

Summary

The present master thesis carries out a study on the implementation of a “Knowledge Management System” in the supply chain department of an internationally reputed electronics firm: Infineon Technologies AG, from now on referred to as “Infineon”.

The first part of the study consists on carrying out a knowledge audit within Infineon’s supply chain; this part concentrates on determining where the knowledge is and how it flows within Infineon’s supply chain. After having analysed the current state of knowledge management and having examined the results of a survey that gathers information about all the problems that affect Infineon’s supply chain we will identify all those problems that come from Infineon’s current policy regarding knowledge management.

After having found the main problems that affect Infineon’s supply chain with regard to knowledge management we will come up with a general solution. As it will be seen, the solution will consist of four different measures that combined will give birth to a very solid knowledge management system, each one of the four measures aims at solving certain problems.

The most important measure and the most innovative one, will try to refurbish the company’s culture and increase its employees’ awareness on knowledge creation and sharing. It will make use of the internal social network to make all employees concerned about the problems that the SC suffers and its potential solutions.

The other three measures, more traditional ones, exist already in the company but have not attained the expected results; the goal of the new knowledge management system will be to make them succeed. They consist in the creation of a knowledge repository with all the company knowledge, the implementation of an internal “*Wikipedia*” which will be called “iWiki” and the creation of an academy to give trainings to the employees on supply chain related topics. The three measures, that will sometimes overlap, will complement each other in a way that every single employee finds his way to better access and share knowledge

Due to time constraints and to the nature of this master thesis only the first measure of the proposed knowledge management system will be fully developed and we will even witness the first steps of its implementation. However, the other two measures will be explained and further guidance will be given so that the project can be continued in the future.





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1. Glossary

BE: Back End → Second part of the supply chain, the process is much easier; it basically consists on assembling the different parts that have been built in the “Front End” creating the final chips and testing that they work properly.

CT: Cycle Time → Time that a certain process needs to be carried out.

FE: Front End → The front end part of the supply chain is where the more technically complicated processes take part; the product is transformed from silicon to the main components that will form a chip.

iPSolving: Knowledge management initiative which at the moment is being implemented within Infineon’ supply chain to foster the collaborative resolution of problems among people who do not necessarily work together and do not necessarily know each other.

iShare: It is an intelligent platform within the Infineon Intranet, where users have the possibility to collect their personalized relevant information on one page, to organize, share and browse them.

iSpace: Infineon Technologies’ internal social network, where employees can create a profile with a picture and some personal and professional information and socialize with its colleagues.

iWiki: It is a free, web-based, collaborative, encyclopedia project supported by Infineon. It was started in 2007 by Adolph Rainer who works in the supply chain department of Infineon Technologies.

Jour Fix: Weekly meeting where all the members of a certain department take part and share with the rest of the team the state of their work. If it is not explicitly specified we will be referring to the Jour Fix of the Supply Chain Innovations department.

KM: Knowledge Management: It is to enhance organizational performance by explicitly designing and implementing tools, processes, systems, structures, and cultures to improve the creation, sharing and use of all three types of knowledge that are critical for decision making. Knowledge management is typically made operational through a series of new projects, processes and activities [1].



SC: Supply Chain → It is a system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer.

SCM: Supply Chain Management

Supply Chain Roadmap: It is task force who is responsible for all the projects which are carried out in the supply chain.

Supply Chain Roadmap Steering Committee: Meeting in which the Supply Chain Roadmap talks about the status of the most important supply chain projects and decisions regarding budget, timing, necessary resources, etc., are taken.



2. Foreword

2.1. Origin of the project

In October 2011 I started an internship in the headquarters of “*Infineon Technologies AG*”, in Munich. As an intern, I joined the department of “*Supply Chain Innovations*” under the responsibility of its director, Hans Ehm.

A growing number of executives, consultants, and management academics have stated in recent years that knowledge now constitutes the major source of competitive advantage for organizations [2]. The supply chain department of Infineon Technologies AG is totally aware of this and has created an entire department (*Supply Chain Innovations*) whose only goal is to generate new knowledge concerning the supply chain and to learn how to better implement the already existing one. In this department, we are about twenty people, most of us either bachelor, master or PhD students carrying out studies to see how to improve the different processes within the supply chain.

Weird as it may seem, despite all the efforts that the company is putting to generate new knowledge, there is not a system to manage the company knowledge once it has been created. There are several employees who have realized of this important lack that Infineon’s supply chain is suffering and have started their own initiatives but nothing at a global level has been considered.

One of the employees that, being aware of this important lack, had started an initiative to better manage knowledge within the supply chain was Geraldine Yachi, who happens to work for the “*Supply Chain Innovations*” department. After several conversations with her and with the director of the department, it very rapidly came clear that I could try to help them and on developing a system to better manage the knowledge of the supply chain at a corporate level.

Once we had the confirmation from Marta Mas Machuca, professor of the Business and Administration department of the “*Universitat Politècnica de Catalunya*” (UPC), we started the preparation of the project that would, at the same time, account for my master thesis or, how it is called in the UPC, “*Proyecto Final de Carrera*”.



3. Introduction

3.1. Goals of the project

This project distinguishes three different partial goals that, combined, aim at allowing the company to fully and successfully implement a knowledge management system within its supply chain.

The first goal will consist in trying to determine what the current state of the supply chain is with respect to knowledge sharing and managing. The critical parts of the current situation will be identified and compared against those who are most desirable in order to better manage knowledge.

The second part of this work, will propose a general management system to be implemented within Infineon's supply chain. This system, developed according to the conclusions drawn in the first part of the work, will consist of four different subparts, each one of them addressing a particular goal. The description of the general knowledge management system to be implemented will only be developed from a theoretical point of view, detailing the intermediate steps that have to be achieved to finally reach the ultimate goal of managing supply chain knowledge as any other asset in the company.

The third goal of this work will consist in accompanying the supply chain department on the implementation of one of the proposed measures, the most important one. A pilot test of one of the initiatives will be run and we will witness how people react to the initiative and interact with each other, especially regarding knowledge sharing and problem resolution.

3.2. Project scope

Even though knowledge management is something that can and must be applied to the whole organization, due to the size and complexity of the company of study, we will only address one bit of the organization, the "Supply Chain Department."

Nevertheless, our goal will be making the whole company aware that Infineon's supply chain knowledge is an asset and, like any other asset, it has to be managed to make the most of it.



4. Environment of Infineon's supply chain

4.1. The semiconductors and its industry

A semiconductor is called like this because it is a type of material that has an electrical resistance which is between the resistance typical of metals and the resistance typical of insulators, so it "semi"-conducts electricity. A semiconductor is a substance, usually a solid chemical element or compound that can conduct electricity under some conditions but not others, making it a good medium for the control of electrical current.

Semiconductor materials are the foundation of modern electronics and are present in our society to an extent often ignored. We are literally surrounded by them and are using them all the time. They are in our radios, computers, telephones, electrical household appliances and many other devices.

The importance that semiconductors have taken in our life in the last 4 decades is brutal and this can be also explained by the drop in the prices and the increase of efficiency that this industry has undergone. Just to give the reader an idea, if the automotive and aircraft industries had developed at the same rate as semiconductors in the last 30 years; a Rolls Royce would cost \$2'75 and get 3 million miles a gallon, and a Boeing 767 would cost \$500 and circle the globe in 20 minutes on five gallons of gas [3].

In 1999, when Infineon was founded, the global semiconductor market had a volume of US\$ 91.3 billion. The global semiconductor market growth can be observed below.

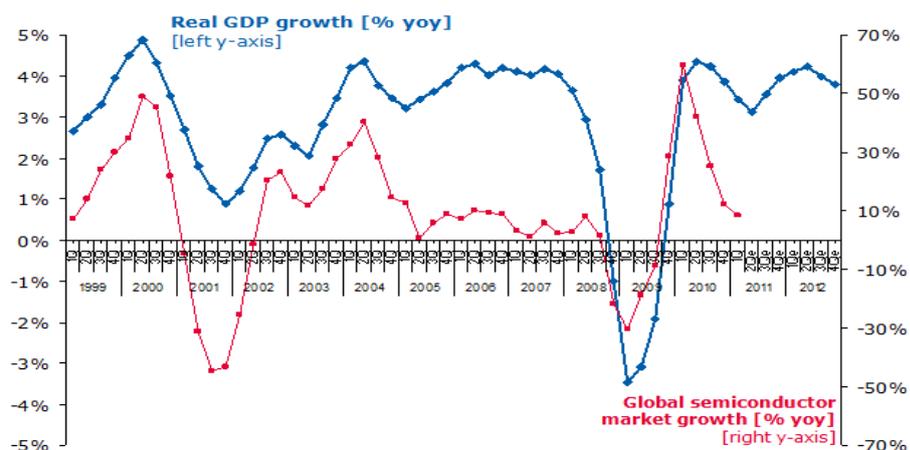


Figure 1: The graphic shows the growth of the global semiconductor market. Source: Internal Infineon



4.2. Infineon Technologies AG

Infineon Technologies AG firstly goes into operation on its own in April 1999. Up to that moment it had been a subsidiary of Siemens AG. At that time, the company already counted 25,000 employees.

Infineon Technologies focuses on the three central challenges of our modern society: energy efficiency, mobility and security. It offers semiconductors and system solutions for automotive and industrial electronics, chip card and security applications as well as applications in communications. With a global presence, Infineon operates through its subsidiaries in the USA from Milpitas, California, in the Asia-Pacific region from Singapore, and in Japan from Tokyo.

In the 2011 fiscal year (ending September 30), the company reported revenues of 4.0 billion euros (€ 3,997 million); with close to 26,000 employees worldwide. Infineon is listed on the Frankfurt Stock Exchange (ticker symbol: IFX).

Despite the global financial crisis that is specially taking its toll in Europe, Infineon Technologies AG has managed to increase its revenues by 21% with respect to the previous fiscal year (2010).

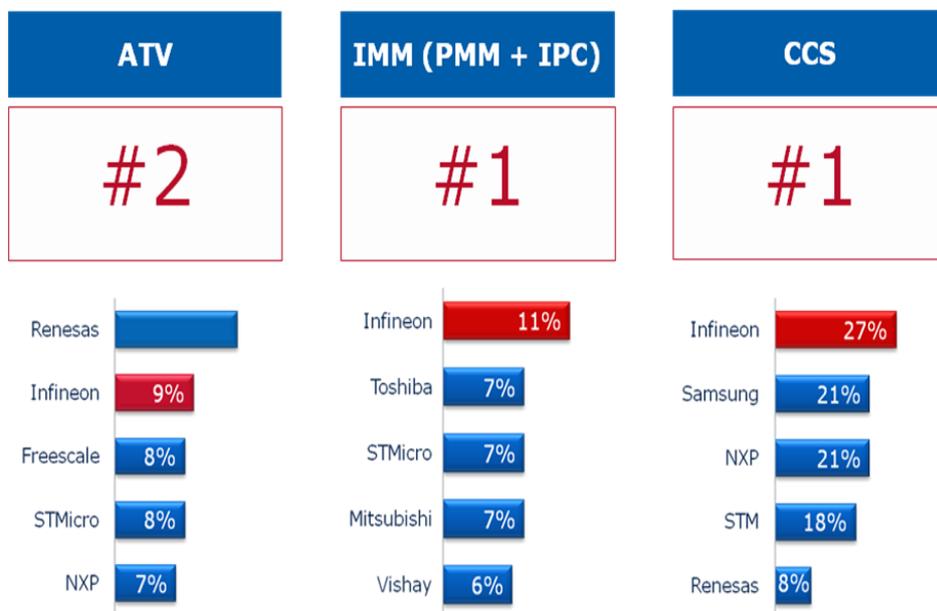


Figure 2: Ranking of the main actors in the semiconductors world per division.
Source: Infineon Technologies AG; Annual report 2011



Infineon Technologies has a strong technology portfolio with about 22,900 patents and applications and more than 28 major Research & Development locations.

Infineon has three main target markets and holds top positions in all of them. The three main divisions are: Automotive (ATV), Chip Card & Security (CCS) and Industrial & Multimarket (IMM); this last division has recently split into two subdivisions: Industrial Power Control (IPC) and Power Management & Multimarket (PMM).

4.3. The Supply Chain of Infineon Technologies AG

4.3.1. What is a supply chain?

The supply chain is the succession of processes which step by step take the raw materials and turn them into finished or semi-finished products. It spans from the suppliers of the suppliers of a given company to the clients of its clients. Some of the typical functions which are found in the supply chain are: manufacturing, logistics, stock management, demand planning, production planning, etc.

Here we have a graphical representation of a typical supply chain with its main constituents.



Figure 3: Representation of typical supply chain with its main constituents. Source: Done by the author

The supply chain of Infineon Technologies AG is slightly more complicated due to the nature of what the product, which is technologically very complex and that requires many different processes.

4.3.2. How is the supply chain of Infineon Technologies AG structured?

The typical internal supply chain within semiconductor chip manufacturers is divided in two main parts which are called “front end” (FE) and “back end” (BE) production. In order not to lose focus in our main topic, we will not see the details of the fabrication process and we will just go over the different processes that are included in Infineon’s supply chain to have a rough idea. In the front end part of the supply chain is where the more technically complicated processes take part; the product is transformed from silicon to the main components that will form a chip. In the back end part, the process is much easier; it



basically consists on assembling the different parts and testing that the final chips work properly.

There are two main processes in each, “Fabrication” and “Sort” in FE and “Assembly” and “Test” in BE. There is an intermediate buffer or warehouse between FE and BE, it is called “Die Bank”. The buffer at the end of Infineon’s supply chain where finished products are stocked is called “DC”.

The raw material to create chips are wafers and they are stocked in a buffer at the beginning of the supply chain.

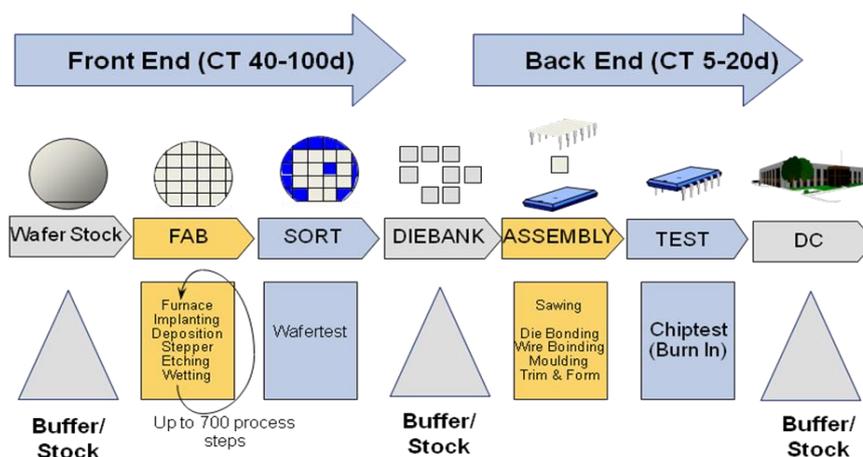


Figure 4: Representation of Infineon’s supply chain structure.
Source: Infineon’s internal intranet

The FE production is technically the most complex part of the production. There are up to 700 different processes and it takes on average from 6 to 15 weeks. The BE production, however, is much more simple, it basically consists in assembling the different parts which have been produced to create the finished product and it only takes between 3 and 4 weeks. After the assembly operations the chips move on to burn in and final test. This is done in the test area. The finished chips proceed to a distribution centre (DC), from where they are ship to the customers.

All in all, it takes around 4 months to produce the chips. Planning, production preparation, and transportation times add to the overall manufacturing lead time.

The whole supply chain includes suppliers providing raw material, like raw silicon or gases and materials like lead frames. There are also suppliers doing manufacturing for Infineon. If they do it in FE they are called Silicon-Foundries (SIFO), and in Backend they are called Subcons.



Infineon's Front End and Back End sites, SIFO's and Subcons are distributed all around the globe. In the following picture we can appreciate the extent to which Infineon's supply chain is internationally spread.

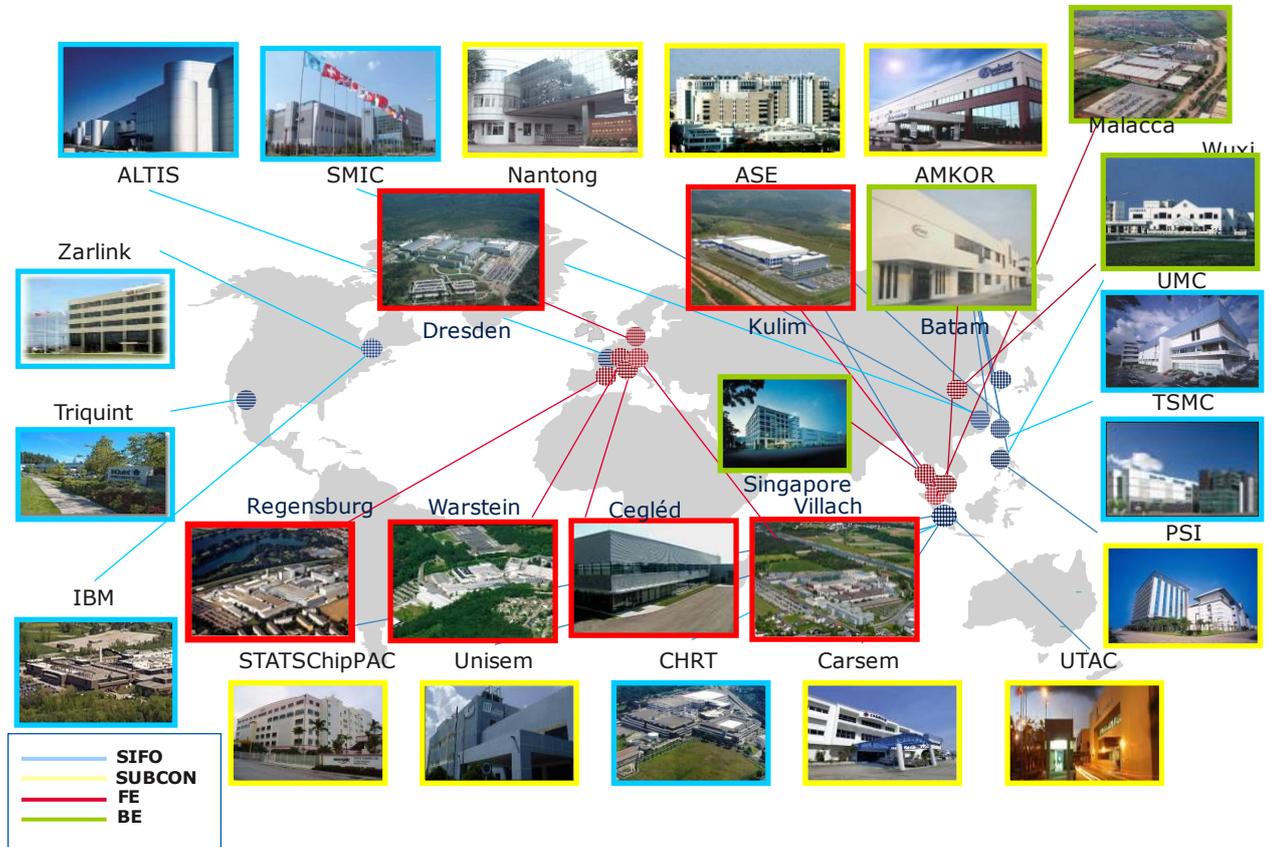


Figure 5: Infineon's supply chain worldwide locations.
Source: Infineon's internal intranet.

In the picture we can see that Front End sites are located in: Dresden, Warstein and Regensburg, (Germany); Villach (Austria); Cegléd (Hungary) and in Kulim (Malaysia).

Infineon's Back End sites are mainly located in Southeast Asia: Batam (Indonesia); Singapore; Malacca (Malaysia); and in Wuxi (China).

The silicon foundries (or SIFOs) are distributed worldwide: in Altis (France); UMC and TSMC (Taiwan) and in CHRT (Singapore).

Not only the supply chain integrant sites are spread all over the globe but, during the fabrication process, the different parts have to go to different sites for all different production steps to be carried out.



The production of one precise product or part might take place at varying locations for the different steps of production. We will call the set of different sites where a part has to “go” to complete the production process, “production path”.

In the picture below we have an example of the different possibilities of path that a part must follow for the production to be completed. Each line represents an alternative path to get to the same result or part. As it can be deduced from the image, Infineon’s supply chain is very flexible and there are many different “production paths” to obtain one same part. That flexibility is needed because as we have commented before, the semiconductor market is extremely volatile.

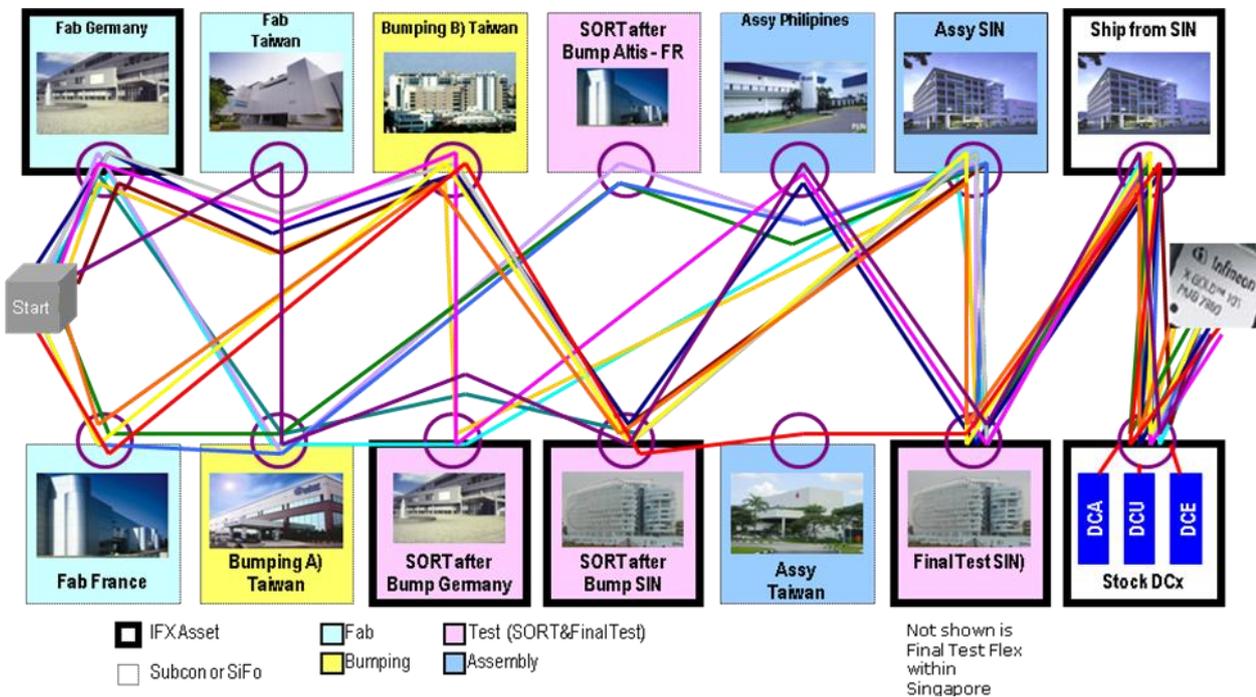


Figure 6: Representation of the different supply chain paths that a phone chip had in just one year.
Source: Infineon’s internal intranet.

