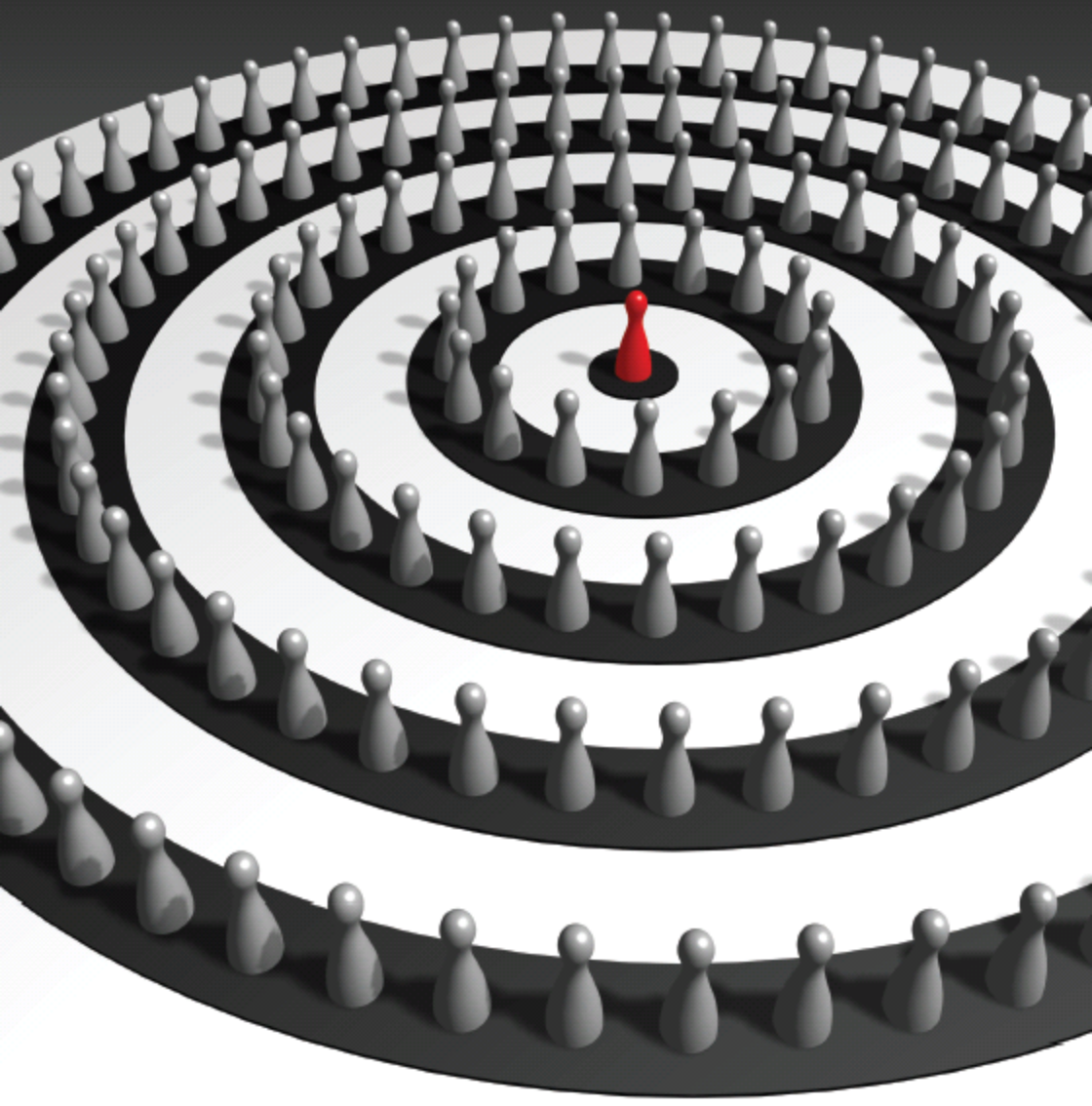Luc De Ceuster

Focus on **Project Success**
Tools & Techniques for Successful Projects

First Edition

APraCom© Project Management

Focus on Project Success

Tools and Techniques for Successful Projects

First Edition, 2010

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For Franciscus De Ceuster
who left us too early

Introduction

When I started my career in the Belgian Military in the early eighties, project management was from the start an important part of my job. At that time, unfortunately we did not really follow a strict methodology as today; nevertheless projects were there from the beginning even without calling it a "project" as such. We were just combining the things we learned because we knew that applying them properly would lead to a correct and timely completion of the project. In the case of a military operation – which would be done in wartime – we never took into consideration the cost when planning the work. We only looked at time efficiency and resource availability.

