.

7.3 Radical innovation measurement

In this section, the findings related to innovation measurement are discussed and analyzed. The objective is to analyze the type of metrics that are used by the companies and appear in the innovation measurement section, which is based on the research of Adams, et al. (2006), and identify possible new ones. This section tries also to analyze if there is any difference among the classic performance measurement and the innovation measurement used by the interviewed companies. Correlations among the different ways of organizing innovation and the innovation metrics used by the companies are also analyzed.

7.3.1 Radical Innovation metrics

This chapter seeks to analyze the innovation metrics identified in the different companies and compare them to the theoretical framework developed about innovation measurement. The first observation that should be made is that the innovation metrics that were identified in the different interviewed companies vary a lot depending on the company. However, some similarities can be identified between some companies.
Two similar overall innovation measurement structures that were identified were the ones mentioned by SGS and TeliaSonera. These companies had when measuring an important focus on the volume generated ideas and their development along the innovation process (where do they die, number of ideas in every step, number of success etc.). This looks like the classic innovation funnel measured quantitatively in every step. These metrics are included in the knowledge management research of Adams, et al. (2006). Apart from these ones, other metrics that were identified and belong to this group are the information and knowledge flow and the knowledge repository, measured by ÅF through the competence-based structure. TeliaSonera and Metrics Salad measure also the information flow, the first one through links with external companies (investments etc.) and the second one through a stronger focus on measuring aspects related to their customers. For the writer of this research, these metrics are considered to be vital for radical innovation due to the nature of the innovation activities. In them, sometimes the outcome is not tangible and the only thing that the company gains in some processes is this knowledge, hence these measurements will act as a motivational factor in these cases.

Another metric that was shared by three companies was the time. In ÅF, Metrics Salad and SGS this metric was used to measure the time that last each innovation project and the different activities inside it. Moreover, SGS relates this time to the previous mentioned innovation funnel, where they measure the time of each idea in each part of the process. This system allows the company to detect bottlenecks in the innovation process. This is why the author of this study believes that this metrics are essential for radical innovation, because by measuring it, you can detect where to put more effort to improve the whole innovation process in terms of efficiency. However, TeliaSonera stated that as the cycles in radical innovation are so fast, they need to measure even faster and hence they do not have time to measure lots of things such as the strategic choices taken along the project.

ÅF and SGS coincided in the need to measure the social part of the innovation, which is the networking. Here the companies aim to measure behaviors, interactions, cooperation, creative tendencies, work environment etc. ÅF does it through the impressions of people and SGS uses surveys but they claim that it is not accurate. Both of the companies stated that this was the hardest part to measure due to its intangibility. These metrics could be a way of showing the organizational culture and structure of each company hence these metrics belong to the fourth aspect analyzed by Adams, et al. (2006) in the theory chapter. In TeliaSonera, all these factors are measured by the Human Resource department. The author of this research believes that since this is a hidden advantage of the innovation practices and that the results of it are long-term noticed, these metrics are extremely hard to measure.

The money was the last common metric among some of the companies. It is measured by SGS, TeliaSonera and SMT. These companies measure the input resources of the innovation and also the money spent in the development of the projects. Apart from the money, these companies measure the physical and human resources invested on the innovation activities. These metrics coincide with the first category that Adams, et al. (2006) proposes in the theory chapter. The author of this research believes that these are important measures for innovation practices in order to determine the amount of effort that a company is allocating in order to create and develop ideas. Therefore, these metrics will determine if the innovation activities are being worth it or not depending on if the revenues that come from them are higher than the effort invested.
One type of metric that was detected to be latent in all of the organization even though it was not stated by them was the one that belong to the third section of the study of Adams, et al. (2006), which is the innovation strategy. This is believed by the author of this research because all the companies stated to have an innovation strategy and that this innovation and its goals are aligned with the overall business. In this sense, all of them have indirect measures towards their innovation strategy. Moreover, companies like SMT and Metrics Salad, measure the commitment to develop products by measuring the new products that they develop or the new markets that they want to reach, which is part of their innovation strategy.

The other three sections that are analyzed in the theory chapter through the research of Adams, et al. (2006), which are portfolio management (strategic technological and resource choices of the projects), project management (factors that make the projects successful) and commercialization (implementation of the innovation process), were found to be less measured than the others. Some companies state that they do not measure them but that they follow them during the process, that is, that they make choices or manage the projects in some ways but it is not measured. However, some of the metrics included in these categories are included in the “money” or “time” metrics previously analyzed. The only aspect that was found to be measured was the implementation, which was measured by SMT by defining what is a new product and measuring aspects related to them. The author of this research believes that these metrics are not used in the companies because these are part of the way of working or the mentality that the organization creates on the employees.