This is the example of a product that broke all records; it was for a mobile phone due to a very steep ramp-up. Usually a product does not need so many changes of production path within one year. These changes in the supply chain usually take place within a short period of time and they always serve the purpose of simplifying process steps, reducing costs or increasing the capacity.

A consequence of having a supply chain that changes so much in such a short period is obviously that the daily routines of all the employees within the supply chain change with every change of “production path”. This has a negative impact on the attitude of the employees towards writing down the different processes that have to be carried out. They



think: Why writing down any information regarding the processes if the “production path” will change tomorrow and they will be completely different?

Because Infineon’s supply chain is so flexible and suffers so many changes in such a short period of time, we cannot force the employees to write down every single process every time change because this would suppose a very heavy burden. We need a knowledge manage system which is flexible too and user-friendly, so that people can easily share the new knowledge needed concerning the new processes.

Infineon’s supply chain is structured according to the SCOR Model. In the following point we will see what that is and how it influences the supply chain.

4.3.3. What is the SCOR[®] model?

The Supply Chain Operations Reference Model (SCOR) is a process reference model endorsed by the Supply-Chain Council (SCC). The Supply Chain Council has about 1,000 corporate members. Infineon Technologies AG is a member of the Supply Chain Council:

SCOR is a management tool, spanning from the supplier's supplier to the customer's customer and describes the business activities associated with all phases of satisfying a customer’s demand.

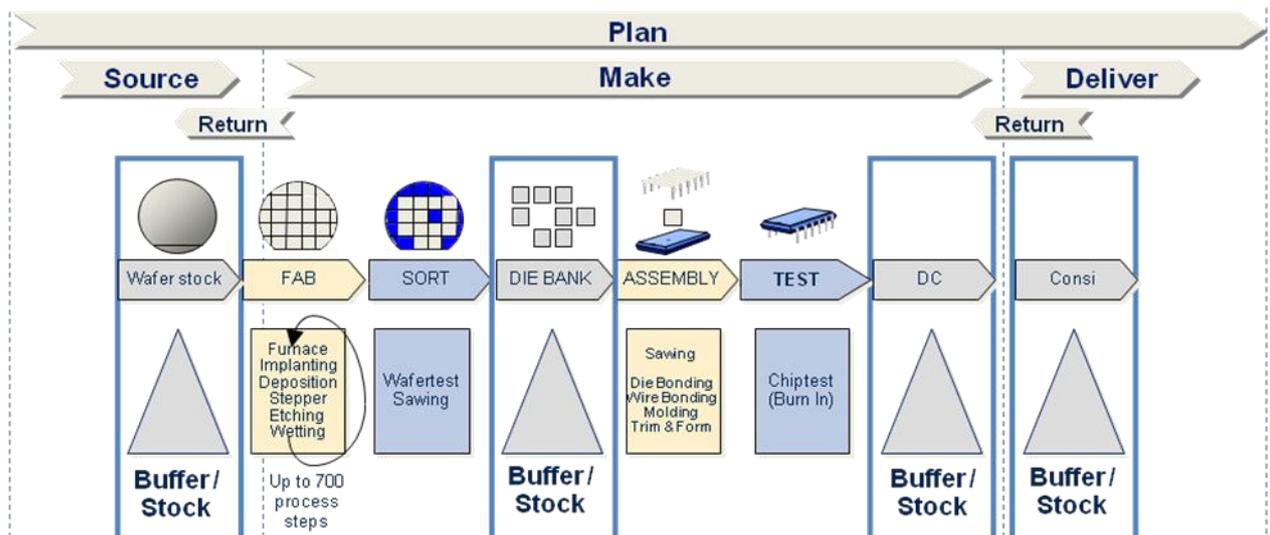


Figure 7: Representation of Infineon’s supply chain according to the SCOR Model.
Source: Infineon’s internal intranet

The SCOR Model aggregates the supply chain in five different processes: Plan (strategic decisions concerning the SC), Source (relation with suppliers), Make (production process), Deliver (delivery of finished product) and Return (return of raw materials or finished products). In the picture above we can see how the processes of Infineon’s supply chain are organised according to the SCOR Model.



That has a big impact in the organization because everything in the supply chain is organised according to the SCOR Model. For example the different projects are organized

The benefits of using the SCOR Model at Infineon are:

- visibility and harmonization of the interrelations of supply chain relevant sub-processes
- helps standardization by using an inter-industrial reference model, it is also used by leading software companies for supply chain tooling
- and last but not least the SCOR model allows reliable and fast benchmarking.

4.4. Infineon's supply chain and its culture with respect to Knowledge

4.4.1. Current state and general perception

It has to be taken into account that, even if before Infineon was part of a larger and older company – Siemens – it only started to operate on its own in 1999, it is only a 13-year-old company. As it is normal, during the first years, Infineon has focused on its operational performance and it has had many successes. For example, the average yield of Infineon's factories is around 98% which, taking into account the difficulties that they have to overcome, is a really good result.

It is in the last few years that the company, specially the supply chain department, has become aware of the need to preserve and share all the knowledge that has been created. Therefore, in the last few years there have already been some initiatives in that field, especially to share the knowledge that Infineon's SC already has. It can be said that the two most important initiatives that have been carried out in the last years have been the Supply Chain Academy and Infineon's internal "iWiki".

The Supply Chain Academy (SCA) is, as its name indicates, an academy to learn about different topics related to Infineon's supply chain and make Infineon's employees more competent. It started in November 2008 and has two main activities: creating what in Infineon is called an "*iLearn*" and organizing seminars and online webinars addressed to all employees within the supply chain.

An iLearn is a self-learning tool on a given topic of the supply chain. It is kind of a Power Point presentation with voice-over that explains what the user can see displayed on the



slides. On average, each iLearn takes between 20 and 30 minutes for the user to complete it but it takes more than 50 hours of work to create an iLearn and each one of them is estimated to cost around 1500€, so create them is really an investment in terms of time and money.

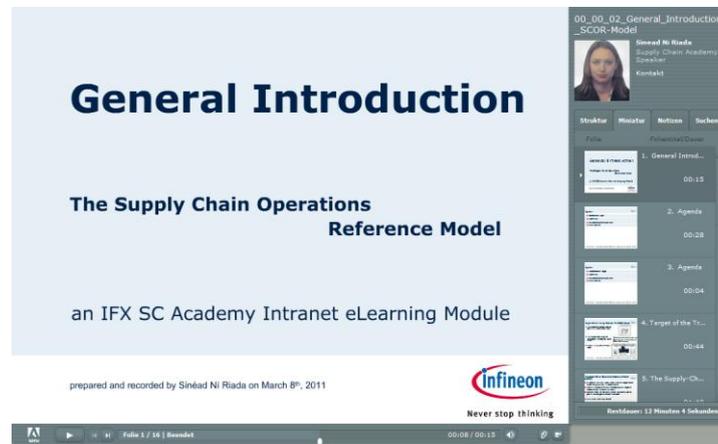


Figure 8: Screenshot of the first slide of an iLearn. Source: Infineon's internal intranet.

To verify whether an employee has assimilated or not the information given in the iLearn, after having completed it, every employee has to fill out a questionnaire with questions on what has been explained on the iLearn. Only if he passes the “test” he will be given a certificate stating that he has now the knowledge explained in the iLearn. This certificate has in reality no other purpose than to motivate people to complete all the iLearns. It has to be said though, that this certificate is no guarantee that the employee has actually gained an insight into the topic covered in the iLearn and that in real life it is often proved afterwards that many employees have not understood the key points of the iLearn and they have nevertheless obtained the certificate.

Even though the iLearn initiative started as a general initiative to be developed in all departments of the company (Quality, Supply Chain, IT, Manufacturing, R&D, Purchasing...), the reality is that, except for Supply Chain, hardly any other department have created iLearns. This is mainly due to the creation of the SCA in 2008 and it is a proof of the engagement of the Supply Chain Department with knowledge gathering and sharing. It can be said that the Supply Chain Department is a step ahead with respect to the other departments in the awareness of the need to implement knowledge management initiatives.

There is a group of iLearns which is specially designed for new employees to gain a basic knowledge on the general structure of Infineon's supply chain and they are mandatory to everybody in the supply chain. They are called “*Supply Chain: A competitive advantage*” and they cover topics such as how Infineon's SC is structured, what the SCOR Model is, what the main processes are and how they are carried out, the tools used, etc.



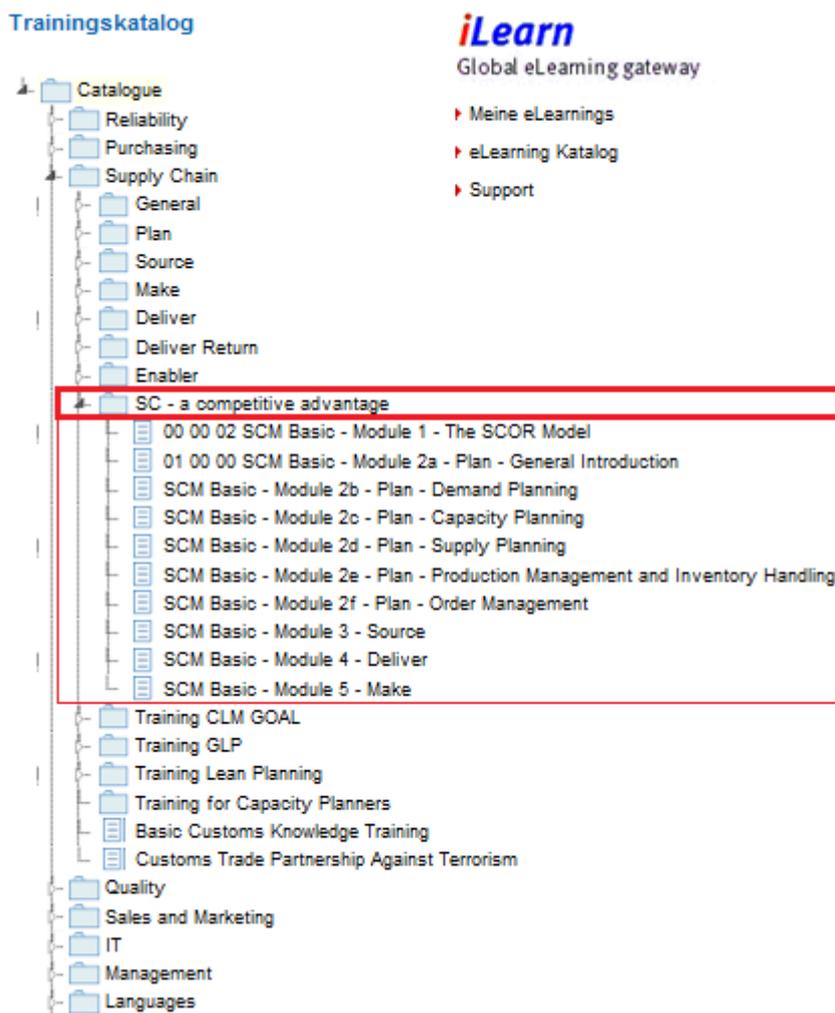


Figure 9: Screenshot from the Infineon's iLearn database. The iLearns that are mandatory for all Infineon's supply chain employees are surrounded with a red line.

The other main activity of the SCA is to organize online webinars. Usually, one webinar is organized every month and it consists of two sessions of five hours usually within two consecutive days. There are a maximum of 16 participants in every webinar and to take part, it is mandatory to have completed all the mandatory iLearns (Supply Chain: A competitive advantage). The goal of the webinar is to go through all the main departments of the supply chain and explain a bit more in detail what it is done so that the participants have an insight on how the different departments work, with whom they interact, the tools that are used, the interlocutors, etc.

Infineon's supply chain has already won two international prizes for its Supply Chain Academy, one of them was the "European Supply Chain Excellence Award" (ESCEA) granted in 2010 and the other was granted by the Supply Chain Council (SCC).



The other very interesting initiative regarding knowledge is what within Infineon is called iWiki or IFXWiki. It is an initiative started in 2009 by an employee who also happens to work in the supply chain department: Adolph Rainer. iWiki is an internal tool where the employees can find all kind of information regarding the company such as acronyms for whom they do not know the meaning or the different steps of a process within the supply chain. It works exactly the same way as “Wikipedia” the online encyclopedia except that it is only for internal use. Every employee can contribute to the expansion of the knowledge in iWiki and the greater the number of people contributing, the bigger the number of articles and links in iWiki and therefore the more useful it will be for the employees.

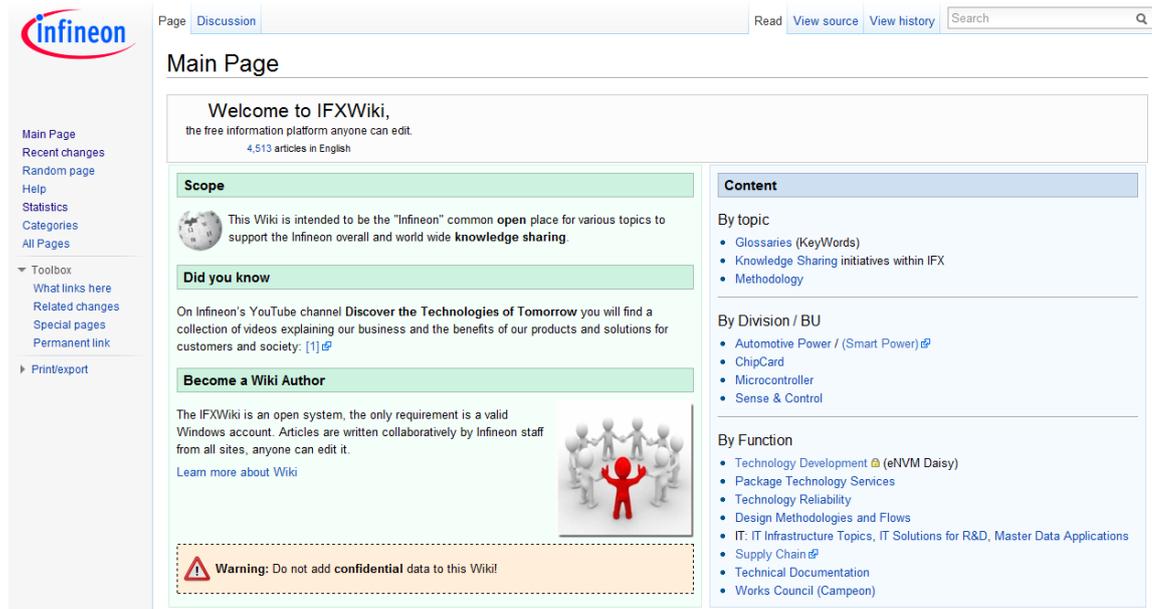


Figure 10: Screenshot of the main page of Infineon's iWiki.

iWiki is the improvement of an older initiative: the “*Infinipedia*”. Infinipedia had already started in 2007 and the official migration of documents from one tool to another was announced in February 2009. That is the reason why even though it started under the name of iWiki in 2009; it is considered to be created in 2007.

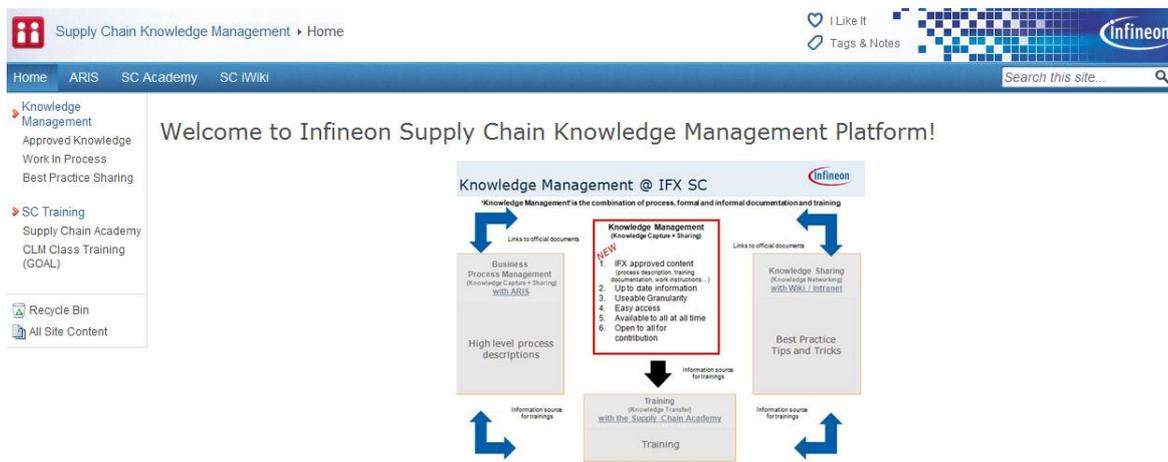
Once again, iWiki is meant for all departments of the company but the way in which supply chain related articles overtake by far the number of articles related to other company departments reveals the difference in the frame of mind of supply chain employees towards knowledge. At the moment there are around 4500 articles in English.

Another initiative that has been promoted by one of the employees of the supply chain is a “Knowledge repository”. It has been started by Geraldine Yachi, who works in the Innovations department. The goal of this initiative is to create a database with all the knowledge of the supply chain so that all employees can address to it whenever they have a doubt. Even though the database already exists, the idea is still to develop and has to be



made public to all Infineon’s employees so that, with time, it becomes the reference tool for Knowledge management.

The informatics tool used to support our knowledge repository is what in Infineon is called an “iShare”. An iShare is an intelligent platform within the Infineon Intranet, where users have the possibility to collect their personalized relevant information on one page, to organize, share and browse them. This way of managing information is made possible by using WebParts. WebParts are movable units that can display almost any kind of information and that can be placed on a website very flexibly. The integration of a search function allows additionally a quick and easy find of all information within iShare.



- Under the library "SC Knowledge Management approved", you will find:
 1. IFX approved content (process description, training documentation, work instructions...)
 2. Up to date information
 3. Useable Granularity
- Under the library "SC Knowledge Management Work In Process (WIP)", you can:
 1. Access useful documents and links which are not yet approved
 2. To upload your documents and links, request write access to Yachi Geraldine (IFAG OP CSC BS IN)
- The library "Best Practices" is available for team work on knowledge management

Figure 11: Screenshot of Infineon’s internal Knowledge repository

4.4.2. Recent past events

Even though many companies are striving to implement knowledge management initiatives, very often their efforts do not lead to the achievement of the expected result and there is a growing sense of disenchantment among executives. As we have seen in the literature, the organizational culture plays a role of paramount importance in the acceptance of such knowledge related initiatives by the employees.

The goal of this point is to try to look at Infineon’s most recent past events and look for situations that might have had a negative impact on people’s attitude towards knowledge creation and sharing. It is important to identify what possible hindrances might be



encountered when trying to implement a knowledge management system so that when we design it we can already think of strategies to overcome them.

We find many authors in the literature signaling culture as a key factor to bear in mind for the success of knowledge management initiatives, for example David W. De Long and Liam Fahey in their article – Diagnosing cultural barriers to Knowledge Management [1]:

“To effectively diagnose the fit between their existing organization and KM objectives, managers need frameworks to help articulate how culture affects their unit’s ability to create and apply knowledge. Only then can they design strategies to either adapt their initiatives to the culture or try to reshape the culture to support the firm’s knowledge management objectives.”

When looking at Infineon’s short history seeking for facts that might have a general negative influence in the implementation of a knowledge management system, the first thing that springs to people’s minds is the situation the company had to go through between the end of 2008 and mid 2009. As it has been shown in figure 1, at that time the global semiconductor market experienced a very critical downturn and Infineon was not an exception; those were hard times for the company too. Because the sales were plummeting, the company had to take tough measures and unfortunately, some of the measures implied cutting the amount of hours that employees worked and therefore also their salary. Some employees saw their working hours and salaries reduced to less than half what they were and that forced many people to quit the company.

When reading about the factors that negatively influence people’s willingness to share their knowledge, one of the factors that comes up more often is the fear to lose their job. Companies with a history of downsizing have a special problem with that and according to what has just been explained, Infineon is in that group. Employees have the impression that by sharing what they know, they are giving away their particular contribution to the company, as a cook who explains his secret recipe or a magician who explains how to perform a magic trick so that anyone can make it afterwards.

In this approach knowledge is regarded as power and by explaining how he carries out his duties he is giving away his power and there is not any exclusive added value in his work, from that moment onwards, anyone can do it the same way. This conception of knowledge as power is very common, it goes with human nature and companies have to make an extra effort to overcome it and make employees disregard it.

The best way of convincing people to share their knowledge is by sharing knowledge with them. If an employee is surrounded by a team in which all the members have a strong tendency to share their knowledge he will drop his guard and start sharing his knowledge



too. Managers have to encourage such kind of knowledge-sharing atmospheres and set the example.

Another field in which for many years Infineon has adopted a position that has proved not to be knowledge-sharing enhancing is in the importance given to individual knowledge. When saying individual knowledge it is included knowledge of a certain sub-group within the company. In Infineon, Knowledge sharing has been sometimes compromised, or even sacrificed, because of norms and practices that reinforce the supremacy of individual knowledge. This could be seen in the way in which the performance reviews were conducted.

For many years, the performance of the different departments in a country were compared with the performances of the same departments in the rest of the countries worldwide so that sentences like *“this year Taiwan had the best Customer Service Level on average”* or *“the best average production yield was this year in our factory in Austria”*. Of course, this way of reviewing the performance does not boost international knowledge sharing. How do we want the different employees from the same department but in two different countries to share information if they feel like rivals in a race, striving to get first to the finish line?

As long as people benefits from not sharing their knowledge, the organization’s ability to change their attitude towards knowledge will be very limited, not to say non-existent.

A subject that has been coming up quite often in the various exchanges that I have had with different Infineon’s supply chain employees is the culture with respect to mistakes. Many employees feel that they are not really allowed to make mistakes and that is something that can have a very negative impact on people’s willingness to share their experiences with respect to knowledge.

The way an organization reacts to mistakes shapes the context for social interaction. If an employee knows that his mistakes can be punished severely he will definitely try to cover them up and ignore them. In such a case, if the company tries to build a lessons-learnt database the employees will be very reluctant to recognize their mistakes and therefore the scope of the lessons that could be learnt is significantly limited.