After completing the Military Academy and obtaining my Masters Degree in Construction and Mechanics, I fulfilled specialized military training going from military tactics to military constructions and planning of operations. It was during this six month period in my military career that I learned about Pert and Gantt and other project related things like Critical Path.

The knowledge we obtained was then used in military operations which of course can also be considered as projects. The large projects start with the strategic considerations and plans of the general staff until the small tasks can be identified.

The initial lesson I learned, was that projects are a kind of cut-and-past type of systems which allow you to split up a large and complex work into small, simple and manageable chunks of work that, when executed properly, allow you to achieve the initial work you intended.

It is like the nice building boxes some of us assembled as kids or still do. Those of you who still remember these days or are still assembling these building kits - my grandmother, now 98 years old always said that it were toys for small children – know that you received a large number of numbered parts and a step by step building instruction.

Following these steps carefully, will lead to the completion of the model as it is represented on the box. You may also have noticed that, although the instructions are chronologically numbered, you could do some of the work in a different order than suggested.

Later, when working for the military construction agency, I was responsible for a large number of military construction projects. The work was very similar to the normal civilian building industry and comparable with developers: we would make the project description including all work to be done and then the company with the lowest or best bid would execute the plan. We then would be doing the follow-up while the contractor would build according to his own project plan.

Later on, after I left the military and spent some time in the aviation and the building sectors, I joined "Big Blue" or IBM and later moved to another famous blue chip company AT&T. It was at that time that project management came back to me and started with my certification through the AT&T training program and culminating in my certification as PMP.

During PMI chapter meetings I was surprised how many people were involved in IT projects while almost no other sectors were represented. It was as if Project Management was something only for IT people and not for the others. When starting my company in Prague and introducing my training program to the

Czech market I also found out that many people asked: "Can this also be used for disciplines other than IT?" Of course, I would then respond. IT is a very young discipline compared to all the other disciplines that built the experiences for the Project Management Institute's (PMI) methodology as described in the Project Management Body of Knowledge or PMBOK©.

Project Management Methodologies have been built upon years of experience. Just think about some of the projects that were done in the past: Panama Canal, Hoover Dam, Minuteman and Polaris Missile projects and many others. Most of these projects have been done when the word ICT did not mean anything yet. Methodologies can be generalized or specialized or are adaptable. Some larger companies build their own methodology based upon one or more general methodologies like PMI, Prince2, IPMA and others. Building your own methodology makes it possible to fine tune them to fit your business and company specifics.

The elements you will find in this and other books will go deeper into other topics related to project management are based upon the PMI methodology and will use its specific terminology. However, everything relating to tools and techniques and practical situations are generally applicable with whatever methodology you are or will be using. Many examples are taken out of my years of experience doing project management. Do not forget, many of the skills we need are also used in many other disciplines and therefore can be very useful to learn.

This book consists of 12 chapters which will lead you through the different phases of a project. The first and the second chapter introduce a number of terms and terminology that will be used further in the book. Starting from chapter 3, we will define the project, start planning it and finally execute (chapter 11) and

close-out (chapter 12) the project. The entire overview is set up in a comprehensive way to lead you from start to finish through the project.

Our experience is that this way of presenting project management creates a lively view for our students and readers by showing what happens when we do projects. It also shows that we have a lot of freedom related to project success and that a good understanding of the initial needs is necessary to define a successful project. Many projects start with a definition of the final solution and nobody ever seems to wonder if the proposed solution is really the best solution to offer. In our competitive world, spending too much money because the project definition was not done optimally means that the profitability of your business case may be influenced negatively.