Apart from these metrics, TeliaSonera stated that all the metrics should have the same weight in order to form a balanced chain. However, SGS claims that some metrics have more importance in one part of the process than others. For instance, time is important in the validation time but not in the creativity step and the money is important in the implementation but not in the creativity part. These two different perspectives show that there might not be just one valid approach for innovation measurement as long as these consider the environmental and individual factors that surround the organization.

SMT perspective towards innovation measurement, which is focused towards the outcome of the innovation, is contrary to the perspective taken by Adams, et al. (2006) or Fitzgerald, et al. (1991), where it is stated that the progress towards the goals have also to be measured. This could be because SMT has a clear defined product, which can be measured in terms of patents and the activities to increase them. Moreover, the development and innovation of SMT is totally focused in the product ownership, which facilitates this measurement. Hence the author of this research concludes that this perspective taken by SMT could be just valid in a company under the previous circumstances. Other analyzed companies such as TeliaSonera or SGS show their interests in both of these parts (progress and outcome) through their measurements in their innovation funnel.

This leads to the conclusion that there is not a common way of working with innovation measurement and that each innovation process must be analyzed individually and considering its context. Depending on the industry, type of product or service that the company offers and the company itself, it will be appropriate to use some metrics or others.
7.3.2 Performance measurement and innovation measurement

The radical innovation metrics that were identified in the different companies and compared to the research of Adams et al. (2006) are similar in some aspects and differ in others from the standard performance metrics analyzed in the theory chapter about performance measurement, which has its basis on the research of Neely, et al. (2005). This chapter divides the metrics for general performance measurement into three different categories which are individual performance measures, performance measurement system and environmental performance measurement. In this chapter, these three categories will be analyzed and compared to the innovation measurement literature and the innovation metrics identified in the companies.

The first similarity that can be identified in terms of a global perspective is the need in both types of measurements of dividing them into more specific parts to get a better outcome of the measure. This is explicitly stated by Neely, et al. (2005) although it does not appear directly in the innovation measurement literature analyzed. However, Adams et al. (2006) divide their study into different categories, classifying the innovation metrics, which helps to achieve more accurate results. Moreover, SGS also claims as an important factor that the metrics that SGS uses should not overlap and this classification avoids it.

In the theory chapter, the individual performance measurement approach of Neely, et al. (2005) englobes four main types of metrics. Two of these four metrics, which are time and cost, are clearly included in the radical innovation measurement perspective. The emphasis of these two types of metrics in innovation activities has been shown in the preceding chapter. However, even though some metrics related to the quality and flexibility were found, these seem to be more hidden in the innovation measurement approach. As quality metrics for innovation, number of ideas that do not succeed, created value, customer satisfaction or other quality tools could be identified. As flexibility metrics, range of components that come from innovation, terms related to new products or product modification could be considered. Therefore, a correlation between the individual performance measurement and some innovation metrics can be established although there is not the same precision in the last ones.

The performance measurement system and the environmental performance measurement have similar approaches regarding the type of metrics or factors to consider but they have different purposes. On the one hand, the performance measurement system does not provide clear and specific metrics that can be compared. Instead of this, it provides an approach or a process to measure that can be compared to the one taken when measuring innovation. On the other hand, the environmental performance measurement provides clear metrics that follow the considerations taken in the process that the performance measurement system offers. Therefore, the same mentality and factors are considered in both parts but with a different outcome and hence for this research their analysis can be performed together.

These approaches consider aspects related to both the results and the processes of the firm, which can be also found as a vital factor for innovation measurement. Moreover, when developing a measurement system, the financial perspective, the internal perspective, the innovation/learning perspective and information of customers, market and competitors, are considered. These perspectives are also considered by the environmental performance measurement because some of these aspects belong to the internal environment (financial or internal perspective) and others to the external one (competitors, customers and market). These considerations, which are vital...
for the success of the company, might be differ in details depending on the business line that is being measured but, it is clear that they are measured somehow in each of the interviewed companies. The financial perspective belongs to the “money category” explained in the previous chapter. The internal and innovation perspectives are clearly included in the metrics due to the focus on innovation process when measuring, of companies like SGS or TeliaSonera. Also, as Metrics Salad showed, radical innovation metrics also consider customers, market and competitors as a part of the innovation flow metrics.