Ideally, the norms and practices in a company should encourage its employees to boldly uncover their mistakes and use them as a source of learning so that the total number of times that the same mistake is made is minimal.

A topic which has been mentioned in some interviews conversations is the perceived approachability of managers and the ease for vertical interactions. Even though it is not a common feeling among all the employees, many of them do not feel at ease when having to



discuss certain topics with their managers. This kind of scenic fear in front of a manager have to be taken into account when deploying a knowledge management system and efforts must be made so that employees are not afraid of looking stupid when talking in front of managers.

The company culture must encourage open and frank exchanges between levels in the hierarchy in order to create a context for communication that boosts effective knowledge sharing.



5. Description of the Knowledge Management System to be implemented

5.1. State of the art and types of KM projects

5.1.1. What knowledge is and is not

Ikujiro Nonaka [4] illustrates a movement between two very different types of knowledge, “tacit” and “explicit.” Explicit knowledge is formal and systematic. For this reason, it can be easily communicated and shared, in product specifications or a scientific formula or a computer program. But the starting point of Tanaka’s innovation is another kind of knowledge that is not so easily expressible: “tacit” knowledge. Tacit knowledge is highly personal. It is hard to formalize and, therefore, difficult to communicate to others. Or, in the words of the philosopher Michael Polanyi, “*We can know more than we can tell.*” Tacit knowledge is also deeply rooted in action and in an individual’s commitment to a specific context – a craft or profession, a particular technology or product market, or the activities of a work group or team.

Tacit knowledge consists partly of technical skills – the kind of informal, hard-to-pin-down skills captured in the term “know-how.” A master craftsman after years of experience develops a wealth of expertise “at his fingertips.” But he is often unable to articulate the scientific or technical principles behind what he knows. At the same time, tacit knowledge has an important cognitive dimension. It consists of mental models, beliefs, and perspectives so ingrained that are taken for granted and therefore cannot easily be articulated. For this very reason, these implicit models profoundly shape how we perceive the world around us.

In order to think productively about the problems of managing knowledge, we need to distinguish between the concepts of data, information, and knowledge. There are several definitions of these terms in the literature, for instance David W. De Long and Liam Fahey give the following descriptions [1]:

“We view data as raw unabridged descriptions or observations about states of past, present, or future worlds, and information as patterns that individuals find in dat. Knowledge, on the other hand, is a product of human reflection and experience. Dependent on contest, knowledge is a resource that is always located in an individual or a collective, or embedded in a routine or process”.



Some researchers and consultants argue that knowledge cannot exist independent of humans, others instead believe that from the practical standpoint of management, knowledge is regularly created and embedded in routines, systems, and tools. The knowledge that is embedded in routines, systems, and tools and that requires minimal human intervention to perform an activity, is different from information, such as that found in books, manuals, and databases. These resources, no matter how highly analyzed, only become practical when individuals can apply their own experience and contextual understanding to interpret the details and implications for actions.

5.1.2. Types of Knowledge Management projects and key to their success

Thomas H. Davenport, David W. De Long and Michael C. Beers have analysed the most frequent types of knowledge management projects in their article: “*Successful knowledge management projects*” [5]. They have concluded that there are basically four types of knowledge management projects:

- **Create knowledge repositories:** A lot of energy in KM has been spent on treating knowledge as an “it”- an entity separate from the people who create and use it. The typical goal is to take documents with knowledge embedded in them – memos, reports, presentations, articles – and store them in a repository where they can be retrieved easily.
- **Improve Knowledge Access:** Many projects focus on providing access to knowledge or facilitating its transfer among individuals. These projects recognize that finding the person with the knowledge one needs and then successfully transferring it from that person to another are difficult processes.
- **Enhance Knowledge Environment:** A third type of knowledge management project involves establishing an environment conducive to more effective knowledge creation, transfer, and use. There are projects that try to build awareness and cultural receptivity to knowledge, initiatives attempting to change behaviour relating to knowledge, and attempts to improve the knowledge management process.
- **Manage Knowledge as an asset:** A fourth type of project focuses on managing knowledge as an asset. One way an organisation does this is by treating knowledge like any other asset on its balance sheet. Skandia, the large Swedish financial services company, internally audits its intellectual capital every year for inclusion in its annual report to stockholders. One goal is to persuade investors of the value of Skandia’s knowledge capital. Another is to focus the organization on how to increase or decrease its effective use of knowledge assets over time.



The four categories of objectives that have been described are “ideal” types. Of course, in real life, ideals rarely exist. Almost all projects have, in addition to the primary objective, aspects of the other objectives. While it is too early to tell, it is expected that KM initiatives along multiple fronts will be more effective than those that seek only one objective.

The same authors have created a list of key factors that make a knowledge management project successful. Successful knowledge management projects often have the following characteristics:

- **Link to economic performance or industry value:** Benefit calculations may be direct (money earned/saved) or indirect, perhaps through improvements in measures like cycle time, customer satisfaction, etc. KM can be very expensive so of course it gets support in a firm when it is somehow linked to economic benefit or competitive advantage.
- **Technical and organizational infrastructure:** Knowledge projects are more likely to succeed when they use the broader infrastructure of both technology and organization. Of the two, technological infrastructure is more accessible. It consists partially of technologies that are knowledge oriented. If these tools and the skills to use them are already in place, an initiative will find it easier to get off the ground. New roles and structures are expensive, but they mean that any new project can get support from them and get up and running quickly.
- **Standard, flexible knowledge structure:** Finding the right balance in the knowledge structure is critical for many projects. Knowledge is fuzzy and closely linked to the people who hold it; its categories and meanings change frequently. If a repository has no structure, however, it is difficult to extract knowledge from.
- **Knowledge-friendly culture:** Being one of the most important factors for a project's success is one of the most difficult to create if it does not already exist. Organizational culture should have several components with regard to knowledge:
 - People have a positive orientation to knowledge – employees are intellectually curious, willing and free to explore, and executives encourage their knowledge creation and use.
 - People are not inhibited in sharing knowledge – they are not alienated or resentful of the company and don't fear that sharing knowledge will cost them their jobs.



- **Clear purpose and language:** Clear purpose and terminology is particularly important for knowledge management. The terms –“knowledge”, “information”, “organizational learning” – are subject to varied use and interpretation. Successful projects pay attention to this factor, often by excluding some issues and concepts from their charters. Some were careful to exclude the idea of “data”. Effective knowledge use implicitly means changing the way people think about knowledge, which almost always means changing the language they use.
- **Change in motivational practices:** Knowledge does not emerge from or flow easily across or functional boundaries. Therefore, the motivation to create, share, and use knowledge is an intangible critical success factor for virtually all KM projects. Finding new sources of motivation to increase participation in knowledge-sharing systems is a constant challenge. Motivational aids or incentives cannot be trivial, as some managers had learned. Motivational approaches to encourage more effective behaviour should be long-term and should tie in with the general evaluation and compensation structure.
- **Multiple channels for knowledge transfer:** Successful knowledge managers recognize that knowledge is transferred through multiple channels that reinforce one another. Successful knowledge projects usually address knowledge transfer through various channels, recognizing that each adds value in a different way and that their synergy enhances use. In this day of global communication systems, it is easy to devalue the need for face-to-face interaction. MIT researcher Thomas Allen has found in many studies that scientists and engineers exchange knowledge in direct proportion to their level of face-to-face contact.
- **Senior management support:** Strong support from executives is crucial for transformation-oriented knowledge projects. The types of support that were helpful included:
 - Sending messages that knowledge management organizational learning are critical to the company’s success.
 - Providing funding and other resources for infrastructure.
 - Clarifying what types of knowledge are most important to the company.



5.1.3. Cultural barriers to Knowledge Management initiatives

Knowledge and culture are inextricably linked in organizations. To evaluate how an organization's current culture influences the creation, sharing, and use of knowledge managers must first understand how culture actually influences knowledge-related behaviors.

In the article: "*Diagnosing cultural barriers to Knowledge Management*", David W. De Long and Liam Fahey give some guidelines on the patterns of interaction between culture and knowledge.

- **Culture shapes assumptions about which knowledge is important:** Culture and particularly subcultures heavily influence what is perceived as useful, important, or valid knowledge in an organization. Culture shapes what a group defines as relevant knowledge, and this will directly affect which knowledge a unit focuses on. Subcultures often lead their members to define important knowledge differently than other groups in the organization.
- **Culture mediates the relationship between levels of knowledge:** Culture embodies all the unspoken norms, or rules, about how knowledge is to be distributed between the organization and the individuals in it. It dictates what knowledge belongs to the organization and what knowledge remains in control of individuals or subunits. This is most evident when management tries to convince individuals to share the human knowledge they have.
- **Culture creates a context for social interaction:** Culture establishes the organizational context for social interaction. It represents the rules and practices that determine the environment within which people communicate. These cultural ground rules shape how people interact and have a major impact on knowledge creation sharing and use.
- **Culture shapes creation and adoption of new knowledge:** Knowledge ultimately assumes value when it affects decision making and is translated into action. A firm's culture heavily shapes how new knowledge about the external environment is created, legitimated (or rejected), and distributed throughout an organization. Organizations need to be able use new knowledge to change strategic direction.



5.2. Infineon's supply chain Knowledge Audit

The objective of this point is to try to draw a general conclusion on the current situation of knowledge management in Infineon's supply chain. The determination of the main problems that somehow derive from the way of managing knowledge used nowadays in Infineon's supply chain, will allow us to come up with a solution that solves the most relevant part of them.

Before addressing the method used to carry out the knowledge audit, it is necessary to explain what the "*Supply Chain Roadmap*" is. The "Supply Chain Roadmap" from now on just referred to as "Roadmap", is a task force responsible for all projects being carried out in the supply chain. It is constituted of around 25 supply chain managers included the Corporate Vice-President and Head of Infineon Corporate Supply Chain: Dr. Kurt Grubber.

The 25 members meet four times per year, once every quarter and that meeting is called the "*Supply Chain Roadmap Steering Committee*". In this meeting they talk about the status of the most important projects and they take decisions concerning the budget, timing, necessary resources, etc. Once a month there is a smaller meeting, with about 10 attendees where the current running projects are tracked down and necessary decisions are taken.

Most, not to say all the projects which are tracked down in the Roadmap are operational projects, so to say, problems that deal with actual operational problems of Infineon's SC such as reducing the lead-times, automating a warehouse, improving the production yield of a given factory, defining the optimal batch size, etc.

Now that we have introduced the Roadmap to the reader we can resume the knowledge audit and the way in which it has been carried out. A very typical way of conducting a knowledge audit and probably the best one is by means of interviews to employees.

Between January and March 2010 a survey in the whole supply chain was conducted to determine the most important problems that were affecting to it. After an extensive series of interviews, around 285 different problems were defined in many different fields.

The problems which were considered most critical – which happened to be all operational – were immediately tackled by the Roadmap. The Roadmap has been and still is trying to come up with solutions for those operational problems. But not only operational problems came to light in the survey and all those problems have not been tackled.

To determine the main problems that derive from the current way of managing knowledge the most suitable would be to conduct another survey – this time focusing on knowledge



management – all along the supply chain. This would allow us to have the freshest possible information. Given the size and geographic location of Infineon's SC (around 2000 employees literally spread all around the world) this option is not taken into consideration; it would take much too long and would divert us from our goal. Instead, the results of the interview which was conducted two years ago will be recovered and treated.

After some discussions with the director of the Supply Chain Innovations department, it is concluded that the fact that we will use an interview which was conducted two years ago will not affect the results of the conclusions drawn from it. That conclusion is due to the fact that in the last two years, no special measures have been taken to palliate the problems related to knowledge management that arose during the survey so most of knowledge management problems that Infineon faced two years ago will still be current.

Nevertheless, after having treated all the data gathered during the survey, all the conclusions will be shown to the concerned area responsible to check whether the results obtained and the conclusions drawn are correct.

Let us now see the procedure that has been followed to withdraw the appropriate information from the survey conducted two years ago.

5.2.1. Analysis of the information withdrawn in the survey

As it has been mentioned before, in total nearly 300 problems related to different fields of the supply chain arose from the survey that was conducted between January and March 2010. The first thing that has been done, has been carefully reading all the problems and making a first distinction between those problems who are somehow related to knowledge management and those who are not. Around 40 problems were estimated to be somehow related to knowledge management.

Once the knowledge-related problems separated from the rest, they have been carefully read a second time, to try to distinguish what kind of knowledge problem they are related to. After this second classification, six main different kinds of knowledge problems were distinguished.

The six main problems were: communication, know how or knowledge gap, training, improving information systems/tools, knowledge repository and process to follow not clear. Let us see how what each type of problem is.

Communication: The employees do not know with whom they have to communicate to obtain certain information or if they know it, there is not an established specific communication channel because the interaction between the two parts is not expected.



Some employees state that they have received different instructions from different departments within the supply chain resulting in a confusing situation. It should be clear what information has to be withdrawn from whom so that when the different inputs do not coincide, it is clear who has to be listened to.

Know how / Knowledge gap: There are certain competences that the company is missing. The method to perform a task or to perform it optimally is unknown.

Sometimes it is just due to a lack of communication, some information that should have been given by the client but that for some reason – maybe just an oversight – has not been provided and our employees have to make without that information. This kind of knowledge gap problem is not critical, a system has to be implemented so that when a client forgets to provide Infineon with certain information it is noticed on time and without any negative consequences for the supply chain.

Some other times it is because Infineon simply does not have the knowledge to carry out certain tasks. We do not know how to do it and therefore, it is either not done at all or it is badly done. This is more a serious issue because it results on a constant decrease of Infineon's supply chain performance.

The main problem here is how to motivate our employees to squeeze their brains and come up with new ideas and solutions that cover the knowledge gaps or the unsolved problems. Sometimes it does not necessarily has to be a new idea but something that has been used in another department or in the past and can now be recycled to face a current difficulty.

Training: The employees show a lack of necessary competences to carry out certain tasks. Those competencies are easily identified by managers and it is thought that the competences can be gained with a training in the field where the deficiency resides so it is clearly not a knowledge gap that the company has.

Some of those deficiencies are in areas where there has not been an especial attention given during the selection process of the employees and there have not been any trainings either, such as the use of some informatics tools like iShares or Excel. Those kinds of deficiencies are not critical because even though they can cause real problems in the normal development of the daily tasks, Infineon can easily provide its employees with a suitable training.

There have also been deficiencies detected in some more important things like some core competences of certain roles in the supply chain. A conclusion drawn from the series of interviews made in 2010 and confirmed now by the different department responsible people is that Infineon needs to improve the trainings in terms of quality and assiduity.



Concerning this topic, there is something that has to be taken into account. It is estimated that about 10% of Infineon's employees will retire in the next two years. The following will be therefore a very delicate moment for Infineon and its success will depend on the success of our ability to train the new employees.

Improving Information Systems/tools: Information which should be provided by the system is not always available or when available is sometimes incorrect. Different departments have different information. Sometimes information systems do not provide some necessary information to certain employees because they are not supposed to need it.

As problems related with information systems are already treated in the field of information systems and technologies, those problems will not be regarded as a priority in our study.

Knowledge repository: There is a strong need for a database where employees or even clients can look for certain information and with the warranty that all the information that can be found in that database is officially approved by Infineon.

Two main problems are identified here. On the one hand, clients very often need information regarding their orders and nearly harass Infineon employees with questions both by mail and telephone. That is really time consuming and prevents our employees from carrying out their normal daily tasks. A possible solution to that problem could be a knowledge repository for our clients with all the information they might need concerning their orders so that they can directly access the data by themselves without hindering the normal work of Infineon's employees.

On the other hand, very often employees miss an internal database whose contents are all approved by Infineon and where they can find official information regarding the different processes. Such a database would be especially useful for recently employed people or for people seeking official information outside their normal area or work.

Process to follow not clear: The path of action to be followed is not fully established. Different employees have different ways of carrying out a certain processes each one of them leading to a slightly different result, sometimes even the same. Employees do not come to an agreement on which one is the most suitable way of doing it.

This is somehow a sub-case of knowledge gap or know-how problems. Employees do not know which one is the optimal way to get to the result. A study should be carried out in those processes where the path of action is not clear to determine which one is the most suitable solution or solutions if there are several.

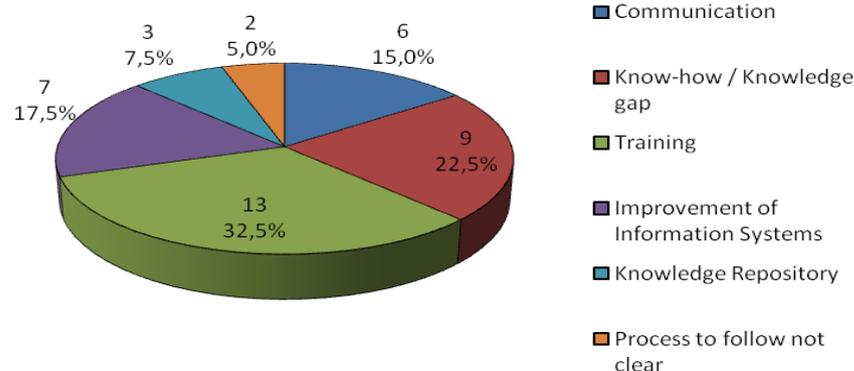


Now that we have had a look at the different problems related to knowledge management that are affecting Infineon's SC, let us see what kinds of problems are the most common and where our knowledge management system will have to focus on.

	Number of problems	Percentage
Communication	6	15,00%
Know-how / Knowledge gap	9	22,50%
Training	13	32,50%
Improvement of Information Systems	7	17,50%
Knowledge Repository	3	7,50%
Process to follow not clear	2	5,00%
Total	40	100%

Table 1: Number of problems and percentage of each type of knowledge management problem issued from the survey carried out between January and March 2010.

At a first glance it can be seen that the majority of problems (32'5%) is related to the trainings given to employees. The second biggest number (22'5%) is for problems regarding knowledge gaps or know-how and the third place (17'5%) is for problems dealing with information systems. As mentioned before, because "information systems" is an entire field of study on its own, we will disregard this kind of problem and focus on purely knowledge management problems. The next biggest number of problems (15%) is communication.



Graphic 1: Graphic representation of the classification of the type of knowledge management problems issued from the survey carried out between January and March 2010.

As it has been mentioned before, around one third of knowledge management problems seems to be related to the trainings given to employees. This indicates that we have to pay close attention to that issue, specially bearing in mind what has been mentioned before, the fact that about 10% of Infineon's employees are estimated to retire in the next two years. If we take as an assumption that this proportion is the same in all departments – which is very close to reality – we realize that about 200 employees working for the supply chain will retire and that about the same number will be hired in the next two years.



Now that we have seen the main problems related to knowledge management that affect Infineon's SC and where they stem from, let us see what is the most suitable knowledge management system and what changes has to implement the supply chain to overcome them. Further advice to steer the company in that direction will be given.

5.3. General description of the system to be implemented

Bearing in mind the different problems related to knowledge management that have arisen in the survey and the different interviews with the employees of Infineon's SC, the idea of this point is to give some tips on the general knowledge management system that has to be implemented in order to overcome the current difficulties that the supply chain is facing because of Knowledge management deficiencies. Rather than designing a whole new knowledge management system, the idea here is to try to build on the different initiatives that employees –especially those from the supply chain– have been trying to implement during the last few years.

The proposed knowledge management system will be basically built on three main initiatives that come from Infineon's SC employees and a fourth one that comes from the IT department. The general idea is to create a solid knowledge management system that allows the employees to access and share knowledge in different ways, each one of them complementing the rest but all of them equally valid so that different employees have different tools. This is really important because not everyone has the same attitude towards knowledge and knowledge sharing so the employees must feel free to choose the way of sharing and accessing knowledge that most suits them.

The three initiatives coming from the supply chain on which the proposed system will be based are: the "Supply Chain Academy", initiated in the *Supply Chain Innovations* department; the "Knowledge Repository" initiated by Geraldine Yachi and "iWiki", started by Adolph Rainer. Those three initiatives have been created and totally or partially implemented within Infineon's SC so it would be absurd not to make use of them. The fourth initiative on which our system will be built is Infineon's internal Social Network, it is called "iSpace" and it is something that is being implemented at the moment.

As we have been seeing along this work, there are many employees who are committed to the creation of new knowledge and to share the already existing one. The problem here is not that there have not been any initiatives, but rather that the different initiatives have not managed to change the general company culture towards knowledge and make people understand that knowledge sharing might be the key of the company's future success.



It is more a cultural change that is needed in Infineon's supply chain; it has to become natural for the different employees to share the knowledge they have without anyone controlling them or making sure they do it. The goal is that, in some years, when employees have a problem, the first thing they think of, is checking the different knowledge management tools available and once that difficulty overcome, they complete the information they have found so that it will be better and more useful for the next user.

The best knowledge management systems are those who work by themselves as something natural. Of course, at the beginning nothing of all this is natural to the different employees or at least to most of them. There has to be a change in the culture and this can only be done over time. In our knowledge management system we have to focus on the long run.

Looking at the three initiatives that different employees from the supply chain have been trying to implement and on which we are going to concentrate, it is easy to realize that although they can be very useful, it is not natural at all for the employees to integrate them in their daily working routine. For example, it is not natural for an employee to take extra time to write down what his work consists of and do it in a way that it is easily understood by others. This might be a key reason why the different initiatives have not attained more success.

Taking into consideration what has just been mentioned, it stands to reason that we need something different now, something that makes the employees get interested in knowledge and that little by little, without they really noticing it, changes their attitude towards knowledge creation and sharing. What is thought to be the ideal tool to achieve such a thing is Infineon's internal social network and that is the reason why it has been decided to use it as a foundation pillar of the new system to manage knowledge within Infineon's SC.

So the general idea is that, at the same time as the already known three initiatives are launched again into the supply chain to try to reach those employees who so far have not feel concerned by them, this fourth initiative will slowly but surely try to refurbish the company culture towards knowledge allowing the other three initiatives to be better accepted. It is as if we were preparing and fertilizing the earth so that when throwing the seeds it is ready to give them all they need to grow strong.

Now that the general idea has been explained, let us have a closer look at what each initiative will consist of.



5.3.1. The Supply Chain Academy and the training to the employees

As the results from the survey show, about one third of the problems related to knowledge management are somehow related to the training that the employees receive. This points at the fact that, even though huge efforts have been made to give proper trainings to the employees, there is still a lot of work to be done.