Chapter I

Terminology and Definitions

Project management has become a separate discipline in our everyday lives. Many people are using different methodologies and it is necessary for those people to use the same terminology in order to understand each other when cooperating. It is clear that a general methodology as defined in the PMBOK© by the PMI is generally understandable by all people who are using this methodology.

Some large companies like IBM, AT&T, KBC and many others have developed their own methodology taking into account their specific needs. In addition to the standard definitions as in the general methodology, they changed or added terms, developed forms and reporting procedures. In some cases, they even developed their own training program.

Not only large companies will have advantages when applying a proven project management methodology to improve performance, small and medium size companies may benefit from it too. There are many myths and misunderstandings related to projects and project management. Some of them, we will discuss or mention in this book. On the other hand, when you have already been working in the project management area or as a projects manager, you may have noticed that many things we regularly do have a lot in common with the project work we do in the office or in some distant location.

What do you think about going on a trip, planning your wedding or just doing the household? Of course, we will not always formally do as we do with large projects; nevertheless, these "small" things are also projects. We will see later what the specific characteristics of a project are.

It is clear that a good project management methodology has to be easy applicable, scalable and adaptable to a large number of situations and disciplines. It is clear that our project team when going on a trip will be significantly smaller than the project team that developed the new Airbus 800 or the Ariane V rocket.

The work of the project manager is not always a simple job. In many cases, he or she will be confronted with many new challenges and will have to find new and creative solutions to resolve issues related to technology, organization, finance and people. It is clear that a project manager is NOT and administrative person who receives papers, fills them out classifies them and send it back to the next level. Project managers need many people skills in order to negotiate with clients, team members and other stakeholders, motivate people, provide solutions for issues and many others.

I have seen many times that some secretary was promoted "project manager" since it is only an administrative job. It is clear that this is a great recipe for disaster. They finally will not understand what is happening and will not intervene as is expected from a real project manager. They probably will sit, wait and accept what is happening.

A project manager has to be able to work with people and these skills are the most difficult to acquire. It is the same with a good salesperson or painter. You can send anybody to any training hoping that they will become a top salesperson or a Rembrandt or a Rubens. Training will only give you tools and techniques and will of course improve your skills; however, courses will not turn a frog into a prince!

Next to the topics discussed in this course, a project manager should get specialized in many soft skills

areas and courses like negotiations, emotional intelligence, Neuro-linguistic Programming, presentation skills, leading successful meetings, assertiveness, leadership and many others.

In many cases, it may be easier to select a person who already has a natural tendency towards leadership, management and sales and train that person into the specific technology of the project. In many large projects, the technical mix will be so large that knowing the specific technologies that are used becomes impossible. It is however a clear fact that a project manager who also understands the underlying techniques and thus better understands the work the people in the project teams are doing will get more credit and respect than a person who doesn't know anything about what is going on.

During some meetings I organized, some people asked me the question about the knowledge of the project manager related to the project. I then explained to them that the training of the project manager is comparable with the training of a painter. The painter learns about techniques how to make the picture but he does not get the genius to be a Rembrandt, Rubens, Dali or Picasso. This genius is inherent to the person and can only be enhanced by the training they get. Somebody who does not have this genius will never get it because he or she went to an art school.

1 What is a "project"

The first step when talking about project management is to define what we mean with the word "project" is and what it is not. Of course, many definitions exist and interpretations may be different from person to person and from industry to industry. You may have heard the word already many times in different contexts around you, on TV or on the radio. Did you ever question if the meaning was the same every time?

Every project management methodology has its specific meaning for the word "project" and the definitions may be completely different to describe the same thing. Even different authors may have their own interpretation of a project. Every source we would consult may have a different definition.

My first research for a suitable definition started by consulting some old dictionaries I bought in Canada during some holidays and found a somewhat simplified definitions in the sense of "doing something in an organized way". Well, this should certainly true for a project and for many other things too. Following this definition your everyday job – even when it is not project related – hopefully fits to this description. The work done in many factories also fit with this definition and much more. Many we finally will not categorize as a project. Therefore, our standard dictionary does not provide an adequate definition for project.

When we look at the different definitions which have been published by a large number of authors which have written books about project management, we can find a number of elements that are in common and that will give us a better understanding what we project managers mean with the term "project".