Apart from this, these approaches also take into account the firm strategy and a continuous improvement point of view when creating a measurement system or when considering the internal environment. Therefore, the firm strategy is another metric that is considered in both types of perspectives because both kinds of metrics (performance and innovation) should consider the firm strategy in order to be implemented in the proper way. As Adams et al. (2006) show in their study, the radical innovation metrics should be aligned with the innovation strategy and this strategy considers the overall business, that is, the firm strategy. Therefore, in an indirect way, radical innovation metrics take also into account the organization’s strategy when measuring. However, the metrics themselves did not show any interest of seeking a continuous improvement. In this aspect, both metrics might differ. In the radical innovation practices, this continuous improvement is mainly achieved through the analysis of the feedback that is obtained during the process, which is considered an essential task in the innovation field.

Other similarities that could be found in both measurement perspectives is that as TeliaSonera stated, the main challenge when measuring radical innovation is to have a clear definition of the metrics and what they measure. This is due to the intangibility of the innovation processes but achieving this clarity is very important. This clarity is also needed in the performance measurement approach, where the metrics must be specific and well defined. However, in the standard business that the performance measurement evaluates might be easier to achieve these characteristics.

Moreover, the long-term perspective that the innovation processes have, is considered by SGS as an impediment when measuring radical innovation because the metrics for it have to have the same perspective. It is difficult have a long-term perspective when the results are usually uncertain and the revenues are not immediately seen. This long-term perspective is also considered essential by the classic performance metrics explained in the study of Neely, et al. (2005) but again, this is easier to achieve in the standard business lines when you exploit existing capabilities.

Considering all the previous information, this discussion chapter has an unexpected result for the author of this research, who expected to find that the innovation measurement and the performance measurement were going to differ a lot. However, there have been identified many similarities between them although there were not the same metrics because obviously, the perspective and needs that innovation carries is different from any other business line. Therefore, it can be concluded that each activity that a company performs, will have their own metrics due to the context in which is immersed but come common patterns or guidelines can be identified in all of them.
7.3.3 Innovation metrics in different organizations for innovation

This section aims to establish correlations between the metrics or perspectives that the companies use to measure innovation and the organization of it that each company has. The first observation that should be made is that as stated in the discussion chapter of radical innovation metrics, there are some characteristics shared among the majority of the interviewed companies. One clear example is the input resource measurement, which was carried out by three companies. These companies are SMT, TeliaSonera and SGS. Two of them share a structural separation but the third one works with a contextual ambidexterity and hence no relation between them and their way of organizing innovation can be made. Other example could be the metrics related to the innovation strategy that all the companies showed. Taking this into account, this section will only focus in the relevant characteristics where conclusions can be drawn.

One significant factor is that SGS considers their innovation business line as any other business line. Therefore, they try to keep their innovation metrics as simple as in the other business lines and this is why they focus on the main ones which are money, volume and time. This is also aligned with their contextual ambidexterity organization, because as they are treating both types of innovation in the same way, they have to use simple metrics so that they can measure in both contexts without changing them. The author of this research believes that this might be a good option for contextual ambidexterity organizations but he would suggest using these simple metrics at the beginning of the process, where the radicalism of the projects is not determined. However, when the project is clearly defined as radical or incremental, some specific metrics for each field should be defined. This will allow SGS to be more accurate when measuring and to satisfy the different needs of both types of projects.

The similar overall measurement approach that SGS and TeliaSonera have and which is focused on the innovation process, might signify that this perspective is useful for any type of organization for innovation. The author of this research thinks in this way because these companies have a totally opposite way of organizing innovation and even in this situation they find this structure as a common support for their innovation measurement.

Both of the companies that have a structural separation, which are TeliaSonera and SMT, are focused more towards the execution or the outcome when measuring. SGS and ÅF, have a way of organizing innovation that makes them switch between radical and incremental projects constantly. With this perspective, whereas the first companies did not focus in aspects such as time of each step or activity, the second type of companies did. This might be because SMT and TeliaSonera have a pre-development part that might untie the whole innovation process and hence aspects such as whole time cannot be measured.