Infineon's SC is so big and there are so many different processes in it that very often the different employees know very well how the part of the SC where they work functions but completely ignore the rest of the processes that are carried out. Most of employees do not have a global vision and that is the main reason why the Supply Chain Academy (SCA) was created. The SCA is not responsible for all the trainings given to the employees working in the supply chain, it is just an initiative issued from one of its departments –Supply Chain Innovations – to give general supply chain notions to the different employees and allow them to have a general idea of all the processes comprised within Infineon's SC.

The proposed idea is to extend the scope of the SCA and take advantage of its infrastructure to attain other goals. The SCA has been now running for three and a half years so it has gathered quite a bit of experience on organizing and giving seminars for many people.

On a general basis, Infineon trains its new employees directly on the job, the so called iLearns allow the new employees to gain a general knowledge about the company and its supply chain but are not supposed to fully train a new employee and prepare it to take full responsibility of his job. This means that while a new employee is being trained, there is an "old" employee who is giving him the training and therefore who is not carrying out his normal daily tasks.

According to the assumption that we have made before, approximately 200 new employees will be hired within the next two years and they will have to be trained. A huge effort will have to be made so that the performance of the supply chain is not affected by the amount of people with little experience and the employees who will have to devote time to train them and make sure that they are autonomous as soon as possible. It will obviously be a very delicate moment and its success will rely on Infineon's capacity to successfully train new people.

What is proposed here is that Infineon's SC makes use of the experienced gathered by the SCA and of the current situation to create a proper academy that gives intensive supply chain training to the newcomers. The SCA could organize trainings to all the newcomers on all the general knowledge that all the employees of the supply chain must have regardless of the specific department they will work on. The entry date of the new employees could be



set in a way that they enter the company in groups of ten or fifteen and all at the same time they receive a training given by the SCA. In this way, we could save the time of all the people already work for the company and who would otherwise teach them on one to one.

Given the big amount of people who is expected to be hired within the supply chain it should not be very difficult to organize them so that they enter in groups at certain periods of the year. For example, if they entered in groups of 10, a group would have to enter the company every month except for July and August. That makes exactly ten entries of ten people per year and in two years we will have the 200 new employees already on board and in theory, fully trained to carry out their tasks.

In the survey as well as in different encounters with employees, many of them have manifested a lack of competencies needed to be able to use some of the available informatic tools, like iShares, Microsoft Excel or other. It would be wise to create also trainings on that field and make sure that employees have overcome that knowledge gap.

Besides, the situation that the supply chain department will have to face during the next couple of years is the perfect opportunity to try to instil the appropriate culture towards knowledge into the new employees. We have to make sure that all new employees make notice of the efforts that Infineon – especially Infineon’s SC – is making regarding knowledge creation and sharing. From day one, it has to be clear to them that knowledge is really an asset and a key one.

There are a series of patterns and attitudes that encourage knowledge sharing and use. The goal has to be that at the end of the training, the new employees have assimilated them and they instinctively link them to Infineon’s culture. Some of those patterns are:

- Sensitive topics: Anything has to be discussible, that’s a norm that builds the trust necessary to support vertical knowledge sharing.
- Approachability: Norms and practices that make executives accessible and approachable also help create a context for effective knowledge sharing. Cultures with norms and practices that discourage open and frank exchanges between levels in the hierarchy create a context for communication that undermines effective knowledge sharing.
- Interactivity. Norms and practices must support higher and higher levels of interactivity between the right individuals.
- Collaboration. A sense of collective responsibility leads employees to go to great lengths to avoid letting colleagues down, even though it burdens their own work.



When norms and practices promote collaboration between functions and operating units, interactions are more likely to lead to creating and sharing new knowledge.

- Reusing existing knowledge. Cultures that primarily reward individual creativity and innovation produce different patterns of interaction around knowledge than cultures where uncovering and leveraging existing expertise is the norm.
- Sharing and teaching. Cultures that explicitly favor knowledge sharing over knowledge acquisition will create a context for interaction that is more favorable to leveraging knowledge.
- Dealing with mistakes. The way an organization reacts to mistakes shapes the context for social interaction. . If a company tries to build a lessons-learned database but the employees are reluctant to admit their mistakes, the scope of the lesson that could be captured is significantly limited. Norms and practices may dictate that mistakes be uncovered and used as a source of learning.

5.3.2. Knowledge Repository

One of the most common knowledge management projects in companies is creating a knowledge repository. Professionals involved in suchlike projects strive to treat knowledge as an “it”, an entity independent from the people who create and makes use of it. The typical goal is to take documents with knowledge embedded in them – articles, reports, memos, presentations, etc. – and store them in a repository so that they can be easily accessed when needed.

As we have already commented in several occasions, the initiative of creating a global knowledge repository for the whole supply chain around the world comes from the Supply Chain Innovations department and its implementation has been started by one of its employees, Geraldine Yachi. It has also been mentioned that at the moment the repository is not known by the supply chain employees around the world, it is a very young initiative and at the moment it is only known by some of the employees working in the headquarters, in Munich.

A big problem that has been identified is that at the moment there are no employees who are working on the repository as their main task, time is only devoted to it when the different employees who are pushing forward the initiative are done with their main task and have some “free time”. Moreover, there is not a formal structure within the organization, a hierarchy, there is no one whose only job is to make this initiative a reality and as many authors in the literature state, without a formal knowledge structure hierarchy the chances of success of a knowledge management project are very scarce.



Rather than concentrating on the structure of the knowledge repository itself we will focus on giving it the support from the organization that it needs to become the reference knowledge management tool within Infineon supply chain all around the world. This is a very ambitious goal but with the necessary resources, a feasible one.

The problem from which this initiative stems from is that, given the size and geographic distribution of Infineon's SC, there are situations where the same function or department in two different countries have considerably different ways to carry out their duties and sometimes even different levels of responsibility. Up to now, there is no general global consensus on which is the most optimal way to perform a certain task and therefore, each department has its own method naturally developed with time.

The ultimate goal of creating a knowledge repository is to bring this situation to an end and create a standard that there will have to be followed by everyone in the future. All the information regarding the different processes within the supply chain will be found on this global knowledge repository and there will be no doubt about the path of action. All documents stored in the repository will have Infineon's approval stamp.

But professionals who have worked on this kind of projects know that it is far easier to write about it than to actually make it come true. When people are too set in their ways it is not so easy to change their work routines and even less if they have to follow the instructions dictated in a document from a knowledge database created in the headquarters of the company, which are on the other end of the globe.

The first step is to determine what is considered to be the most optimal way to carry out the tasks of processes of a certain department. For that, it is advised to compare against the different paths of action from the different countries and come up with a solution. Of course, this solution can be the method used in one of the countries because it has been proved to be the most efficient or a mixture of several methods taking on the best of every one.

Once the path of action has been established, someone has to be responsible for writing down all the different steps in a way that it is understandable by the professionals who will potentially address the document. Ideally, the person responsible for the writing will be a professional who works in the exact department or area to which the document is addressed. After the writing of the document finished it will have to be revised and corrected by a group of qualified employees and finally it will be given Infineon's official approval stamp and it will be uploaded into the knowledge repository.

One of the first things that quickly springs to people's mind when talking about creating a knowledge repository is the tool on which the initiative is going to be supported. As it has been mentioned before on this work, the informatic tool that has been decided to use to



support our knowledge repository is “iShare”. An iShare is an intelligent platform within the Infineon Intranet, where users have the possibility to collect their personalized relevant information on one page, to organize, share and browse them.

Besides the fact that iShares are widely used in the company and employees are already familiar with them, this method is thought to be a very suitable one because of the many possibilities that it offers. An iShare is like a folder on the internet, where people can store documents or data. As it is a folder on the internet and not in your computer, you cannot access it if you have not been invited to it. Only the administrator of the folder can give the rights to whom he estimates appropriate. They can be read-only rights, edit rights or owner rights.

- Read-only rights: Users who are given read-only rights, can only access the folder (iShare) and browse all the documents in it but cannot modify them or add any other document. In other words, they cannot contribute to the enrichment of the knowledge contained in the folder.
- Edit rights: Users who are given edit rights can contribute to the expansion of the knowledge contained in the documents either by correcting them or by adding new documents.
- Owner rights: Users who have owner rights have the possibility to add or modify documents and besides that, they can give or withdraw rights to or from people. They decide the degree to which people can contribute in the folder.

This is very suitable for a knowledge repository which is meant to be used by many people from different countries because if we want to have the repository under control some rules are needed. We need to give the repository a structure, not anyone has to be able to change or add things whenever he or she estimates it necessary.

The idea is that everyone working in the supply chain has access to the knowledge repository, from the workers on the different production lines or the truck drivers to the head of supply chain. Everyone will have read access to be able to clarify any doubt he/she might have or to be able check whether his/her working routines are in accordance with Infineon's standards.

Then there will be a series of people that will not only have read access but also edit access, they will be responsible for a certain area of knowledge in their country or business unit. We will refer to that position in the knowledge repository hierarchy as the business unit Knowledge (repository) coordinator. When the amount of employees in a certain business unit or country is big enough there can be several business unit coordinators with edit rights,



one per knowledge area for example. In this case they will be business unit Knowledge (repository) area coordinator.

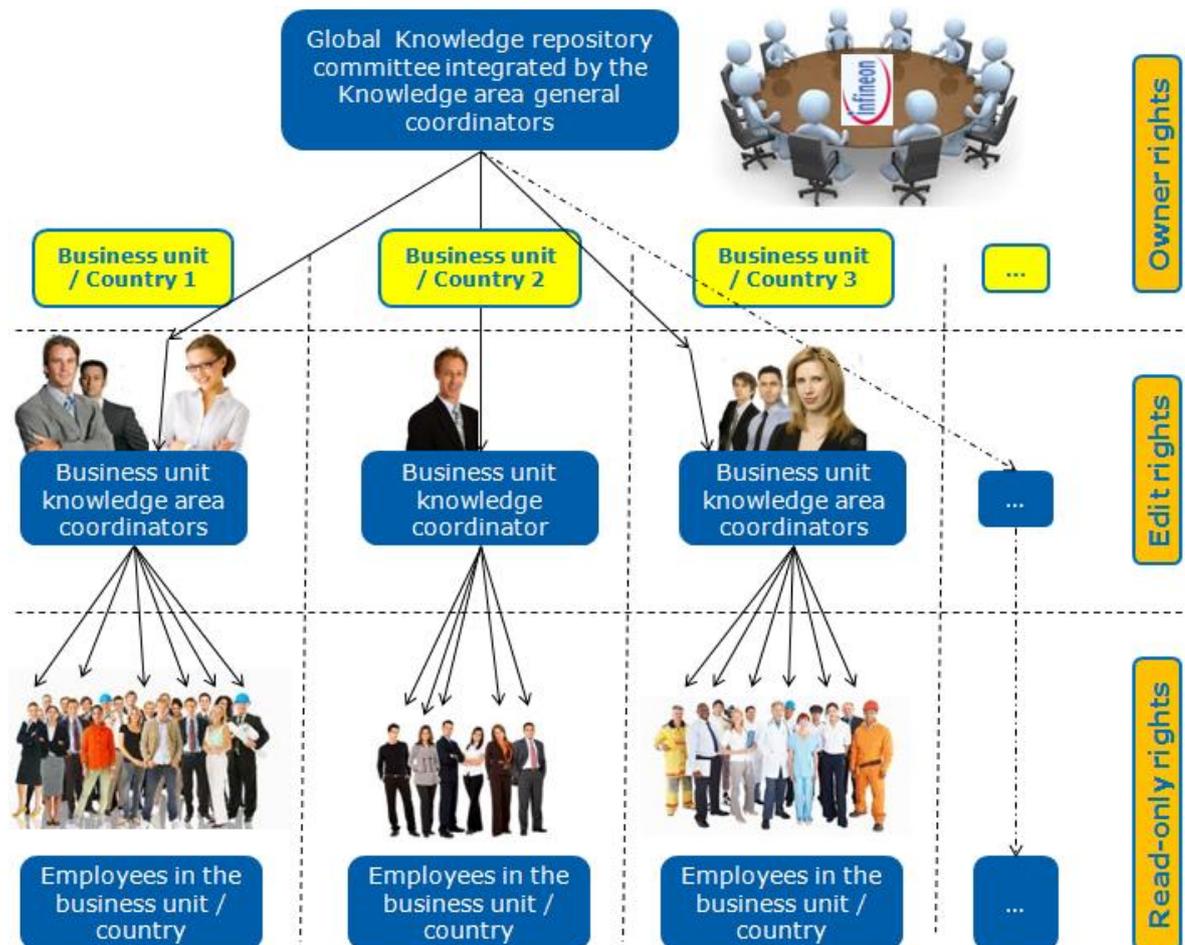


Figure 12: Knowledge repository hierarchy structure within Infineon's SC organization.

Figure 12 depicts a simplified schema of the knowledge structure organization that is being proposed. It represents three different countries or business units with its employees and its business unit knowledge coordinators. The first column represents a relatively big business unit and therefore there will be several business unit knowledge coordinators, one per area of knowledge. The second column represents a considerably smaller business unit and therefore there is only one business unit knowledge coordinator and he is responsible for all knowledge areas.

When a business unit knowledge coordinator finds a document which is not complete or missing or there is an employee who lets him/her know about an improvement, he/she will notify the general knowledge area coordinator and send him/her the potential improvement of the current document which will have been done either by him or by the employee who let him/her know about the deficiency. The document will be then reviewed by the knowledge area general coordinator and, if approved, it will be uploaded on the knowledge repository.



The general knowledge area coordinators will be employees with a great deal of experience and a deep knowledge in their assigned knowledge area. Besides, they must have an overall idea of the supply chain and know how all the processes that are under his responsibility are carried out. They will be responsible for all the documents in the knowledge repository that are under their area of expertise and will be the ones responsible to determine whether the documents with potential improvements that the different business unit knowledge coordinators will send them are actually an improvement or not.

The general knowledge area coordinators will have owner rights in the knowledge repository iShare and therefore, they will control who the business unit coordinators are in every country or business unit; they will be the ones granting them edit rights.

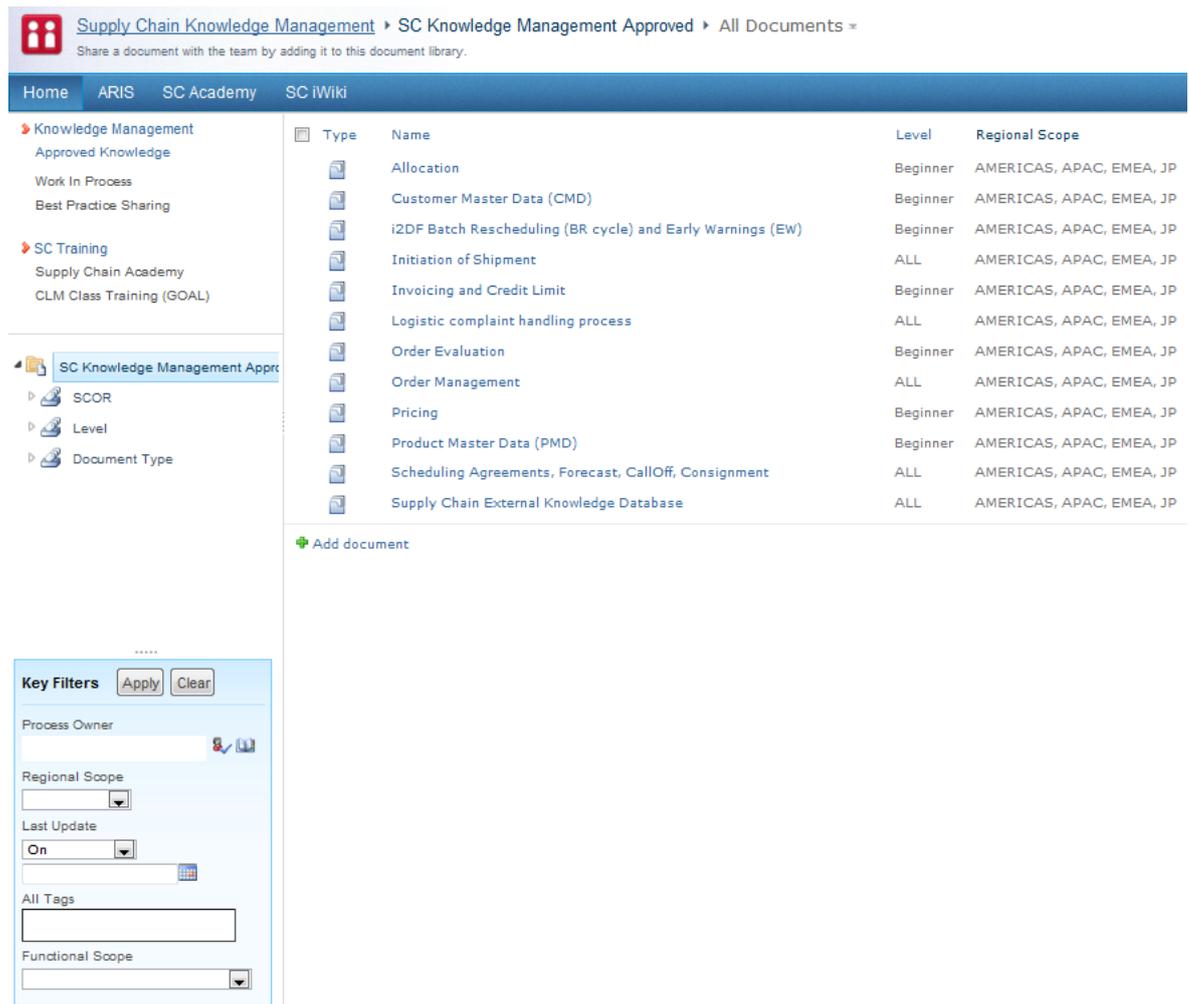
This structure might look a bit too rigid, but it is needed to keep control of the knowledge that the repository will contain and to make sure that everything that is on the repository has Infineon's approval stamp on it.

Besides the structure regarding the rights to access the iShare, the knowledge repository will have an internal structure to ensure that all the documents can be easily found and retrieved. Concerning that aspect, the structure that the current knowledge repository has, is thought to be adequate and therefore it will be the model followed. It consists of two main folders:

- **Approved Knowledge:** It has all the documents which have already been reviewed and approved by the general knowledge area coordinator.
- **Work in Progress:** It is not possible to upload all the documents at the same time; it takes time to verify that a document is ready to officially receive Infineon's approval. For the time being, the documents will be stored in this folder so that, if necessary, employees can have look at them, always under their responsibility and being aware that those documents have not yet obtained Infineon's approval.

Inside each one of these two folders, the documents will be organized per supply chain topic so that it is easier to find documents. The structure will be from general to more specific and besides the folders structure, there will be a search engine allowing the search to be more quick and efficient. In picture thirteen it can be seen how the current knowledge repository looks like. A view of the supply chain approved knowledge can be seen and of the different folders containing documents such as Allocation, customer master data (CMD), Product Master Data (PMD), etc.





The screenshot displays the 'Supply Chain Knowledge Management' interface. At the top, there is a navigation bar with 'Home', 'ARIS', 'SC Academy', and 'SC iWiki'. Below this, a breadcrumb trail shows 'Supply Chain Knowledge Management > SC Knowledge Management Approved > All Documents'. A sidebar on the left contains a tree view of the knowledge repository structure, including 'Knowledge Management', 'SC Training', and 'SC Knowledge Management Approved' (which is expanded to show 'SCOR', 'Level', and 'Document Type').

The main content area features a table of documents with the following columns: Type, Name, Level, and Regional Scope. The table lists various documents such as 'Allocation', 'Customer Master Data (CMD)', and 'Supply Chain External Knowledge Database'. Below the table is an 'Add document' button.

At the bottom left, there is a 'Key Filters' panel with the following fields:

- Process Owner: [Text input]
- Regional Scope: [Dropdown menu]
- Last Update: [Dropdown menu set to 'On']
- All Tags: [Text input]
- Functional Scope: [Dropdown menu]

 The panel includes 'Apply' and 'Clear' buttons.

Type	Name	Level	Regional Scope
	Allocation	Beginner	AMERICAS, APAC, EMEA, JP
	Customer Master Data (CMD)	Beginner	AMERICAS, APAC, EMEA, JP
	i2DF Batch Rescheduling (BR cycle) and Early Warnings (EW)	Beginner	AMERICAS, APAC, EMEA, JP
	Initiation of Shipment	ALL	AMERICAS, APAC, EMEA, JP
	Invoicing and Credit Limit	Beginner	AMERICAS, APAC, EMEA, JP
	Logistic complaint handling process	ALL	AMERICAS, APAC, EMEA, JP
	Order Evaluation	Beginner	AMERICAS, APAC, EMEA, JP
	Order Management	ALL	AMERICAS, APAC, EMEA, JP
	Pricing	Beginner	AMERICAS, APAC, EMEA, JP
	Product Master Data (PMD)	Beginner	AMERICAS, APAC, EMEA, JP
	Scheduling Agreements, Forecast, CallOff, Consignment	ALL	AMERICAS, APAC, EMEA, JP
	Supply Chain External Knowledge Database	ALL	AMERICAS, APAC, EMEA, JP

Figure 13: View of the current structure of the Supply Chain Knowledge Repository.

Finally, there is the knowledge that resides in the minds of the people in the organization but has not been put in a structured, document-based form – commonly referred to as “tacit” (versus explicit) knowledge. It is hard to transfer tacit knowledge from individuals to a repository and organizations usually use some sort of community-based electronic discussion. In our case, for that purpose we will use the two initiatives that we still have to take about: “iWiki” and Infineon’s internal Social Network: “iSpace”.

5.3.3. iWiki

As it has already been mentioned before, iWiki is the creation of an employee who works in the supply chain department: Adolph Rainer. It was started in 2007 under the name of “Infinipedia” and in 2009 there was a change in the tool that supported it, giving birth to the new “iWiki”.

The reason why the change of tool was decided in 2009 was that people needed to be able to write in HTML to create an article in “Infinipedia” and this was hindering its expansion



throughout the company. With the new tool, any employee can edit an article on Microsoft® Word and then upload it on “iWiki”. This facilitates considerably the task and has proven its efficiency, only in the first year of iWiki, the number of new articles created outnumbered the quantity of articles that had been created with “Infinipedia” during almost three years (from 2007 to 2009).

In general, when hearing about iWiki, the different employees seem to be very interested but then they are slightly reluctant to explicitly take part in the initiative by creating or correcting an article. This is often like this at the beginning but it has been observed that, often, once a user has contributed to the expansion of knowledge on iWiki through creating or correcting an article, it is then much easier for him or her to do it again.

What do people use right now to get the information they need? Most of them learn from their colleagues, word of mouth is the most successfully used method but when it does not work, almost all employees recognize that they resort to iWiki to try to find the information they are missing. This proves that iWiki is already a tool which is present in the minds of the employees and when they use it, they are, more often than not, satisfied. At the moment there are around 4500 articles in English. It is an impressive number of articles taking into account the size of the company and the age of the initiative.