Every project has at least the following six characteristics, which we will describe in detail further:

> Objective
> Activities or tasks
> Unique
> Time
> Budget
> Service or product
> Specifications

1.1 Objective

The objective relates to the final goal to achieve of the undertaking. Some examples are build a warehouse, install a new Wide Area Network (WAN), build a new airplane, install new software, and design a new software package or whatever you can imagine you would want to do.

The objective should be clearly stated and success criteria should be available to verify if the objective was obtained or not.

Without an objective, we would not know in what direction to proceed. It may lead us to very exiting places nevertheless, any way we would go to would be good, but without an objective, there can be no project!

1.2 Activities or Tasks

When we define a clear objective there will have to be some action undertaken to reach the objective. In order to reach the (complex) objective, we will subdivide the work in activities and tasks that we can easily manage. Completing them will lead us straight to the objective.

The tasks will have their own natural order, which means that some tasks are completely independent of all others while most of them can only be started once its predecessors have been completed. The relationship that exists between all the tasks are unique for each project and will provide the project manager and team a logical sequence in which the project has to be executed. Changing the natural order will prevent you from completing the project as it was initially defined.

Some examples of natural order are:

• You cannot build the roof of a house before the walls have been completed[1];
• It is impossible to complete a flight test of an airplane before it has been completely built;
• You cannot put the septic tank into the ground before digging the hole.

1.3   Unique

Projects relate to endeavors, which have never been done before and thus are unique. It is in a way like the voyages of Starship Enterprise in the science fiction series Star Trek going to unknown places or like they said it in the series "To go where no one has ever been before".

Of course, the term "unique" may be interpreted in a more general sense and does not have to be applied on everything we do in the project. Some

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1 *The statement about the roof sounds very logical, nevertheless we could consider a different way of working were we would work with prefabricated elements. In that case, we could easily build a roof separately from the rest of the house and when the walls are completed, put the roof on top of the walls. Special techniques may have to be applied; nevertheless, the work could be done differently.*

elements may be generic or have been done before while others are new. The first airplane builders were really pioneers and did many things by trial and error. They probably did not use any of the project management tools we have today. Nevertheless, they were doing something unique. Since then, many airplanes have been built and many of them were unique.

The same, we can say about building a house. Even an identical house in a different place will be unique because of the specific conditions at that place. The construction of the house in some circumstances may be integrated in a process where a company has a factory in which houses are built on customer order. The house itself you could select from a catalogue, complete the necessary formalities like signing a contract, obtaining the financing and payments and the company will start building it. On the other hand, your house will be unique because it will have to be transported to your land and the final installation and completion will be unique compared to the others.

When I was working in AT&T, I was part of a team selling and implementing network services – including all security and other services that AT&T offered – for a set of customers. Although we were offering preferably standardized services, the final design for each customer was unique.

1.4 Time

Projects are limited in time. They start at a specific date and end after completion, preferably on time or even early. Once the project starts, the tasks are being executed – each task has its own duration – and project progress is measured. Ideally, tasks are completed within the estimated

time or earlier. In many cases, the duration is longer than estimated and in some circumstances, this may influence the project duration and completion date.

We all know these "small" projects around us like building your house, reconstruction of a road nearby or installing some new software in your company that started on time or not and which seem to be never ending due to delays in project completion. Although you were given the planned end date of the project, it did not complete on time.

Projects will finally end and thus are limited in time where processes keep on repeating the same thing repeatedly. We can consider the design of the first Lexus car including the production process with test runs by Toyota as a project while the production itself is repeating the same thing all over again until the model and the production process changes and is called a process.

The end date of projects may be set by some external factors and then becomes in fact the driving factor for the project. This was the case for the Y2K[2] project. All programs – in any case the most important ones – had to be adapted to the year 2000 by removing all the old programming

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2   *Y2K refers to the Year 2000 project. At that time, all programs had to be verified and corrected if necessary. During the early time of computers, capacity was very low and expensive. The programmers at that time wrote the year 1975 as 75 which reduced capacity dramatically. The problem was that the programs using this method couldn't make any difference between the year 1910 and 2010. This could have had a lot of consequences for example when calculating the interests on your money, navigation systems and other vital systems. It was therefore very important to verify all these programs and adapt them to the year 2000.*

simplifications. The time constraint, in this case, was the most important problem and it would have been nonsense to allow additional time to complete the work. Of course, some risks existed that delays would occur and that it would be difficult to complete everything up to the last program. In order to secure the most important programs priority lists were made so that the crucial programs would not be forgotten.