It has to be added that as the services companies such as SGS or ÅF, are more focused towards social aspects and knowledge building are more considered when measuring innovation. Product owners companies such as SMT, mainly measure the outcome of the process. This product ownership enables an easier measurement for them and shows a stronger focus on the implementation of their process. This is because the first ones cannot measure the outcome so tangibly due to the lack of product and hence they have to measure more abstract concepts in order to have some indicators about their innovation activities. The author of this research would encourage SMT to add some metrics related to knowledge building or social aspects to their innovation measurement system. This is believed to be beneficial for them due to the support to
the knowledge creation that they show, through their structural separation that focuses on research.

In this chapter, some correlations have been made. However, it has to be concluded that these were not significant to state that different types of innovation organization have different KPIs for innovation. Each company has their own innovation measurement system, which relies on their individual and environmental factors that surround each business.

8 Conclusion
In this section, a brief summary of the discussion, the answer to the research questions, the limitations of the study and the recommendations for further work are described.

8.1 Discussion summary
In order to have a better overall perspective about the discussion section of this research work, a summary of the main points of the discussion are described below.

In terms of the goal setting process, it can be seen that the process that all the companies showed a similar process so no pattern was identified depending on the way of organizing innovation. This process is also aligned with the one described by Locke & Latham (1990), Emsley (2003) Rauch & Frese (2000). However, some changes are detected when this process is introduced in innovation processes such as the flexibility needed and the importance of the feedback but the results are not considered relevant. Therefore, it cannot be concluded that this process changes when it is applied into the innovation activities or into other business lines and neither that it varies depending on the way that each company organizes for innovations.

According to the types of goals that the companies used to encourage innovation, some of them are detected in all the companies and with a clear importance and others not. The learning or education goals were seen to have a great importance among all the companies due to the insistence of these in the education and research. The use of this goal in innovation activities is also aligned with the theory developed by Seijts & Latham (2012), who state that this goal must be used in complex situations like innovation practices. It has to be remarked these learning goals were divided and that the companies with structural separation have a stronger focus on research and the companies with contextual ambidexterity or temporal separation are focused on education. This might be because in the first type of organization the employees only work with radical innovation and in the other two they have to switch between projects.

A common ambiguous goal that is considered essential in all the companies is the need of introducing an innovation culture. It is detected that this goal is easier to achieve in smaller companies or units rather than in big organizations. The strategic goals that each company has are identified as superordinate goals in some aspects and as stretch goals in others, depending on the challenging degree or the involvement of different departments. Hence, this is another type of goal shared by all the companies in innovation activities. For attaining the superordinate part, a holistic understanding is considered vital. The stretch part tries to provoke big changes in the organization. Therefore, the superordinate and stretch goals are found to be usually merged between them and also used by all the companies not only for innovation activities, but also for
the rest of the business lines although are considered beneficial for innovation. These four types of goals are detected in all the ways of organizing innovation.

However, the only relevant difference between the type of organization for innovation and the type of goals was that the innovation or creativity goals are only found in big companies that do not have a structural separation for radical innovation due to the stronger need that they have to enhance creative behaviors. The efficiency that the efficiency goals seek is attained by the companies by setting the normal SMART (Doran, 1981) or performance goals (Locke & Latham, 1990) so not explicit efficiency goal is found. This efficiency was mostly tried to be achieved in the implementation part of the innovation and apart from the standard goals, it is encouraged through norms and ways of working. The negative feedback goals are not detected in any of the companies. Furthermore, the companies give a strong importance to the feedback but not in the way that this type of goal encourages.

About innovation metrics, it can be stated that most of the innovation metrics that belong to the four first categories that Adams, et al. (Adams, et al., 2006) expose in their review, are detected in all of the companies. However, as it is logic, the companies express differences in the way of working with them or the metrics used due to the individual characteristics that each company has and hence, only some agreed metrics such as time, money and volume of ideas were found among some of them.

When relating these differences to the way of organizing innovation that each company has, some correlations such as the focus on social aspects or knowledge building of SGS and ÅF, which do not have an structural separation and are service companies which have the innovation processes embedded in the organization, and the focus on the execution or outcome of TeliaSonera and SMT, whose radical innovation is organized separately. Also the fact of keeping simple metrics for contextual ambidexterity in order to change better from incremental to radical projects was seen as a pattern.

The conclusions that lead form the comparison of the classic performance measurement established by Neely, et al. (2005) and the innovation measurement research done by Adams, et al. (2006) are unexpected for the author of this research. This is because common patterns or guidelines can are identified between both perspectives, with more similarities than differences. However, there are some differences in terms of the perspective taken when measuring due to the nature of the innovation business.

8.2 Reframing the research questions
The first research question posed in this thesis addressed the challenge of using goal setting and measurements in radical innovation activities for different companies.