Their main problem with iWiki then, is not that people do not use it, but that people feel reluctant to contribute by creating new articles or correcting the existing ones. That is the hurdle over which iWiki has to jump to be successful. But, how can Infineon encourage its employees to edit articles on iWiki?

Firstly, giving example, researchers state that it is always advisable that the upper parts of the hierarchy set an example on what employees should do. It might sound a little bit weird but the recommendation is clear; the higher positions of the hierarchy should also create some articles of general interest in iWiki. Afterwards there could be some emails inviting the employees to have a look at the articles and why not, to improve them.

At the end of the year all employees have their performance evaluation in nearly all companies. Something that would be advisable to do, would be to include the contributions of the employees on iWiki as a criterion to be taken into account in their end-of-year performance evaluation. There are many successful companies (such as MacKinsey) that use this method and the results they have obtained are quite encouraging.

5.3.4. Infineon’s internal Social Network

Finally, the last initiative that is proposed and the one that is considered to be the most important, is the utilization of Infineon’s internal social network to try to refurbish the



company culture towards knowledge, especially within the supply chain. Infineon's internal social network is called "iSpace", and at the moment the company is in the process of implementing it.

Infineon's IT department is working on the development of this tool which is almost ready to be officially presented in the company as our internal social network. At the moment, only a few employees have access to it so that they can already try it and help the IT department to improve it. Infineon's social network will be officially presented at the end of June 2012.

From 2005 onwards, social network technologies or social network systems (SNS) have widely spread all around the world and have been adopted by internet users with a speed never seen before for information technologies. In April 2010, the French journal "Les Echos" stated that 100% of American university students had an account on "Facebook".

This kind of technologies have also accompanied certain social and political changes in some emerging and developing countries; the role they played, for example, in the so called "Arab Spring", was of paramount importance. This phenomenon is strongly linked with the fact that it is everyday easier and cheaper to access the internet from wherever you are with gadgets such as smart-phones or tablets.

These technologies are making his way into the professional world with professionally oriented social networks such as "LinkedIn" or "Xing", but on a general basis, companies are still reluctant to implement suchlike technologies in their organizations. It is the first time that a technology is widely used by individuals on the first place before it is actually implemented in the professional world. Having a look at the precedent technology disruptions (telephone, fax, internet, etc.) it is clearly observed that they were firstly used on a general basis by companies and only after were they adopted by individuals for their daily use. This phenomenon has been exactly the opposite with web 2.0 technologies, particularly with social networking technologies; companies are now trying to see how they can best use them to improve their work environment.

For companies like Infineon Technologies, who look for innovation and are in the business of modern technologies, it is very important to question themselves about how to keep up to date with modernization not only with their products but also internally, with the tools they offer their employees to build the work environment.

These tools identify the relationships between individuals allowing them to interact and exchange information in an informal context. Due to their capacity to facilitate cross functional collaboration and to improve informal communication between users, everyday more and more companies are interested in such instruments.



Why is it that makes companies so interested in implementing such systems? The implementation of professional networking systems counts many advantages, the most important ones are:

- Finding an expert: In big companies, with thousands of employees often spread all over the world it is most of times not easy to hit on the person you are looking for. Many employees invest a lot of time to find knowledge that others employees in the company already have. Social networks can make this task much easier.
- Staying up-to-date: These platforms can be the means to keep track of what is going on in the company. Just devoting some minutes two or three days per week employees can be informed in a more informal and friendly way.
- Avoid re-inventing the wheel / find or share best practice: The sum of the knowledge that every employee has is superior to the the knowledge that the company has as a whole. Very often, when an employee is confronted with a problem; another employee from the company has already been confronted with the same problem and solved it. If instead of spending his time in solving that problem he had a means to get in contact with the person who already solved the problem before and get the solution from him, he would save a considerable amount of time.
- Putting in contact people with similar interests: These tools allow employees to create communities of interest. This allows them to get to know peers from other departments or countries, setting the basis for a very fruitful relationship from a professional point of view.

There are some of examples of companies that have already developed and implemented this kind of social network technologies in their organisations: one example is the “*Foundation Bruno Kessler*” which is a community of researchers whose internal social network is called “*Taolin Platform*”. Another example is IBM (consulting) whose internal social network is called “*Bee hive*” with around 30000 employees having created a profile in it. It has to be mentioned that the adherence rate is more related to the size of the company than to the success of the network.





Figure 14: Snapshot showing how IBM's social network, "bee hive", looks like.

Different authors state however that these tools are also likely to highlight the informal structure of the organization and make visible what was hidden before and therefore these tools may have significant social and political impacts within the organization and lead actors to re-negotiate their social positions in the organization [6].

The cultural changes that some of these technologies bring about and the way they affect individuals are factors that have to be taken into account. A project whose goal is to implement this kind of technology in an organization has to go hand in hand with a reflection on how to manage the change. In a professional environment where there is a hierarchy and it must be respected or where certain employees play a prominent role in the diffusion of information, the users have to adopt a very different attitude from the one they have when they interact with their friends through a social network.

There are also jurisdictional issues that might show up concerning the publication of certain information or the employer's legislation. Some even more complicated issues might appear if the company evolves in an international context, with laws that can vary across borders and that is exactly the case of Infineon Technologies AG.



As it has been mentioned before, the development and implementation of an internal social network in Infineon is something the company is already working on, it is called iSpace and it will be available to all Infineon employees around the world from June 2012 onwards. So the goal of our initiative will not be to create a social network but to make sure that now that it is going to be implemented, it is used to foster a knowledge sharing and creating environment.

As mentioned before, the main problem that has been observed during this work has not been the lack of initiatives related to knowledge management but rather the company culture that somehow has proved not to be ready to make those initiatives grow and reach their maximum potential. Our goal will be that the change needed in Infineon's employees culture towards knowledge is made possible through iSpace.

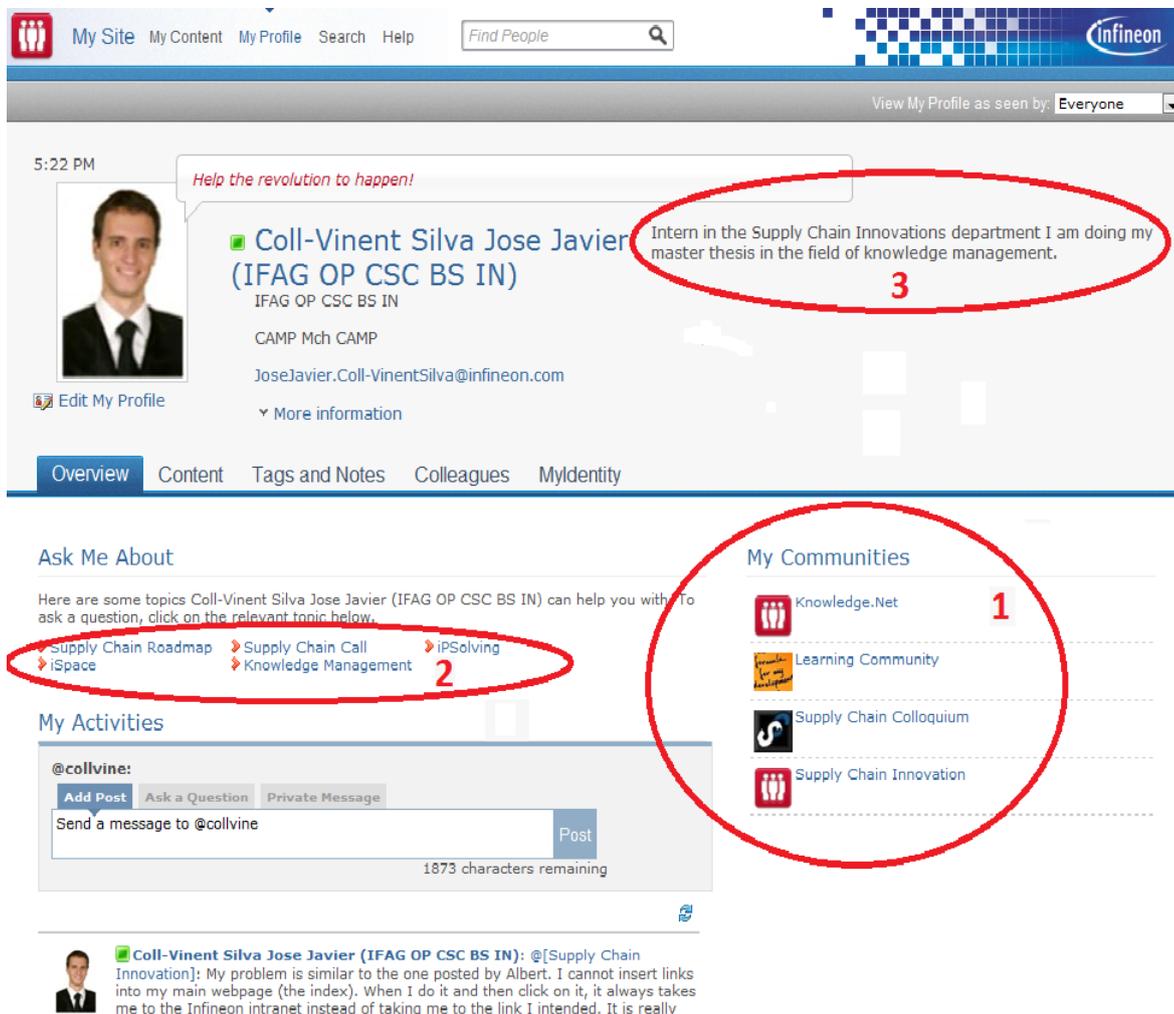


Figure 15: Snapshot of how the profile of an employee on iSpace looks like and of the different features that the tool offers to its users.

Figure 15 shows how the profile of a user of iSpace looks like. On the top part of the image it can be seen a picture of the user, his name, department and location (MUC/04.4.105-22



Mch CAMP), this means that he is in Munich, in the fourth floor of building number four. Infineon's facilities in Munich are the headquarters and they are called Campeon, that is why we can see the initials CAMP just right from the location of the user.

On the top right part, surrounded by a red circle and signalled with number three, it is found a sentence written by the user letting everybody know what his status in the company is and on what he is working at the moment, in this case, it is an intern in the "Supply Chain Innovations" department and he is working on his master thesis on the topic of knowledge management.

Just beneath the main personal details of the user, we find the "Ask me about" part of the profile, also surrounded by a red circle and signalled with a number two. Here the different users can let know the rest of the community the areas they have an expertise in. This makes much easier the search for experts on a given topic; in case that someone has a problem for example with Customer Order Management he can just type in the key words and he or she will automatically get a list of the employees who have an expertise in that area. He will see the location of the different people and their contact details, the person he is looking for can be in the other end of the world or just a couple of tables away.

On the same level but on the right part we see "My communities", also surrounded by a red circle and signalled with the number one. Here we can see the different communities the user is a member of. The different communities are like virtual collaboration rooms for like-minded people / colleagues that share a common interest / topic. This is a very interesting feature because it allows likeminded people to get to know each other, setting the basis for a very interesting and potentially fruitful relationship from a professional point of view.

Anyone can create a community if he/she estimates it necessary, after having sent a proposal to the iSpace coordinators, they will review it and if the proposal is approved then the community will be automatically created and start operating.

Finally, on the bottom part of the profile we can see the "My activities" section. Here we see all the comments, questions or ideas that the user has posted and the reaction that he/she has from the iSpace community by means of other comments or by clicking on the "I like" button that appears every time that a user posts a comment.

A feature of iSpace we have not yet talked about is the so-called "Wall". It is called "The Wall" because it literally represents a virtual wall where the user can see all the updates of his direct contacts such as if they have joined a new community or if they have set contact with another person and at the same time, the wall shows the user the comments posted by his contacts or by the people who belong to the same communities as him/her. In figure 16 we can see how the wall of iSpace looks like.



The screenshot shows the main interface of iSpace, Infineon's internal social network. At the top, there is a navigation bar with links for 'My Site', 'My Content', 'My Profile', 'Search', and 'Help', along with a search bar labeled 'Find People'. The main content area is titled 'Activity Stream - This post is public (for all Infineon employees)'. It features a post creation box with the text 'What are you working on?' and a 'Post' button. Below this is a newsfeed with several posts from users like Lang HP, Hoensch Helmut, Yachi Geraldine, Werner Robert, and Coll-Vinent Silva Jose Javier. On the right side, there are sections for 'Quick Links' (Report misuse, Request for contact, etc.), 'Getting Started' (Add Profile Picture), 'Communities' (View All Communities, My Communities), and 'Recently Active' (Nora Ricardo, Gross Andreas).

Figure 16: Screenshot of iSpace: Infineon's internal social network. The image shows the main page, it is the equivalent to "the wall" on Facebook.

Now that we have presented the tool, we can start talking about the initiative with which we expect to refurbish Infineon's culture towards knowledge. It is an initiative that has not been invented in Infineon; it comes from an innovation fest that was organized in November 2011 in Germany. Hans Ehm director of the Supply Chain Innovations department was in that innovation fest and had the opportunity to listen the idea from the company that had developed and implemented it for the first time. Let us see on what this idea consists.



6. Implementation of iPSolving in Infineon's Social Network: iSpace

6.1. What does iPSolving consist on?

The name that has been given to the initiative is “iPSolving” is and it comes from: “*I like Problem Solving*”. The ultimate goal of iPSolving is to encourage users both to create new knowledge and to share the already existing one. And how is it supposed to accomplish that mission? Let us explain how it works but first there are some explanations that have to be made.

As commented before, once someone has posted a comment, iSpace gives the users the possibility to manifest their support to that problem by clicking the “I like” button that automatically appears beneath a comment once it has been posted.



Figure 17: Feature that iSpace offers to its users of giving support to a comment by “liking” it.

And when someone clicks on the button, the person who originally posted the comment gets a notification and everyone else can see it on the wall.



Figure 18: Once someone has “liked” a comment everyone else from his/her contacts can see it.

Let us now see the key points of the initiative: Every employee will have access to iSpace and will have a profile created on the platform with a picture and some professional information of interest for his/her colleagues. Inside iSpace there will be a special feature for iPSolving where the users will interact; it will be a sort of wall only for posting problems.

Every employee will have an annual budget of points to vote for problems he or she feels identified with, for example 50 points/year. Every time that an employee formalizes his support by clicking on the “I like” button beneath a problem, he will be giving a fraction of his annual budget to that problem, for example 3 points.

If all the employees of Infineon's SC around the world proceed in the same way it will very quickly become clear what problems are the ones that affect most people and therefore the



most important ones. The problems many people identify with, will very rapidly raise in value and by reaching a considerable amount of money they will at the same time make more people interested in them creating a sort of snowball effect.

The most important part comes here, once an employee manages to come up with a solution for a problem, he will get 85% of the value of the problem he has just solved and 15% left will be for the employee who originally posted the problem even though he did not have a clue how to solve it. From now on, we will refer to the employee who originally posted the problem as the “problem poster” or simply the “poster” and to the employee who solved it as the “problem solver” or simply the “solver”.

The idea is that at the end of the year all the points that will have been obtained either by posting a problem that has been afterwards solved or by solving problems will be exchanged by a check worth the amount of points. So to say that if at the end of the year an employee has obtained 70 points by posting problems that have been afterwards solved and 210 by solving problems, he will get a 280€ check.



Figure 19: Logo of iPSolving.

This last reward that will be given to the problem poster, tries to compensate for the fear to recognize a problem that most of employees have. Normally, employees are reluctant to admit they are not able to solve something and even more to do it on a professional social network where dozens when not hundreds of their colleagues or bosses will see it.

On the other hand, the reward that goes to the employee who manages to solve the problem – 85% of the value of the problem – pretends to be an incentive for people to spend some time trying to solve a problem that affects a colleague and the whole supply chain.

The main goal of iPSolving is to make people aware of the great amount of problems that Infineon’s global supply chain has to face on a daily basis and of the huge impact that the mere fact of sharing one’s own knowledge can have on the resolution of those problems and therefore on the overall performance of the supply chain. Many of the problems that the employees of the supply chain encounter stem from silly mistakes that other employees have committed in other departments and could have been avoided. iPSolving can be the way of making people aware of the impact of their slips can have on the work of others.



At the same time, if there is a structural problem that affects a lot of people, it will very rapidly stand out because its value will mount. This will give managers the opportunity to reconsider the way in which that part of the supply chain is structured and in some cases it can even be an employee that comes up with an idea of how to overcome that structural problem.

Although iPSolving's main purpose is not to solve particular problems that employees might have in their daily routines such as problems with Microsoft Excel or similar, it can also be used for that. An employee who is for example creating an Excel macro in Visual Basic and that is stuck could explain the problem that he or she is having and see if someone can solve it.

The idea is to create iPSolving communities with different problem areas, for example there could be a community for each one of the main supply chain activities: production planning, demand forecasting, order management, production, logistics, stock management, etc. But also for some of the tools that the employees are using in their routines such as Microsoft Excel, Power Point, Access, iShares, etc.

So if an employee has a problem with an Excel sheet, he will go to the Microsoft Excel iPSolving community and will post his or her problem on the wall of the community. And on the other hand, if an employee is an expert, for instance, in Microsoft Power Point, he or she can go to the wall of the respective community and have a look at the different posted problems and try to solve them.

Normally, all employees have a considerable workload and none of them would devote his time to browse and try to solve the problems that some other employees somewhere in the planet have. Of course, there are people with a strong sense of community and sympathy that would do it in exchange of nothing but that is not the majority of people. That is why it is important to reward the employees when they take extra time to help the others.

6.1.1. iPSolving's structure and formal way of proceeding

Like in any other formal initiative that the company implements, iPSolving will also need a structure to make sure that everything works accordingly.

There will be a series of employees that can be from the IT department or, if not, that will have to work very closely with it and whose responsibility will be to make sure that everything works smoothly. Once there is a posted solution, they will have to verify whether that can be a real solution or not and they will take the decisions that they think necessary. They will be called "iPSolving Community Administrators", later we will see what their responsibilities will be.



There will be two main ways of proceeding, one for important problems that affect one or several departments in the supply chain and one for little problems that individual employees have.

For small problems that affect only the individual who posted the problem the process will be much easier and faster and the problem poster and solver will be, in most cases, able to close the problem without the intervention of any other party. This kind of small problems will normally not get many votes and therefore their value in points will be very low if any at all. The idea is that once someone has posted a solution, the person who originally posted the problem verifies whether the supposed solution works or not and in case it does he or she can close the problem by posting that it has been solved. In case there are any points they will be automatically distributed.

For more complicated problems that affect one or more departments the process will be slightly different. It will not be solved and closed just between the employee who posted the problem and the one who solved a solution. Let us imagine that someone from the "Production Planning" department can say that his problem is that the "Demand Forecast" department provides his department with the forecast necessary to plan the production to late in the week and that puts them a great deal of pressure. Someone can propose that the limit to sent the forecasts will be from that moment onwards on Wednesdays and the person who originally posted the problem agrees and considers that as a solution. Obviously, this method would only bring chaos to the company.

As mentioned before, there has to be a committee that is in charge of studying the proposed solutions and determining whether they are really solutions or not. For general supply chain problems, the best suitable committee is the one that is already in place; the Supply Chain Roadmap. The SC Roadmap Committee is already responsible for all the projects that are carried out within the supply chain so iPSolving will just be like a generator of ideas to improve the supply chain coming from the employees. Of course, the SC Roadmap committee should not be continually bothered with proposals, especially if they are obviously not feasible at all. There has to be someone who filters the posted problems and solutions proposed to the committee, this will be the role of the "iPSolving Community Administrator".

The iPSolving Community Administrator (iPSCA) will either belong to the IT department or will work very closely with it. The idea is that there is at least one iPSCA per community and that he controls that everything evolves according to expected. He will be the person to whom the employees will address in case of a dispute or disagreement and he will have to determine the path of action. Another of his duties will be to control that no one misuses iPSolving.



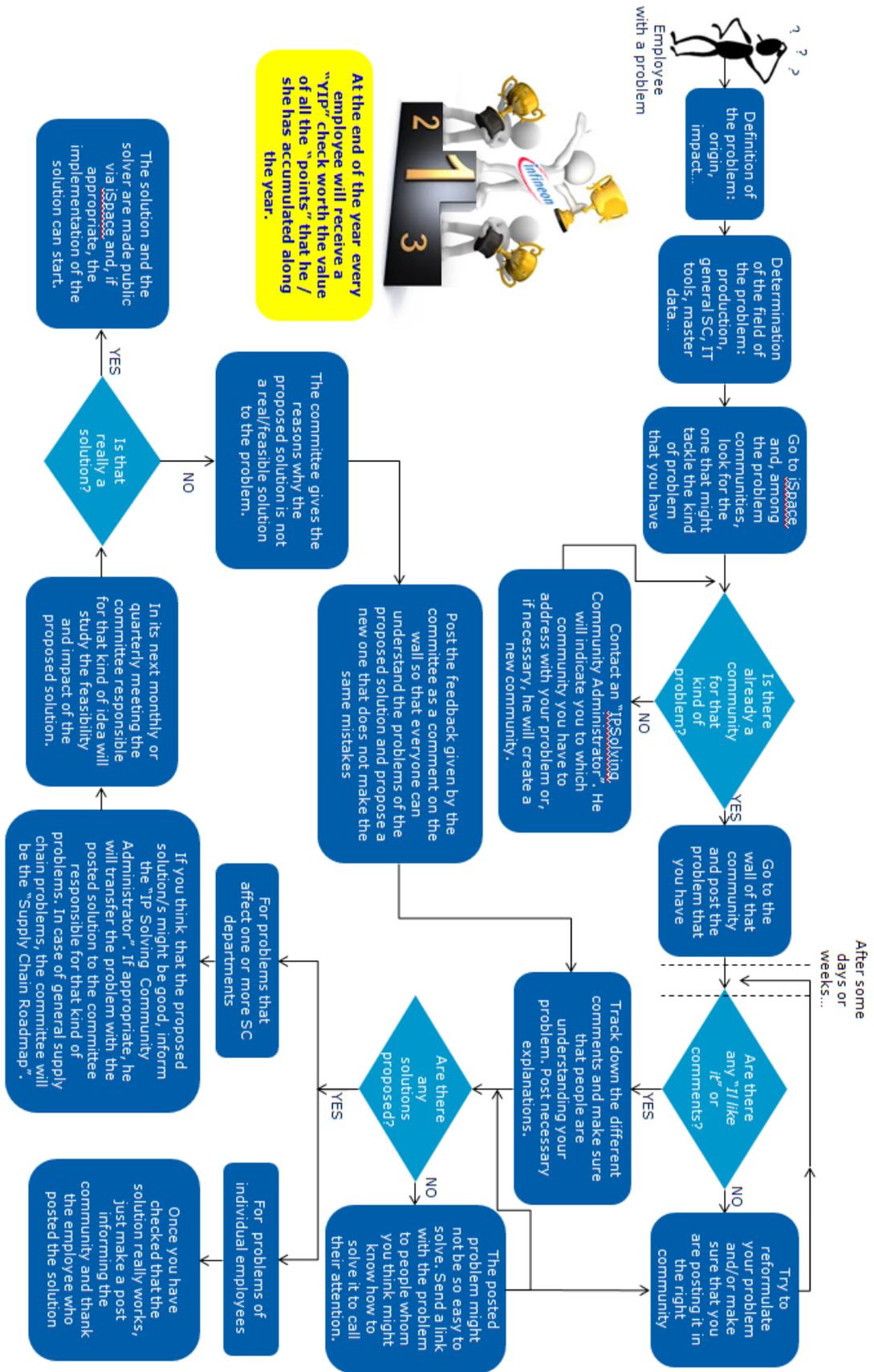


Figure 20: Representation of the formal procedure of iPSolving



A detailed process description can be observed in picture number 20. With all the steps that a user has to go through to finally get the reward deserved for having solved a problem. There is a very important topic that has not been tackled so far, it is the origin of the money that will be used as a reward. We will now see from where it will come but to understand it, we will first need to explain what “YIP” is.