1.5 Budget

Since doing projects means working on things, it also means that the effort has to be paid. We need people and other resources to do projects, so we have to pay for these relative to the effort each delivers. Unfortunately we are not living in a world without restraints so, the people we work with, the resources we need and the money we have to work with are limited so we have to organize them optimally.

Once we know the cost for each task and the time the task will be executed, it is possible to specify the budget on a weekly basis and represent that budget in a diagram, which is the time-phased budget. Starting from these estimates, we can build the cumulative budget, which shows in time how much money we are planning to spend by the end of the project is known as the Budget at Completion or BAC.

It is clear that the initial budget or initial base line is just an initial estimate of how we expect to be spending our money from the beginning of the project. Once we have changes in specifications, costs, planning and other factors the real spending will differ from the initial base line or due to officially approved changes, a new baseline is defined taking into account the new information.

1.6   Service or product

The result of a project is either a service or a product in the most general way. The existence of the project is only justified by the fact that we want to realize something to fulfill a specific need. There may be many or just one reason to do the project.

The reason may be legal, environmental or purely business and may be motivated by a business case showing a profitability that has been projected to be obtained once the product or service has been completed or installed. The business case may also relate to savings that will be realized once the project is completed.

In fact, the project starts with a need and results in a solution. It is very important to identify clearly the need and not to mix this with the solution. The initial study of the need may lead to different possible solutions and selecting the best possible solution is a very important factor in assuring project success. We will discuss this further later in this book.

1.7   Specifications

Each project or service has to be described by the specifications it should have in order to comply with the initial needs and the selected solution. Identifying and describing these specifications in detail is very important.

Many people make the mistake only to describe what specifications have to be included and forget to specify what is NOT included. Unclear specifications will certainly lead to a bad project and that is certainly not our goal!

The deliverable specifications are the baseline for determining project completion and success and are included in the project charter. This document is in many cases a contractual agreement between the project manager and the project client. The project manager should at all times keep the specifications in mind when planning, executing and closing the project. He or she does not have the liberty to change the specifications.

Although the project specifications are an important part of the project charter, they are not written in stone and can be changed during the project. The project change process controls these changes. Once the project team approves a change, the project planning, budget and baseline will be adjusted to represent the changes. It is clear that all project members have to be informed about the approved changes and everybody should start working with the new data.

All uncontrolled changes, also called "scope creep" have to be avoided because they will influence the project result, planning and budget. Uncontrolled changes may be a reason for variances between baseline and actual. The project manager has to take the necessary measures to prevent any unapproved changes or additions.

2 What is a "program"

The term program refers to interlinked projects like for example the Airbus A380 program or the NASA Space Program. In fact, programs are mega-projects, which are so big that we have to split them to stay manageable. Even the different programs influence each other and are so-called "interlinked" which means that one projects depends on results obtained in another project.

Today's airplane development programs have become so complex that they are split up in interlinked projects which are each led by a dedicated project manager and team. These independent teams are dependent on results of the other teams to complete successfully their part of the work. Separate teams design for example the nose wheel system, the main wheel system, the instrument system, the wings system and many others. It is clear that the results of these different projects depend on other projects.

Programs are everywhere and even today you may be working as a project manager on a project which is in fact part of a larger program.

3   What is "project management"

Project management or the "art of project management" relates to the way we will be managing the projects, which tools and techniques we will be using and how we will deal with changes and problems.

In order to better understand what project management is about, we will first look at managers and leaders and determine what is the difference between both and what they have in common. During my career in different companies and industries, I had the opportunity to observe many managers and leaders. I also had the opportunity to identify people who taught being a manager was the same like being a leader and acted as such towards their subordinates. However, towards their up line managers and leaders, they showed a different behavior.