*RQ1: How do companies work with goal setting and measurement for radical innovation?*

In answering the research question one, the challenge of merging all the different perspectives that are found in the different companies, is faced. Considering the previous chapter, it can be stated that there is not an optimal way of organizing goal setting and measurement for radical innovation. Therefore, it can be concluded that this organization depends on the type of company, the size, the industry and in some cases, the way in which the companies organize
their innovation processes. Each company will need an individual and a context analysis of their processes and ways of working in order to achieve and determine the best possible way of working with goal setting and measurement for radical innovation.

However, some common factors that the companies attain through goal setting have been identified in all of the companies and hence they are considered as necessary in order to innovate in a proper way. These factors are the need of an innovation culture, a focus on research or education and a challenging and holistic perspective when innovating. A common goal setting process with some flexibility and a strong feedback focus needed, was also detected. Furthermore, a common guideline was found when the companies work with innovation metrics. This guideline fairly approximates to the research performed by Adams, et al. (2006) although this research seems to be more complete than what the companies use to measure.

The second research questions addresses factors that establish some relations between the organization for innovation and how companies use goal setting and measurement for radical innovation.

**RQ2: How does the innovation organization of the companies affect goal setting and measurement for radical innovation?**

Some factors are identified in the search for an answer to this research question. In terms of goals, the two relevant correlations between the type of goals used and the type of organization for innovation was that the innovation or creativity goals are only found in companies that have their innovation processes embedded in the organization. This is aligned with the conclusion that having an innovation culture is more difficult in big organization rather than in small units. Since these companies do not have a structural separation, which leads in a minor unit in charge of radical innovation, they have a stronger need of enhancing creative behaviors. Therefore, they have to encourage this creative behavior through goals or activities. The other pattern that is found is that the companies tend to divide the learning goals into research or education goals. The companies that work with structural separation are focused towards the research goals whereas the companies that use contextual ambidexterity or temporal separation focus more in education goals. However, the author of this research doubts if these patterns are enough to be considered significant and state that different ways of organizing innovation need different types of goals to encourage it.

According to innovation metrics, some factors were found that establish relations between the metrics used in some of the companies and the way that they have of organizing innovation. These were for instance the focus on social aspects or knowledge building of SGS and ÅF, whose innovation processes is embedded into the organization though a contextual ambidexterity or a temporal separation, and the focus on the execution or outcome of TeliaSonera and SMT, who have a structural separation organization. Furthermore, the fact of keeping simple metrics for contextual ambidexterity in order to change better from incremental to radical projects was seen as a pattern. However, the author of this research thinks that these two patterns are not enough to state that different types of organizing innovation need different KPIs. When measuring, an emphasis on the innovation process is also detected to be beneficial for any way of organizing innovation.
Therefore, it can be stated that there is an effect on the way in which companies work with goal setting and innovation measurement that comes from the organization of innovation. However, this effect is not so strong so it is not enough to determine any clear and defined pattern.

To end with, taking into consideration both of the answers, it has to be concluded that the effect of these goals or metrics has been discussed in the discussion chapter and some suggestions have been given to the companies regarding them. Therefore, it is up to the companies to consider if from the personal analysis of each company, these suggestions or ways of using goal setting and measurement for innovation will have beneficial effects on them or if their use is appropriate

8.3 Limitations and Suggestions for future research

Only five interviews were performed. With more interviews, different companies and industries would have been analyzed and hence more data that allows corroborating some results would have been gathered. Lack of physical interaction, such as observing, analyzing their ways of working and teaching methods, was another limitation to this study. If a more thorough analysis would have been performed at the respective companies, more detailed results might have emerged. As a complementary work for this study, more data could be collected by cooperating with companies in a more interactive way, performing activities such as workshops and having closer collaboration.

Furthermore, it was not possible to determine quantitatively the extent in which the innovation practices were improved by the use of the different types of metrics or goals and only a qualitative approach was taken. This was due to the lack tangibility of the studied area. Therefore, finding methods to measure quantitatively the effects of these goals or metrics in the innovation performance of the companies and implementing these methods, can be matter for further research.

Moreover, the author of this research project believes that the innovation practices will have better results if the drawbacks or considerations mentioned in the discussion chapter are avoided by for instance, following the given suggestions in the preceding chapter. These suggestions have not been proven but they were deduced from the information obtained from the interviews and from the theory chapter. Taking this into account, it can be work for further research to validate the suggestions given by this study.
9 References