6.1.2. Sourcing of iPSolving’s budget and the YIP initiative

YIP is an initiative which was implemented in Infineon at the very beginning, around ten years ago. It consists on rewarding any employee in the world who submits a proposal for an improvement in the company. As it can be read in Infineon’s internal website, the ability to innovate is a strength to the company and a key element of its mission.

YIP stands for “*Your Idea Pays*” and it is a means to show that Infineon is aiming to have people on board who bring their ideas to life. The YIP Program assists responsible business managers in achieving their targets and increases economic value added. All employees are invited to submit proposals for improvement within Infineon’s YIP Program and actively work toward their realization.



Figure 21: Logo of YIP that appears on the welcome page of the website.

Once a submitted idea is studied by the YIP committee and it is decided that it is a good idea and the company will make profit of it, the employee who submitted the idea is rewarded with a check worth a considerable amount of money. The amount of money is decided by the YIP committee but the rewards fluctuate between just a few Euros and 2000€.

Managers are obliged to encourage and support their employees by providing them with the time and resources needed to elaborate and implement ideas. The message that Infineon’s



board wants to get across with this initiative is that that devoting time to think of a good idea and then implement it pays off, both for the company and for the employee.

After having some discussions with the director of Supply Chain Innovations and with several other employees it was agreed that the YIP Program was the perfect match for iPSolving. Our initiative, iPSolving, strives to make employees think about the problems they have, make them public through Infineon's social network and solve them; and the goal of YIP Program is to reward all employees who identify a potential improvement and achieve it.

Given the visible synergies of both initiatives, why not combining them? The obvious match here is to use the YIP Program to reward the employees that, using iPSolving, have solved a problem. At the end of the year, all the points that the different iPSolving users have gathered either by posting problems that have been afterwards solved or by directly solving posted problems will be exchanged by checks worth the amount of points gathered.

Of course this has to be discussed with the YIP committee and approved by them. At the moment, some discussions have been held and even though everything seems to move in the right direction, some very important details have yet to be discussed. One of the most important things is the total annual budget that the YIP Program will have to devote to reward the participants of iPSolving that have won a reward. In that respect, a fairly accurate estimation will be provided in this work, but that will be after the evaluation of the pilot test that will be carried out.

In some cases though, an economic reward will not be needed. As we have seen before, two different kinds of problems are distinguished, those who affect only the individuals who post them and those who affect one or more departments. Those problems that affect only the individuals who post them will be most of times solved without anyone having manifested its support to the problem and this means that the solver will not get any reward for the effort and time devoted to solve that problem.

This will be the case only for little problems that an expert in the field will be able to solve within minutes. Some examples are the typical problems that we all have when handling the usual informatics tools such as Microsoft Excel or Power Point. Even though this is not supposed to be very time-consuming for employees who solve these problems there has to be a reward for them, they will devote some of their time to go on the social network and try to help some colleagues who they will possibly never cross on the aisle. This attitude has to be somehow fostered by the company, and the role of those employees has to be stressed in front of their peers.

A very typical way of acknowledging their work and positive attitude is by giving them "points of recognition" so that even they will not receive money for having solved that problem;



everyone on the social network can see that they have solved a problem and that this employee helps his peers and contributes to the progress of the company without seeking to make profit out of that. Creating this reputation can sometimes be the best reward that an employee can ever dream of.

There could be a counter for solved problems and for attempts of solving a problem. The counter could be displayed on the profile so that anyone having a look at an employee's profile could see the quantity of problems in which the employee's help has played a major role. Besides, the amount of points that an employee has earned either by solving problems that have been afterwards solved or by posting them and that will be exchanged for money at the end of the year will also be displayed.

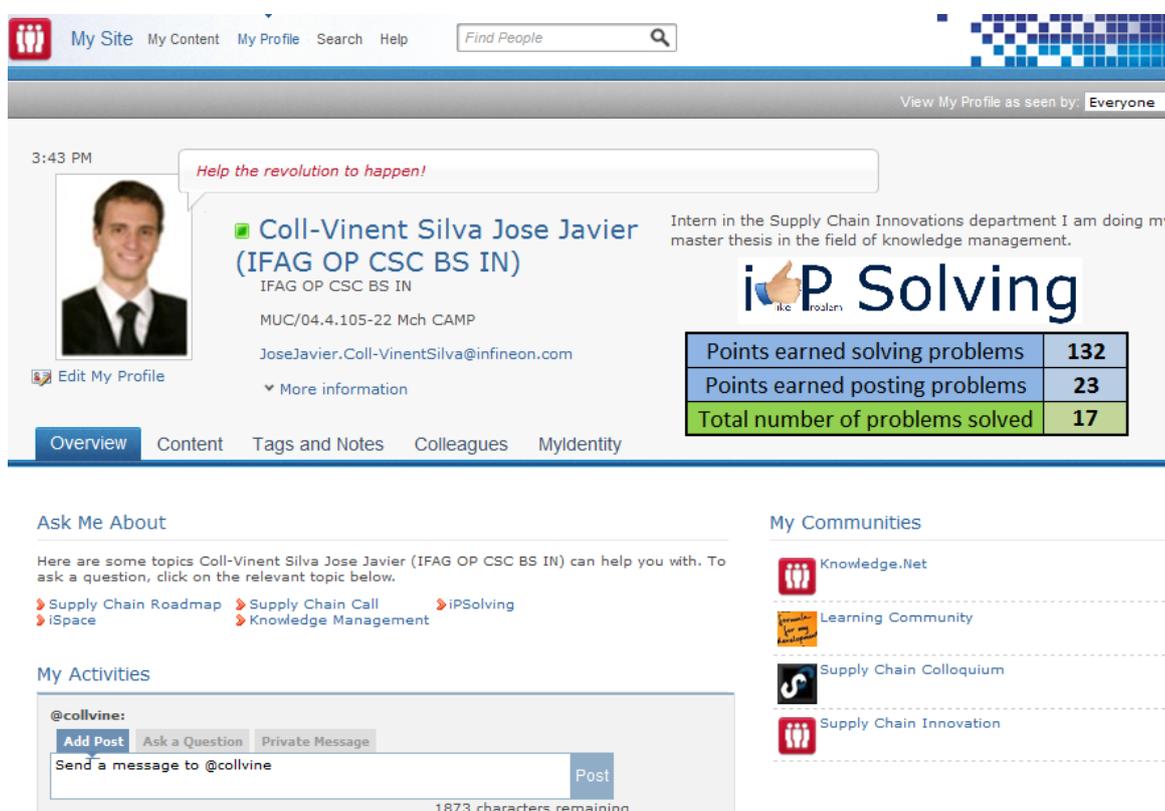


Figure 22: Possible layout of a profile showing the points earned by solving and posting problems and the total quantity of problems solved.

In picture number 22, we can see how the profile of an employee who has used iPSolving could look like. On the upper right part of the image, a table giving some iPSolving statistics can be appreciated. The employee on the example, has earned 132 points by solving problems and 23 points by posting problems that have been afterwards solved so if this was the end of the year he would get a check worth: $132 + 23 = 155$ €. Besides, we can see the total quantity of problems that he has solved is 17. In this case we do not know how many of the 17 problems had a reward and the quantity of them that the employee has solved just



for the sake of helping a colleague but without getting a formal reward; the suitability of this should be further studied.

6.1.3. Some basic rules against the misuse of iPSolving

As any reward, iPSolving's reward is meant to encourage the employees to take part in the initiative and by doing so, to contribute to the progress of the company. But as always, suchlike initiatives can also be misused to obtain personal profit instead of pursuing the benefit of the whole company. The goal of this point is to explore possible misuses of iPSolving and to try to come up with a set of rules that prevents or hinders this kind of behaviour.

As it can be guessed, it will be much easier to illegitimately use iPSolving with little problems that affect only the individuals who post them because for more serious problems that affect one or more departments there will be a whole committee studying the validity of the solution proposed for the problem and any irregularities will be detected.

Little problems are instead supposed to be solved without the intervention of anyone except for the person who posts the problem and the one who solves it. One could for example, post a problem, click on the "I like" button to give it his/her support and then solve it so that he or she would get the reward. Of course, this is not the kind of use that the employees are expected to give to iPSolving. The same thing could happen among a group of employees who reach an agreement to share afterwards the reward.

It stands to reason that if iPSolving is ever going to be implemented, some basic rules are needed to make sure that the employees use it the way it is meant to be used. After some dome discussions with the director of the "Supply Chain Innovations" department the following set of rules has come up as a result:

- An employee either likes a given problem or does not like it so he or she can only give his or her support to a problem once.
- An employee cannot give his or her support to a problem that he or she has posted, if he has posted, it is obvious that he supports that problem.
- An employee is supposed to have tried to solve a problem before posting it. However, if he or she happens to find a solution after having posted his or her problem, he or she will be able to solve and close the problem. In case there is a reward, he or she will obtain 85% of the value, as stipulated.

Concerning this last point, in the end it is almost impossible to discern whether the employee has really come up with a solution after having posted the problem or he/she had



always known what the solution to that problem was and has just waited for the problem's value to raise in order to make some money. This is very important because in the end, the only thing that can be done is trust the employees and they will know it. This can create a very nice bond of mutual confidence between Infineon's formal structure and the mass of employees.

Every boss of department will have to have an iPSolving end-of-year review with each and every one of his subordinates. In this review they will have a quick look at all the problems in which the employee has played a major role either by posting or by solving them. The goal of this review will be to identify possible problems or misuses of iPSolving and in order to make the most of this review all managers will be debriefed on how to best perform it.

6.2. iPSolving's "Pilot Test" in the SC Innovations department

As it has been announced since the very beginning, one of the most important parts of this work is the pilot test which is going to be run within the Supply Chain Innovations department. We will evaluate how the different employees of the department react to the initiative and interact among them. Depending on the conclusions drawn during the pilot test certain measures to improve iPSolving will be taken into consideration and the feasibility of implementation of the initiative in Infineon's whole supply chain worldwide will be studied.

6.2.1. Preparation of the "Pilot test" of iPSolving

The first and most important thing that is needed to run the pilot test is the informatic tool that will give physical support to the initiative. In our case, the tool will be the existing internal social network: iSpace. Of course, iSpace is not fully tailored to fulfil iPSolving's needs; it is just a normal social network system and further work will have to be done to make the pilot test possible given the current status of iSpace.

As it has already been mentioned before, at the moment the IT department is working on the development of iSpace, Infineon's internal social network it is not ready to be launched to the whole company and only a few people have access to it so that they can try it and help to improve it. As the pilot test is going to be run within the "Supply Chain Innovations" department, the first thing that is necessary is to request access to all the members of the department; we are a little bit more than twenty.

The original idea of iPSolving is to create one community for each type of problem but given the small amount of people that are going to take part in the test it would not be wise to create many different communities. Instead, we will only create one community for any kind of problem that the members of the Supply Chain Innovations department have. The



community will be named after the department: “Supply Chain Innovations Community” and only people from our department will be able to write (edit rights) on “the wall” of our community. However, people from outside the community will be able to see the different posted problems and solutions and will be able to give them their support by clicking on the “I like” button or even to add comments on the posted problems.

iSpace offers the user of a community different possibilities to interact with the rest of the members of the community. The different possibilities appear as flanges on the top centre of the page: Overview, Documents, Calendar, Links, Blog, Members... Because of its configuration, the option that best adapts to the needs of iPSolving is the “Overview”. On the Overview, the user can add “Posts”, “Questions” and “Comments” and among those three options, the one that best adapts to the needs of iPSolving is the “Post”. After a user has added a post, another one can click on the “I like” button and everyone will see it having a quick look at the site.

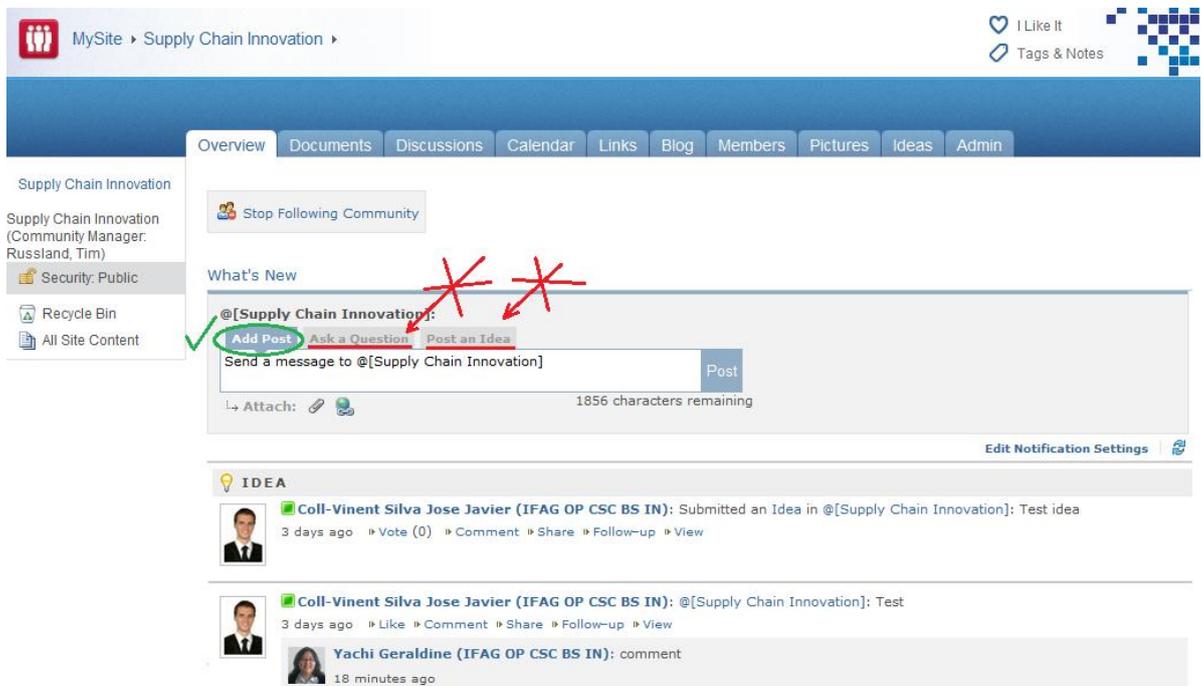


Figure 23: Image of the “Overview” of the “Supply Chain Innovations Community”, indicating that the users only have to use the “Post” option when posting a problem, not the “Question” or the “Idea” options.

As it can be seen on the lower part of the picture, after a user has added a “Post”, other users can click on the “I like” button or add a comment to the post. The idea is that every time that someone wants to post a problem he or she will have to do it using a “Post”, not a “Question” or an “Idea” because those last two options do not give the user the same possibilities. Once someone has found the solution to that posted problem he or she will have to post his or her solution by adding a “Comment” to that post. This can be appreciated on the following picture. When someone clicks on the “Comment” button,



beneath a problem, a dialog box appears and the user has up to 1024 characters to type in his or her solution.



Figure 24: Screenshot of the dialog box that appears when a user clicks on the “Comment” button that is displayed beneath a posted problem. Any potential solution to a posted problem has to be posted as a comment.

Those little details about how to post a problem or a solution had to be very clear for the users of iPSolving during the pilot test. A Power Point presentation was created to show to all participants how to proceed. Another thing that was also very important before launching the pilot test was to run an appropriate advertising campaign so that little by little, the different members of the department could start to familiarize themselves with the initiative. The two basic means that were used to start making people aware of iPSolving and of the pilot test that was going to be run within the department were sending emails and talking during the department’s weekly meeting, the “Jour Fix”.

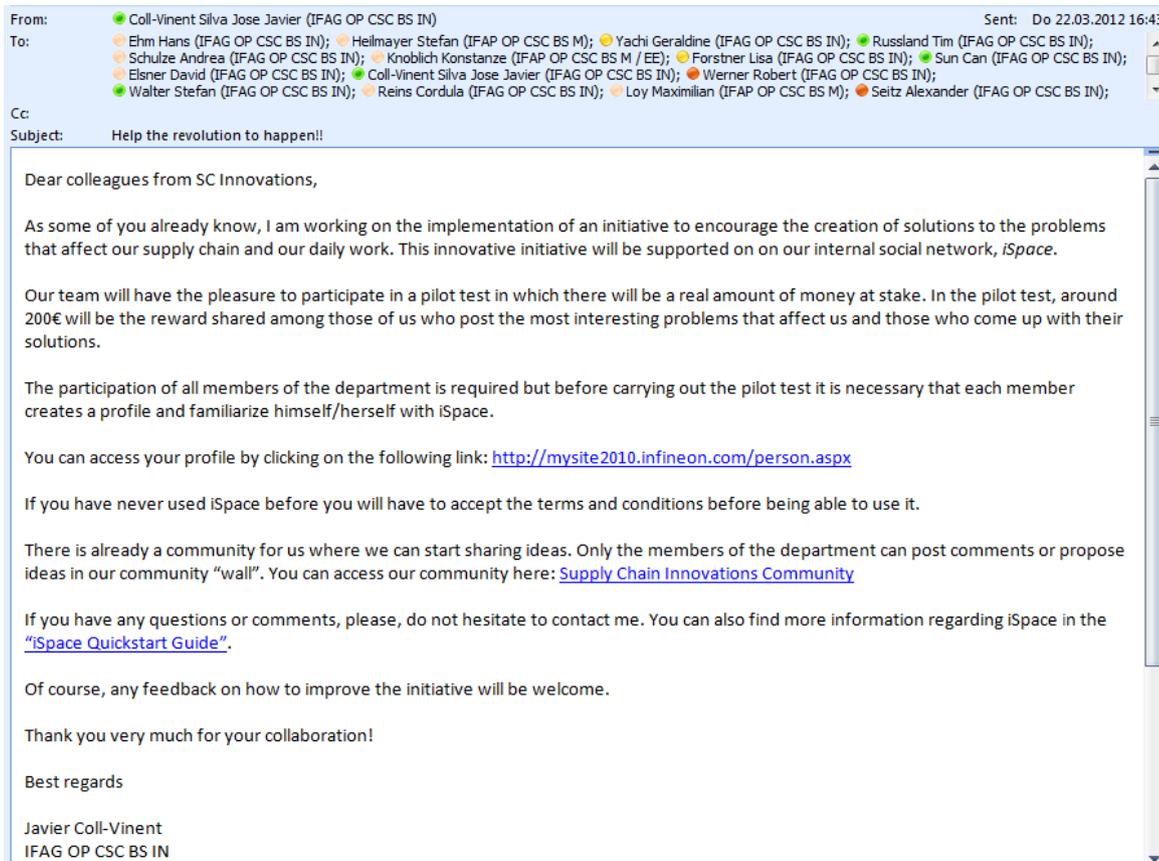


Figure 25: The picture shows one of the first emails that was sent to all the members of the Supply Chain Innovations Department to make them aware of iPSolving and of the pilot test that was about to be run.



On the picture above, an example of one of the emails that was sent to all members of the Supply Chain Innovations department can be appreciated. This email was sent on Thursday the 22nd of March and the “Pilot Test” would start only 8 days later, on Friday the 30th of March.

Every Friday morning from 9:00 to 10:00, the “Supply Chain Innovations” department has its weekly “Jour Fix” and all the members of the department are there. It is used to keep track of what all the members of the department are working on and it was used to make everyone in the department aware of the initiative during the weeks previous to the pilot test.

We count on a budget of 200€ in the department to run the pilot test, this will be the total amount that will be distributed among the participants that deserve a reward. After several discussions with the head of “Supply Chain Innovations” it was concluded that the value of an “I like” would be of 4€ and that every employee would have 5 votes to give his or her support to the different posted problems. This means that every employee has $5 \times 4 = 20\text{€}$ as a personal budget and taking into account that there are 21 people taking part in the pilot test, that makes $20 \times 21 = 420\text{€}$, which is higher than twice the real budget that the department has to reward the winners of iPSolving. This is due to several facts; the most relevant ones are:

- Not everyone who is in the department and has therefore the right to take part in the initiative is going to do it. The participation in iPSolving does not have to be an obligation to anyone. The different employees must feel free to take part in the initiative and this will allow us to evaluate what is the natural tendency of people towards iPSolving and what urges them to participate in the initiative.
- Even if some employees have the intention to take part in the initiative, they might not find interesting any of the problems posted by their peers. If there are no votes supporting a problem or just a few, the quantities of money that will be given as a reward will be very small. The idea is not that the participants use their votes just for the sake of using them but because they would like the problem they are supporting to be solved.
- Not all the problems that are posted on the wall of the community and that receive the support of many of the employees are going to be solved. There will be problems that will be still unsolved at the end of the pilot test and no one will get any money for them as a reward.

Of course, before running the test there is no way of guessing what the pattern of interaction among the different employees will be like. It is therefore very complicated to give an accurate estimation of the budget that every employee must have in order to make



sure that afterwards, the global sum of money that has to be distributed among the winners is not higher than the real budget that the department has. This is a fundamental question that Infineon's board will have to pose to themselves if they are ever going to implement the initiative on a global level. If "X" is the total budget that we would like to devote to iPSolving, then which one has to be the individual budget that every employee has to give support to the different posted problems? How much has to be an "I like" worth? Further advice on these topics will be given once the pilot test is concluded.