Therefore, it is good to try to demystify both necessary positions within a company or within an organization. Understanding both roles will help all

people to better cooperate and act in the correct way.

3.1 Managers and Leaders

The following bullet points summarize the main responsibilities of managers:

- Execute tasks received from the management;
- Verify if the tasks can be done as requested;
- Organize and plan the work in the most efficient way using the resources at disposal;
- Report to management about progress, problems, estimates and other information;
- Direct the team members;
- Hire and fire people for the team the manager is responsible for;
- Propose solutions for encountered problems;
- Provide training and support for the team members;
- Lead and motivate the team in the best manner to obtain the best results.

This list is not extensive but gives you a short overview of what the manager is in fact doing for the team for which he or she is responsible. You also see that the manager does not have the authority to determine the mission; the leadership team of the company in fact does this. Management is done at different levels in the company or organization. The managers just under the leadership team send "orders" or instructions down to the lowest management level – sometimes also called first line management.

The managers cannot change the mission that has been determined by the leaders or leadership team! They will however organize their workforce to execute the mission in the best possible way.

The difference between leadership and management can also be compared to strategy and tactics. Managers are responsible for working out the tactical way to reach the defined strategies.

Leaders as said before determine the strategies the company, organization or army has to follow to be successful. They create the vision how the organization will operate.

The strategic or visionary statement gives direction to and builds a framework within which the management has to organize the work. Management will finally execute the "orders" received from the leadership team to bring the company to the final objective.

Some of these phrases remind me a lot of military strategies and tactics. In fact, they are very similar. The Chief in Command determines the final goal or strategy and orders are sent down to the lowest levels. Each of these intermediate levels has its own responsibility and determines strategies and tactics to realize the general strategy. Finally at the lowest levels, the platoon commanders will be the first line managers to implement the tactics that support the strategies.

During the cold war, which started at the end of WWII and ended in the late eighties in Europe, both sides had strategic and tactical nuclear weapons at their disposal. The strategic nuclear weapons were destined to destroy the supporting infrastructure of the homeland and take away the lifeline of the armies fighting in the field. On the other hand, they also had tactical nuclear weapons, which had less destructive power for use at close range on the battlefield supporting the tactics of the fighting troops.

Another nice comparison between leaders and managers brings us to a simple example of constructing a road through a forest. The leader will determine which way the road has to go and the manager will use his or her means and resources in the most effective way to build the road. The manager will not determine the path of the road while the leader will not organize and plan the work.

3.2   Project Management

Project management is like the word says, a management discipline which include the following functions:

- Plan;
- Organize;
- Control;
- Direct.

In the above 4 points, you will see that the "staffing" function is not added. This is because a project manager will not have any authority over the people working on the project. He or she will request for the resources that are needed for realizing the project to the management of the company and the different managers will delegate the team members. The project manager will manage them related to the project nevertheless; their "people" manager will manage them for other purposes.

The project manager will negotiate with the functional managers or other people in the organization to get the people he or she needs to complete the project. In case the people do not have the necessary skills or less people are available, it will have an impact on the project. Since the project manager does not have any

impact on this, it is important to observe what is happening with the people that have been assigned to the project for specific tasks.

The functional managers may withdraw people from the project even without informing the project manager. This of course can seriously influence the project outcome and as a project manager it is important to ask for support from your project sponsor in case you have one. Those of you have been working on projects may recognize this and already have experienced that people are withdrawn from your projects and you just cannot do anything against it. Of course, at the end of the project you are still the project manager and you are accountable for the results.

This course of action may look very unfair to you nevertheless it may be part of doing good business. The goal of the company is to make money and it may be a good decision to withdraw people from a less important or delicate project and allocate them to projects that are "more important". Of course, the management should also take into account the effect on your project and a good idea would be to rework the project plan with the new information and have it approved at least internally. When you are dealing with external parties, this may be more difficult and your external customer may be very unhappy.

In the following chapters, we will describe the project management process, which we will repeat whenever we start a new project. Each step of the process has its own set of deliverables, which have to be completed in order to complete the project. Project management uses techniques to plan, organize, direct and control the company resources during the duration of the project in order to complete the project obtaining

or exceeding stakeholders expectations related to scope, time, quality and budget.