One of the most important things that the current version of iSpace lacks is the ability to keep track of the financial status of every user. In iPSolving, every employee has an annual budget and every time that he or she manifests his or her support to a problem by clicking on the "I like" button, a certain percentage of his total annual budget will be deduced from it. Once a user has run out of points to support problems, he or she will no longer have the option to "like" a problem anymore.

To keep track of the financial situation of every user in terms of points earned through taking part in iPSolving, an Excel sheet has been created. This Excel sheet will allow the person that will play the role of "iPSolving Administrator" during the pilot test can keep track of the budget of every user. During the pilot test that will be run within the innovations department, the "iPSolving Administrator" will have to manually register in the Excel sheet all the interactions that occur on the wall of iSpace among the different users. In this case, the person who will play the role of "iPSolving Administrator" will be I, the author of this work: Javier Coll-Vinent Silva.

The idea is that every time that a user posts a problem, manifests his or her support by clicking on the "I like" button underneath a problem or posts a solution, the "iPSolving Administrator" will have to update that information on the Excel sheet. The Excel sheet will automatically register the economical impact of every action, keeping track of the financial status of all participants.

On the following page we can observe how the Excel sheet that will help the iPSolving administrator to keep track of all changes looks like. On the upper part of the screenshot we can see the financial situation of the participants, in this case of only four of them. On the left part of the Excel sheet a list with all the problems can be observed. Every time that a participant posts a problem, the iPSolving administrator will copy the problem on the Excel sheet and whenever a participant manifests his or her support to a problem by clicking on the "I like" button, the iPSolving administrator will insert in the Excel sheet the time and date when this has occurred. For example, if we have a look at the first row (problem number 1: "Editing rights in iShares"), we see that Tim Russland "liked" that problem on April the 13th at 09:30, Javier Coll-vinent on March the 30th at 09:47 and Christian Pitulia also on March the 30th but at 10:30.



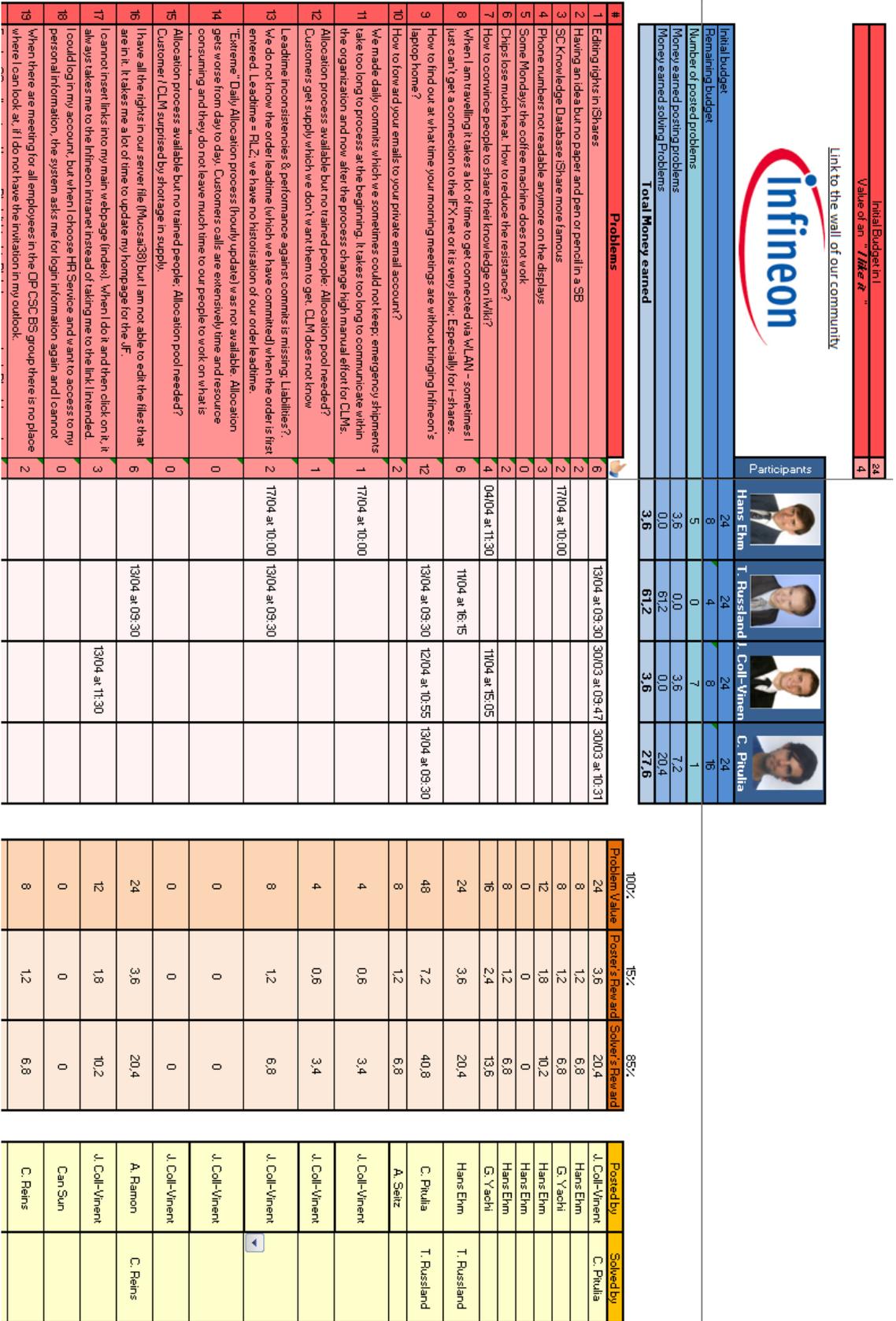


Figure 26: Screenshot of the Excel sheet created to keep track of all the interactions that take place on iSpace during the pilot test of iPSolving.



On the right part of the Excel sheet, the total economical value of each problem is displayed. The value of problem number 1 is 24€, this means that 6 people have given their support to that problem (6 x 4€ = 24€). If the problem is solved in the end, of those 24€, 15% will be for the participant who posted the problem (3'6€) and 85% will be for the participant who solved the problem (20'4€).

All this details will have to be carefully explained to all participants in the pilot test. A Power Point presentation has been prepared with that purpose and to explain the main goal of the initiative and the different possibilities that iSpace offers. The Power Point file will be included in the CD that will be handed in along with this work.

The pilot test of iPSolving will be run in the Supply Chain Innovations department during three consecutive weeks, starting on Friday the 30th of March and finishing on Friday the 20th of April.

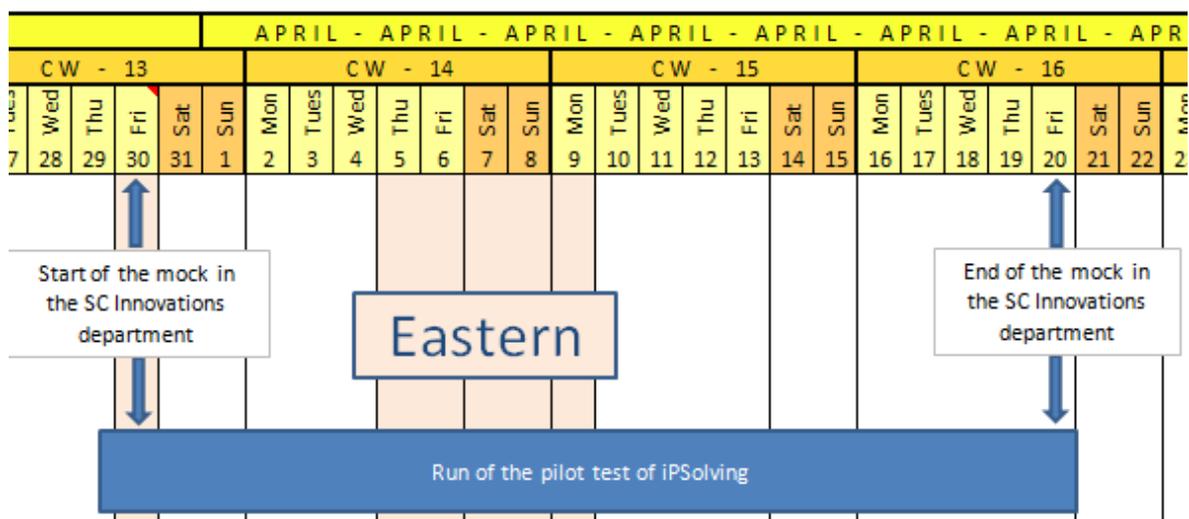


Figure 27: Screenshot of the “Milestone Trend Analysis” showing the start and end date of the pilot test.

6.2.2. Run of the “Pilot test”

As it has been mentioned before, the best moment in the week to make announcements is during the so called “Jour Fix”, where all members of the Supply Chain Innovations department take part. The start of the pilot test is announced on Friday the 30th of March. During the weeks previous to the start of the pilot test all members of the department had been hearing about the initiative and had received emails encouraging them to create a profile on iSpace. Once everything was ready, a Power Point presentation was shown, going through all the details that have already been explained in this work.



After having explained everything and having answered the questions of all members, the pilot test was considered started. The first thing that was done then was to post a problem that I, the author of this work, had had some months before. This would set an example of the kind of problems that the participants could post.

This was the first problem posted: *“When being the administrator of an iShare, I do not manage to control the rights that allow people to edit files and contribute. I often receive emails of people complaining because in theory they have editing rights but they cannot modify and save a file on the iShare on their own. In the end, they send me the updated file and I have to upload it on the iShare.”*



Coll-Vinent Silva Jose Javier (IFAG OP CSC BS IN): @[Supply Chain Innovation]: When being the administrator of an iShare, I do not manage to control the rights that allow people to edit files and contribute. I often receive emails of people complaining because in theory they have editing rights but they cannot modify and save a file on the iShare on their own. In the end, they send me the updated file and I have to upload it on the iShare.

Figure 28: First problema that was poste don the wall of iSpace to set an example on the kind of problems that could be posted and encourage the rest of the participants to do take part in the initiative.

During the first days of the pilot test, almost no one posted a problem. After almost one week there were 8 problems posted but there were only two people who seemed to be interested in the initiative and who used it to post their problems, they were Hans Ehm and Geraldine Yachi. Both of them had taken part in the creation of iPSolving so their behaviour was not really representative of the behaviour that any employee will have in the future once iPSolving is implemented.

Although there was a reward, the different employees in the department were not motivated enough and were not taking the time to think of the problems that they encountered in their everyday-life and to post them. They needed something else to motivate them and to remind them of the possibility of having those little problems that hindered their work solved. It became very clear to us, the precursors of iPSolving (Hans Ehm, Geraldine Yachi and I) that we had to do something else to motivate people. We came to the conclusion that a good solution could be to send emails reminding the participants of the possibility to post their problems and making them aware of the problems that had been already posted. We would send them a link that would take them directly to the wall of the community where all the problems were posted.

Two different emails were then designed. One of them would be a general email that would be sent to all participants at the same time to try to encourage them to go to the wall of the community and have a look at the different posted problems and/or to post a problem. This email would include a list with a short description of all the problems that had been posted on the wall and their value. The goal of this email is to facilitate the resolution of problems; if someone receives the email and sees the description of a problem that he or she thinks that



can be easily solved, he or she would only have to click on the link to the wall to see the complete description of the problem and, if possible, post a solution. This email would be sent every two or three days, depending on the natural disposition of the participants to go to the wall of the community on their own.

It goes without saying that the text of the email would be different every time, trying to best adapt to the situation.

From: Coll-Vinent Silva Jose Javier (IFAG OP CSC BS IN) Sent: Mi 11.04.2012 14:05
 To: Coll-Vinent Silva Jose Javier (IFAG OP CSC BS IN); Ehm Hans (IFAG OP CSC BS IN); Heilmayer Stefan (IFAP OP CSC BS M); Yachi Geraldine (IFAG OP CSC BS IN); Russland Tim (IFAG OP CSC BS IN); Schulze Andrea (IFAG OP CSC BS IN); Knoblich Konstanze (IFAP OP CSC BS M / EE); Forstner Lisa (IFAG OP CSC BS IN)
 Cc:
 Subject: Help the revolution to happen!!

Dear all,

As you know, the pilot test for "iPSolving" is running and you are invited to collaborate!

We have already 8 problems posted and all of them are looking for a solution. Feel free to go to the [wall of our community](#) and have a look at them, you can give them your support by clicking on the "I like button" or, even try to solve them.

Find here a summary of the posted problems, their value and their reward.

#	Problems	Problem Value
		100%
1	Editing rights in iShares	12 €
2	Having an idea but no paper and pen or pencil in a SB	0 €
3	SC Knowledge Database iShare more famous	0 €
4	Phone numbers not readable anymore on the displays	0 €
5	Some Mondays the coffee machine does not work	0 €
6	Chips lose much heat. How to reduce the resistance?	0 €
7	How to convince people to share their knowledge on iWiki?	4 €
8	When I am travelling it takes a lot of time to get connected via WLAN - sometimes I just can't get a connection to the IFX net or it is very slow; Especially for i-shares.	0 €

Figure 29: The screenshot shows an example of an email that was sent to all participants four days after the start of the "pilot test" to encourage them to have a look at the wall of the community and post a problem or solve one of the existing ones.

The other kind of email that would be sent would be a personalized one, informing each and every participant of his or her financial status. The email would contain the following information of the participant:

- Numbers of problems that the participant has posted.



- Part of his or her budget that the participant has used to support problems.
- Remaining budget
- Amount of money that the participant has earned by posting a problem that has been afterwards solved.
- Amount of money that the participant has earned by solving problems.

From:  Coll-Vinent Silva Jose Javier (IFAG OP CSC BS IN) Sent: Mo 16.04.2012 16:27
 To:  Pitulia Christian (IFAG OP CSC BS IN)
 Cc:
 Subject: Last four days!! Help the revolution to happen!!

Hallo Christian!

As you already know, this is the last week of the pilot test of **iPSolving**. This initiative could really help a lot of people to find the solution to the many different tedious problems that hinder their daily work. It can be a real revolution and your participation in this test is fundamental its future implementation.

At the moment, your status is the following:

Number of posted problems	Budget used to support problems	Remaining budget	Money earned by posting problems	Money earned by solving problems
1	8 	16 	0€	0€

It is extremely easy for you to help this revolution to happen. You only need to...

- Spend some minutes trying to think of the different problems that you usually encounter in your daily work.
- Go to the [wall of our community](#) (Supply Chain Innovations) and post your problem in a way that is easily understandable. If you need it, you can attach files or add links.
- Have a look at the different problems that have been posted by our colleagues and give your support to those that you find most interesting. To give your support, you just have to click on the "I like"  button beneath the problem.

 **iPSolving**

If you have any questions don't hesitate to ask!

Figure 30: The image shows an example of the personalized emails that were sent to every participant with their personal information regarding iPSolving.



The idea in the future when iPSolving is implemented in Infineon’s supply chain around the world is that iSpace will be fully tailored to fulfil the needs of iPSolving and every user will be able to find on his own the information provided in this email.

It can be said that the results sought with the emails were totally achieved. Only a few days after having started with the email campaign the number of people participating in the initiative was 3 times higher. People participated mainly by giving their support to the posted problems but also by posting new problems.

As time went by during the three weeks of pilot test, the different participants were using their budget to vote and therefore they had less and less votes left. All of them started with 5 votes (each one of them being worth 4€). It was observed that several participants were keeping their votes until the end of the pilot test just in case someone posted a very interesting problem in the last moment; of course, they wanted to have some votes left to vote for interesting problems appearing in the last moment. It was then decided that every employee would get one more vote (4€).

#	Problems	100% 15% 85%			Posted by	Solved by	
		Problem Value	Poster's Reward	Solver's Reward			
1	Editing rights in iShares	6	24	3,6	20,4	J. Coll-Vinent	C. Pitulia
2	Having an idea but no paper and pen or pencil in a SB	2	8	1,2	6,8	Hans Ehm	
3	SC Knowledge Database iShare more famous	2	8	1,2	6,8	G. Yachi	S. Felsmann
4	Phone numbers not readable anymore on the displays	3	12	1,8	10,2	Hans Ehm	
5	Some Mondays the coffee machine does not work	0	0	0	0	Hans Ehm	
6	Chips lose much heat. How to reduce the resistance?	2	8	1,2	6,8	Hans Ehm	
7	How to convince people to share their knowledge on iWiki?	4	16	2,4	13,6	G. Yachi	
8	When I am travelling it takes a lot of time to get connected via WLAN - sometimes I just can't get a connection to the FX net or it is very slow; Especially for i-shares.	6	24	3,6	20,4	Hans Ehm	T. Russland
9	How to find out at what time your morning meetings are without bringing Infineon's laptop home?	12	48	7,2	40,8	C. Pitulia	T. Russland
10	How to forward your emails to your private email account?	2	8	1,2	6,8	A. Seitz	
11	We made daily commits which we sometimes could not keep; emergency shipments take too long to process at the beginning. It takes too long to communicate within the organization and now after the process change high manual effort for CLMs.	1	4	0,6	3,4	J. Coll-Vinent	
12	Allocation process available but no trained people; Allocation pool needed? Customers get supply which we don't want them to get. CLM does not know	1	4	0,6	3,4	J. Coll-Vinent	
13	Leadtime inconsistencies & performance against commits is missing; Liabilities?. We do not know the order leadtime (which we have committed) when the order is first entered. Leadtime = RLZ; we have no historisation of our order leadtime.	2	8	1,2	6,8	J. Coll-Vinent	
14	"Extreme" Daily Allocation process (hourly update) was not available. Allocation gets worse from day to day. Customers calls are extensively time and resource consuming and they do not leave much time to our people to work on what is	0	0	0	0	J. Coll-Vinent	
15	Allocation process available but no trained people; Allocation pool needed? Customer / CLM surprised by shortage in supply.	0	0	0	0	J. Coll-Vinent	
16	I have all the rights in our server file (Mucsa38) but I am not able to edit the files that are in it. It takes me a lot of time to update my homepage for the JF.	6	24	3,6	20,4	A. Ramon	C. Reins
17	I cannot insert links into my main webpage (index). When I do it and then click on it, it always takes me to the Infineon intranet instead of taking me to the link I intended.	3	12	1,8	10,2	J. Coll-Vinent	Can Sun
18	I could log in my account, but when I choose HR Service and want to access to my personal information, the system asks me for login information again and I cannot	0	0	0	0	Can Sun	
19	When there are meeting for all employees in the OP CSC BS group there is no place where I can look at, if I do not have the invitation in my outlook.	2	8	1,2	6,8	C. Reins	
20	For the SC colloquium, I have a DL. Within this DL I ahve several sub DLs. I have the impression that outlook does not update my invitations automatically when there are	1	4	0,6	3,4	L. Forstner	C. Reins
21	Sometimes I have a problem with the iLearns. After completing the review questions I try to open the assessment form but it does not open, saying I first have to answer	3	12	1,8	10,2	S. Felsmann	

Table 2: Table showing a summary of all the problems that were posted during the pilot test, the value of the problem, the person who posted it and the one who solved it (in case it has been solved).



At the end of the three weeks that lasted the pilot test, 21 different problems had been posted in the wall of the community. Out of the 21 employees that took part in the pilot test, about half of them, 10 employees, posted a problem. Among the posted problems, 5 of them were totally solved and 2 partially. In total, 7 out of the 21 problems were totally or partially solved (33'3%).

Among all the different problems that were analysed in point 5.2.1 of this work, five of them were selected and posted on the wall of the community during the pilot test (problems 11 to 15). As those were real problems that different employees from Infineon's Supply Chain had had during the last few years, we wanted to see how people reacted to them. Of course we were not expecting anyone in the department to solve them because those are complicated problems and the members of the department are basically students with little experience in the world of supply chain and its challenges. Even if only employees from the Supply Chain Innovations department were taking part in the pilot test, the different posts were seen by anyone using iSpace so the idea was to show to everyone the potential the iPSolving has.

Something that was observed during the pilot test was that once the first problem was solved and it was announced in the department, the interest that the different participants had in the initiative rocketed. Having seen that one of their colleagues had solved a problem and therefore won a reward, pushed the rest of the members of the department to solve problems.

Participants					
	Hans Ehm	G. Yachi	T. Russland	L. Forstner	Can Sun
Money earned posting problems	3,6	1,2	0,0	0,6	0,0
Money earned solving Problems	0,0	0,0	61,2	0,0	10,2
Total Money earned	3,6	1,2	61,2	0,6	10,2

Participants					
	J. Coll-Vinen	C. Reins	A. Ramon	C. Pitulia	S. Felsmann
Money earned posting problems	5,4	0,0	3,6	7,2	0,0
Money earned solving Problems	0,0	23,8	0,0	20,4	6,8
Total Money earned	5,4	23,8	3,6	27,6	6,8

Figure 31: Employees that have won Money during the pilot test of iPSolving either by posting problems or by solving them.

As it has been mentioned before, there were some problems that were given a solution that helped the employee who had that problem but not totally solved it. Those problems that were partially solved were considered as solved from the point of view of the reward. The employees who had posted that partial solution received the normal reward. This was only



to reward their positive attitude and because the budget had not been used out. Those who deserved a reward received a check of the suitable value issued by the “YIP” committee.

In total only 144€ were distributed out of the 200€ that had been allocated for the pilot test. This proves that the hypothesis that had been formulated before the pilot test was right. The sum of the individual budgets of all participants must be higher than the real budget that the company has allocated to use as a reward. In our case there were 21 participants with 24€ each as a personal budget; that makes $21 \times 24 = 504\text{€}$ whereas the department counted only on 200€ to give out as a reward.

Only 144€ out of the 504€ originally allocated were distributed in the end, that accounts for 28,6% of the sum of individual budgets. This means that 66€ of the 200€ that were meant to be used as a reward (33%) were not used in the end. The first thing that springs to our minds is that we could have increased the individual budget so that in the end the amount of allocated money that is not used is minimized.

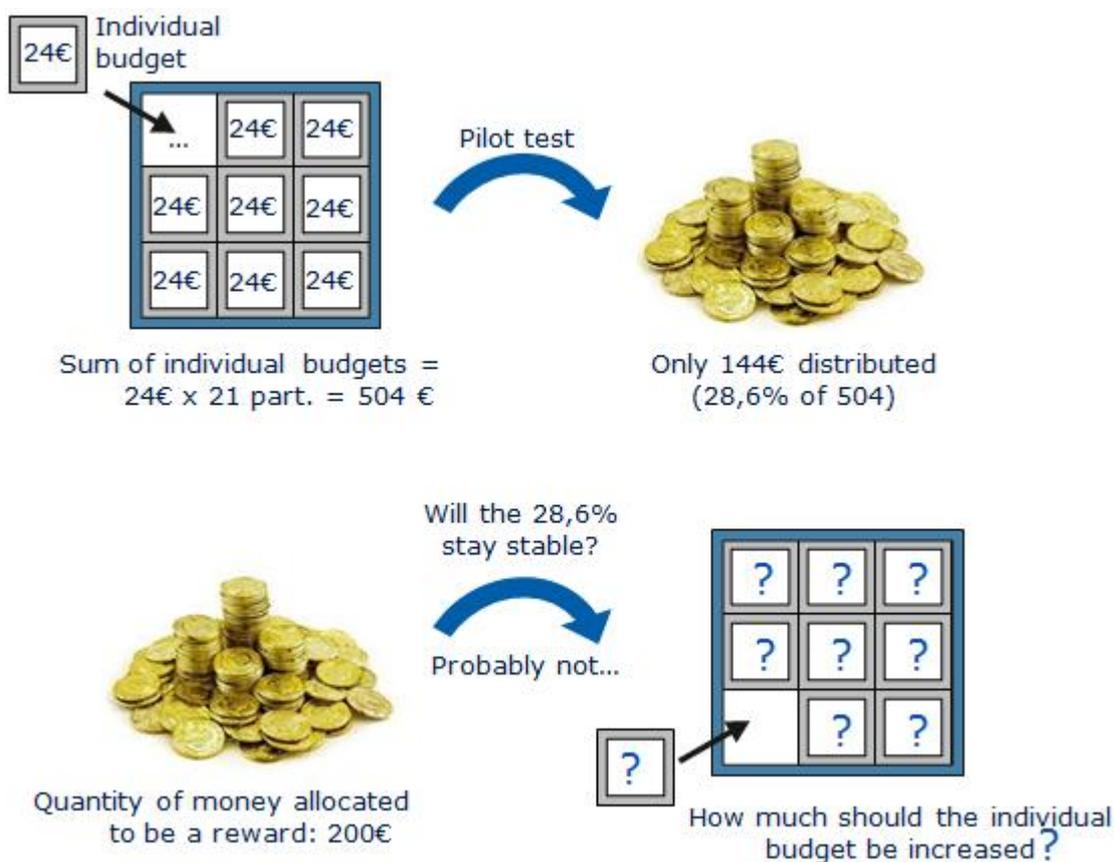


Figure 32: The image represents the challenge of determining the ratio between the annual amount of money that the company can spend rewarding the winners of iPSolving and the individual budget of a user.

If we estimate that the ratio 28,6% would have stayed stable, we could say that we could have increased the total budget of the participants up to $200 / 0,286 = 700\text{€}$. This means



that the individual budget of every participant could have been $700 / 21 = 33 \text{ €}$ instead of 24. But, would the ratio have stayed the same (28,6%) if the individual budget had been different? Probably not, it has been proved during the pilot test that such changes can have a huge impact on the behaviour of the user.

Another variable that plays a role of paramount importance in the behaviour of the user is the value that a vote ("I like") has. If a user has an individual budget of, for instance 40€, his behaviour will be radically different if he has 10 votes (each one of them being worth 4€) or 40 votes (each one of them being worth 1€).

For a given individual budget, the bigger the quantity of votes (low value of every vote) the higher the volume of interactions among users. The user feels he or she has a many votes and therefore he or she makes use of them more recklessly, voting for any problem that he or she finds just slightly interesting. At the same time, the value that the problems can achieve is lower because the value of every vote is lower and this can have a negative impact on the employees' willingness to devote time to solve the problem.

On the other hand, if a user has fewer votes but with a higher value he will very carefully think about it before voting for a problem because he will have fewer votes and will not want to run out of votes. The user will always want to reserve a few votes for interesting problems that might appear in the future. This will make that the average amount of votes per problem is lower. A user will not be equally drawn to spend time solving a problem that has the support of 20 people if the value of the vote is 1€ (value of the problem = 20€) or 4€ (value of the problem = 80€).

The amount of money that is worth a vote depends on many variables some of them very obvious like the total amount of money that the company is willing to distribute as a reward and some other not so obvious, like the general attitude of the company and its employees towards knowledge sharing.

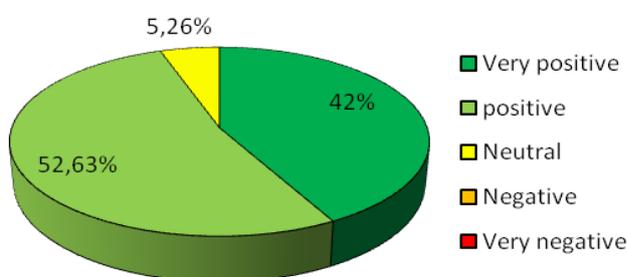
Further research would have to be carried out to determine all the variables that might have an effect on the value of a vote. According to the experience gathered during the pilot test, a first rough recommendation would be that the bigger the group of employees that takes part in the initiative, the lower the value of the vote and vice versa. It seems that the fact that there are more people who might like a problem compensates for the fact that the value of a vote is very low so that in the end the average value of a problem is not dramatically reduced. Stress is put on the fact that this hypothesis has to be validated with more tests and further research.



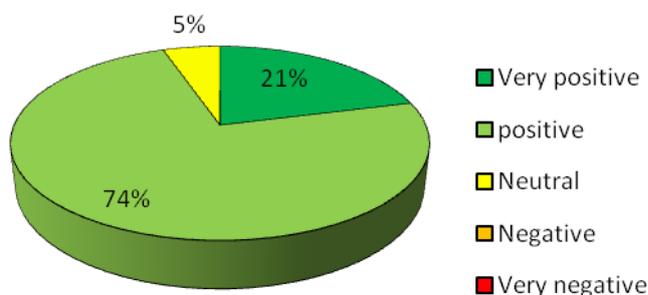
6.2.3. Impressions gathered during the pilot test

Once the pilot test of iPSolving had come to an end, it became clear to the promoters of the initiative that it would be wise to conduct a survey among the participants in order to gather their impressions. The survey would have to tackle some fundamental questions such as the overall impression of the initiative or the importance that the participants give to the reward but would also have to leave some freedom to the respondent to try to contribute to the future improvement of the initiative.

All participants were kindly invited to fill out the survey whose results would, of course, be anonymously treated. Nineteen out of the twenty-one participants filled out and handed in the survey within a few days. All the surveys handed in by the participants can be found in the annexes and the results are presented below.



Graphic 2: Evaluation of the overall initiative



Graphic 3: Impact of iPSolving on the resolution of daily problems

As it can be observed in the two first graphics, iPSolving has been very much appreciated among the participants of the pilot test. Around 95% of them would describe the initiative to be positive or very positive and about the same number of people found that it could have a positive or a very positive effect on the resolution of the employees' daily problems. Only five per cent of the respondents estimated that the initiative has neither a positive nor a negative impact on the resolution of the daily problems and no one had a general negative impression of the initiative or thought that it could have a negative impact on the resolution of the daily problems.





	Very positive	Positive	Neutral	Negative	Very negative
1 - How do you value the overall initiative?	<input type="checkbox"/>				
2 - How do you value the impact that iPSolving can have on the resolution of your daily problems?	<input type="checkbox"/>				
3 - How do you value the impact that iPSolving can have on your daily workload?	<input type="checkbox"/>				
4 - How do you value the impact that iPSolving can have on the employees' willingness to create new knowledge or share the existing one?	<input type="checkbox"/>				

	Very important	Important	Neutral	Not very important	Not important at all
5 - Was the possible reward important to make you participate in the "Pilot test"?	<input type="checkbox"/>				
6 - If you have posted a problem, was it important for you the fact that there was a reward?	<input type="checkbox"/>				
7 - If you have solved a problem, was it important for you the fact that there was a reward?	<input type="checkbox"/>				

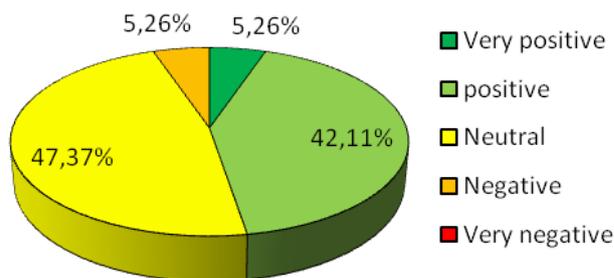
	Yes	No
8 - Did you take the participation in the "Pilot test" seriously*?	<input type="checkbox"/>	<input type="checkbox"/>
9 - If you posted a problem, was it totally or partially solved?	<input type="checkbox"/>	<input type="checkbox"/>
10 - Do you think that the implementation of iPSolving within Infineon's supply chain around the world is feasible?	<input type="checkbox"/>	<input type="checkbox"/>

How would you improve iPSolving? Please take into account that it is ment to be implemented in the whole Supply Chain around the world.

Please, use this space to make any other suggestion

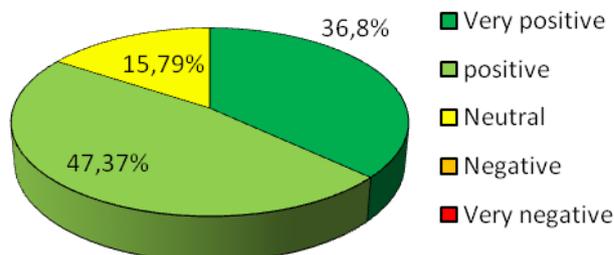
Figure 33: Layout of the survey about iPSolving that was conducted within the SC Innovations department.





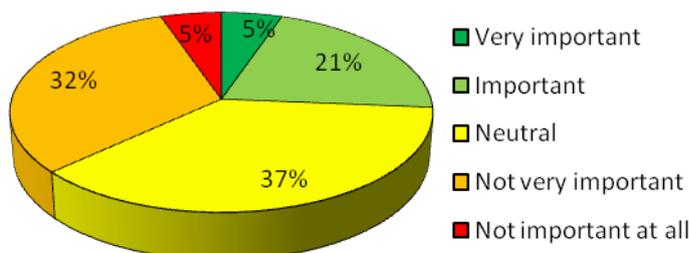
Graphic 4: Impact that iPSolving can have on the daily workload.

One of the major concerns of most knowledge management initiatives is that they always take working time from the employees and therefore, they either increase the working hours or have a negative impact on the performance of the employees. As it is depicted on the graphic below, only 5% of the participants in the pilot test considered that the initiative had had a negative effect on their daily workload. About 50% of the employees thought that the initiative would have no effect at all on their daily workload. The rest considered the initiative to have an overall positive effect. This was because they considered that the time they saved when they had their problems solved through iPSolving was more than the time spent posting their problems on the wall or browsing at the different problems posted by others.



Graphic 5: Impact of iPSolving on the employees' willingness to share and create knowledge

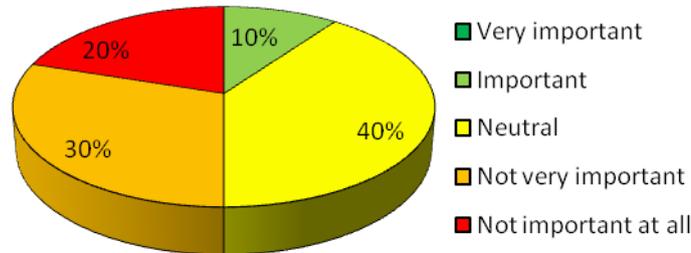
As it can be seen on graphic five, the opinion that people have about iPSolving's capacities to foster knowledge sharing and creation within the company are very positive. Around 85% of the respondents think that it can have a positive or very positive impact.



Graphic 6: Was the reward important to make you participate in the test?

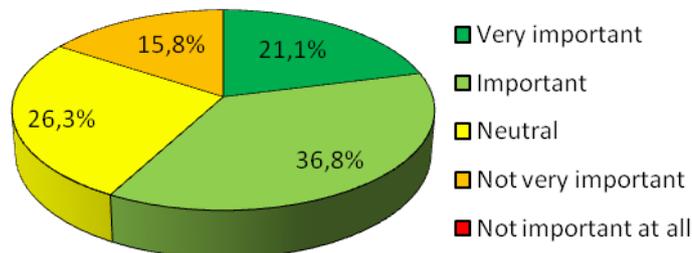


Graphic 6 shows that most of people think that the fact that there was a reward was not important to make them participate in the pilot test, only 25% of people thought it had been important or very important for them. This shows that iPSolving is innovative enough to capture the interest of the participants without necessarily rewarding them, at least at the beginning.



Graphic 7: If you have posted a problem, was it important for you the fact that there was a reward?

The graphic above (graphic 7) depicts the importance that the different participants gave to the possible reward they could obtain when posting a problem. The results show that the majority of people are not driven by the reward when posting a problem; they do it because they are interested in having their problem solved. Only 10% of the respondents stated that the reward was important for them also when posting a problem.



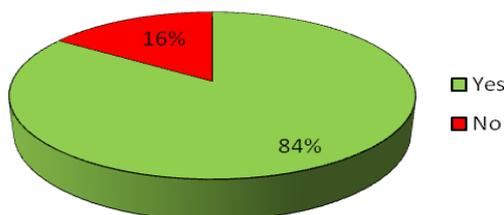
Graphic 8: If you have solved a problem, was it important for you the fact that there was a reward?

Graphic 8 depicts the importance that the participants give to the potential reward when trying to solve a problem. The graphic shows a totally different behaviour in comparison with the previous two graphics. Whereas the participants give very little importance to the reward when posting a problem, they give it much more importance when they have to spend their time to solve someone else's problem. Around 58% of the respondents estimated the reward to be important or very important when considering whether they were going to spend their time to work on the resolution of a problem or not.

Surprisingly as it may seem, 26% of the participants estimated that the reward did not play a role in either way when solving a problem and 15% judged the reward to be "not very important". This is closely linked to the employee's tendency to share his or her knowledge.



In companies with a very strong culture fostering knowledge creation and sharing, employees will be more prone to solve someone else’s problems just for the sake of building a reputation that acknowledges them as “knowledge sharers”, contributing with that to the progress of the company.



Graphic 9: Do you think that the implementation of iPSolving within Infineon's SC around the world is feasible?

The last graphic shows that 84% of the participants in the pilot test estimate that the implementation of iPSolving within Infineon's supply chain around the world is feasible. Taking into account that 100% of the respondents are Infineon’s employees who already work in the supply chain department and have therefore an insight into it, the results are very encouraging.

Among the different recommendations that the participants of the pilot test submitted, the most frequent one was that there should be a specific wall for every kind of problem. This possibility had already been considered but for the pilot test was not possible for different reasons, the most important one was that iSpace was not ready to support different walls, one for every kind of problem.

<u>Opportunities / Advantages</u>	<u>Risks</u>
Improve transversal work	Confusion between private and professional life
Reinforce the sensation of belonging	Leaks of information
Gain efficacy	Waste time
Facilitate transparency of information, improve the attractive of Infineon, facilitate innovation...	Bypass of hierarchies, diffusion of viruses...

On the table above, we can find a list of different advantages and disadvantages that can have the use of a social networking tool in the professional world. They are the fruit of long



discussions with the employees of the Supply Chain Innovations department and from the experience gathered during the pilot test.

6.2.4. Next steps

Being the ultimate goal of this project, facilitating the implementation of iPSolving within Infineon's supply chain first and then on a larger scale throughout the company, it is necessary to provide the department that will carry on with this task with a set of recommendations to make sure that the goal is achieved with the least difficulties.

Now that the success of iPSolving has been proved by the interest that so many employees inside and outside the Supply Chain Innovations department and with the results obtained during the pilot test, the first next step would be to create a set of rules to determine the proper way of using iPSolving.

Then, it is also very important to work very closely with the IT department to make sure that the future versions of iSpace fully satisfy all iPSolving's needs. Giving the user the impression that the smallest detail has been taken into account is of paramount importance for the success of the initiative.

It goes without saying that a very important aspect of iPSolving is the financial one. An estimation of the total amount of money that Infineon will have to devote annually to reward the winners of iPSolving has to be done. To do that, the recommendation is to proceed as follows: Determining the amount of people that will use iPSolving in their day to day, with that, determining the value of a problem on average and the percentage of problems that will be solved along the year.

Finally, there will have to be a database with all the problems that have been already solved in the past. The first thing that any employee will do when having a problem will be going to the database and verifying whether his or her problem has already been solved or not. There will have to be an appropriate search engine that allows the search for problems to be effective.

Of course, once iPSolving is launched on Infineon's supply chain on a large scale all around the world, there will be patterns of behaviour that will change and some structures of the initiative will have to be modified and adapted to the new environment. After having identified those changing variables and having come up with solutions to control them, iPSolving will be ready to be implemented on the whole company with more than 25000 employees making use of it and benefiting from it all around the globe.



7. Economical impact of the project

The elaboration of this work has generated the expenses that are hereafter specified.

As it has already been mentioned before, the elaboration of this work has been carried out as part of an internship. During the internship, the author of this work was expected to devote around 50% of his time to the development of this project and the rest to take part in the different tasks that appear in the hectic reality of the supply chain department of an international company.

The internship has had a duration of 7 months working 35 hours/week and the percentage of time devoted to this work has been, as established, 50%. This means that the elaboration of this work has needed: 30 weeks * 35 hours/week * 50% = 525 hours.

The salary of the junior engineer that has carried out this work was 1050€/month. As he has devoted only half of his time to this work, the total cost of the junior engineer in this work has been: 7 months * 1050 €/month * 50% = 3675€.

Besides the junior engineer, several senior engineers have taken part in the project, mainly by giving guidance to the junior engineer. On average, the junior engineer has worked side by side with a senior engineer around 5 hours/week. Being the cost of a German senior engineer working for the company of 80 €/hour, the total cost of the senior engineers has been of: 80 €/hour * 5 hours/week * 30 weeks = 12000 €.

As the project has been realized from Germany and the university advisor was from the UPC in Barcelona, several flights have been imputed to the cost of the project.

Concept	Time spent	Price	Cost (€)
Junior engineer	0,5 x 7 months	1050 €/month	3675
Senior engineers	150 h	80 €/h	12000
HUMAN RESOURCES			15675
Travel			1500
TRAVEL EXPENCES			1500
Personal computer			1028
Microsoft Windows XP	7 months	10 €/month	70
Microsoft Office 2007	7 months	40 €/month	280
Internet acces	7 months	25 €/month	175
Printing Ink			60
1000 DIN A4 (90gr)			14
MATERIAL RESOURCES			1627
TOTAL			18802

Figure 34: Cost of the project. *VAT has not been taken into account.



8. Regarding the environmental impact

As it has already been mentioned before, Infineon Technologies is a company that focuses on the central challenges that our modern society has to face. There is a special attention to energy efficiency, mobility and security but Infineon is doing a great work in other fields, many of them related to the environmental impact of today's way of life.

But Infineon's attitude towards the environment cannot be seen only in the nature of its products but also in the company culture. Infineon has taken many different measures to try to collaborate to leave the world in proper conditions for the generations to come. One of those measures has been, for example, to dramatically cut all the travels which are not strictly necessary

During the first years of the "Supply Chain Academy", Infineon's employees travelled from all around the world to the headquarters in Munich and there they did the two-day-long training organized by the SCA and the Supply Chain Innovations department. Even if Infineon could keep on paying those business trips, it is not environmentally friendly and therefore not coherent with Infineon's culture. That is the reason why it has been decided that all employees will attend those lectures by means of a conference call.

The implementation of iPSolving within Infineon's supply chain is a wonderful opportunity to foster Infineon's culture regarding sustainability and the environment. A wall will be created to post problems related with sustainability and environmental impact. Besides that, creating a community for employees who feel concerned with the environment can be a very good way to put them in contact so that further initiatives can be proposed and implemented in the future.



Conclusions

This work had as main goal the design of a new knowledge management system within the supply chain department of Infineon Technologies AG. Of course, to achieve such a goal there are some requirements that are needed beforehand and some consequences that derive during and afterwards. This has given place to two other sub-goals, the first one being carrying out a knowledge audit to determine Infineon's previous state with respect to knowledge creation and sharing and the second one being the assistance to the company during the first steps of the implementation of the new system.

The results of the study to determine the current status of the way in which Infineon's supply chain department was managing knowledge were better than expected. Not only had the company the necessary resources to build a proper knowledge management system from the point of view of technical and organizational infrastructure but also from a human standpoint. In the past few years there have been a few employees who, out of their own eagerness to improve the scenario, have tried to implement different initiatives to foster the creation and sharing of knowledge.

The main problem that has been identified as responsible for all the hurdles that hinder the sharing of knowledge is a cultural one. Many employees feel still reluctant to openly take part in knowledge management initiatives to make public what they know. As we have seen along this work this was sometimes caused by the practices of the company that were not the appropriate ones and some other times instead, it was caused by external factors such as the economical crisis.

Bearing in mind what has just been mentioned, the proposed knowledge management system will be built on three different initiatives that some employees have tried to implement just reinforcing them with a totally innovative initiative that will strive to refurbish the company culture. This new initiative will allow the existing ones to achieve the potential success they are meant to achieve. This new initiative is iPSolving and will be supported by Infineon's internal social network: iSpace.

iPSolving is thought to be the appropriate tool because it lacks the usual problems that nearly all knowledge management initiatives have. More often than not, knowledge management initiatives require a big effort from the employee, for example when an employee is asked to carefully write down how he proceeds when carrying out his normal duties so that others can read it afterwards and understand it. That is the reason why many knowledge management initiatives fail, especially if the company culture is not very strongly oriented towards knowledge sharing.



iPSolving instead, is a very powerful tool that allows the company to create a database with all the problems that different employees have had. And this, without requiring a big effort by any employee. When an employee posts a problem, does it out of his own interest to get it solved and when another one solves it, does it seeking the reward that can be either economic or simply in the form of public recognition in front of his peers. Both the problem and the solution are stored in a database from where they can be easily retrieved in the future.

But the key point of iPSolving is that little by little, without even noticing, the different employees enter the game of making public their own problems and the knowledge required to solve them. This point is of paramount importance because it has a direct impact on the culture of the company regarding knowledge creation and sharing.

As people start to overcome the mental barriers that prevent them from sharing their problems and their knowledge they are preparing themselves to take part in other knowledge management initiatives which require a bigger effort and a more mature frame of mind with respect to knowledge sharing. This is the fundamental reason why iPSolving will allow other initiatives such as the knowledge repository or iWiki to be more successful, because it will prepare the company culture to better accept them.

All the theory aside, a pilot test within the Supply Chain Innovations Department has been run and the results are more than satisfactory. With rates of 95% of the participants of the pilot test considering the overall initiative to be positive or very positive and about the same number of respondents affirming that it has had a positive or very positive impact on the resolution of their daily problems.

As author of this work and forerunner of iPSolving within the Supply Chain Innovations department of Infineon Technologies, I have witnessed the power of this initiative and I have no doubts about the competitive advantage that this knowledge management tool can be for any company that implements it.



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