Project management also deals with managing the different expectations, requirements and needs expressed by the stakeholders at the beginning or during the project.

4 Defining the Project Managers role

The project manager has a very exciting and demanding role. Management puts him or her in charge of a multi-disciplined team in order to complete a specific project with success. He has to communicate with top-level management, with functional management, and with his team. He has to resolve conflicts, negotiate, manage crises and co-ordinate and integrate activities across multiple functional levels.

Communication, interpersonal skills, understanding the line organizations he is working in and having a general knowledge of the technology used are some of the challenges he or she has to overcome.

In some cases, people with very good technical skills are pushed in the role of project manager. These highly skilled specialists are pushed into a new world were their high technical knowledge becomes a disadvantage instead of the advantage they had in their previous technical jobs. Experience shows that many highly technical people lack communication and interpersonal skills you need to be a good project manager. In addition to that, they tend to take part in project execution and do not fully undertake the management role.

Of course, there are also a large number of

technical people who have the necessary skills but who would rather like to do something else than the specialized technical work. They may be challenged to become a project manager and enhance their communication, interpersonal and management skills by following the necessary courses and trainings.

A person with good communication and interpersonal skills and with an academic background - having the basis to understand quickly the technical aspects of the project - has the best chances to become a successful project manager. His or hers previous training provides him or her with the basis of studying and interpreting new things and integrates quickly within the technical aspects of the project. Of course, as interpersonal and communication skills are key, the project manager can also have team members around him who have more technical skills to assist on technical matters.

Assigning a person with very high technical skills without good interpersonal skills does not necessarily mean that the project will be a failure. It is however necessary to take into account this lack of expertise by for example assigning an assistant who would be responsible for the managerial part of the project.

Project managers need both technical and personal skills. Technical skill include project planning, managing tasks and reporting status while personal skills relate to recruiting project participants, managing teams, leading meetings and communication on different levels.

The project manager will have to deal with both the project organization – a specialized task oriented entity – and the traditional structure of the

organization. This means that the project manager has to:

- manage the interpersonal relationships between the project members
- maintain the balance between technology and management
- manage the risks associated with project management
- operate between organization restraints

Training for the job of project management can be done in different ways. Obtaining a degree in management like an MBA, attending specialized project management and time management courses and some on the job training may be very helpful. However, the types of skills you need for project management are in many cases "inborn". Additional training though will give the project manager the tools to make better use of these skills. Somebody who does not have many communication or interpersonal skills as such cannot obtain excellence just by training alone.

You cannot make a person into a great salesperson by sending him or her to a sales training. A painter only learns techniques at the academy of fine arts with which he can express his talents better; he will not finish the classes by receiving the talent itself. It is a waste of time to push your best technical specialist to obtain management skills if he or she is missing the basis of communication and interpersonal skills.

It is a waste of time to try to teach an elephant to fly! (Unless it's name is Dumbo).

5   Pros and Cons of Project Management

Project management is not the "Holy Grail" that

will bring salvation for whatever your will do when working on projects. Project management is a great tool and unfortunately it also has disadvantages (see table 1).

Advantages	Disadvantages
Easy communication	Focus on tools and techniques
Team organization	Ramp up time
Saves time	No authority over resources
Work in a structured way	Complexity
Clear task description	Overhead
Better control over resources	Resources change regularly
Increased quality and visibility	Time

Table 1: Advantages and disadvantages of project management

5.1 Advantages

The main reason why we use project management relates to the advantages we gain when introducing a clearly defined project management process in our organization. Constantly using the process and methodology will create an organization, which will gain from the structured approach, and everybody in the organization will clearly understand what is happening and why you are doing certain things.

Easy communication
Project management operates within a specific framework with clear communication lines and relationships between people and task. Information is shared in a pre-defined way and a communication plan exists. All these elements help to facilitate easy communication between all team member, project client and external partners and all stakeholders.

Team organization
The project team gets its own identity and organizational structure, which enforces cooperation and efficiency. People get the feeling to work on something special and it makes them motivated.

Time saving
Organizing the work in a clear way gives all people working on the project and the project stakeholders a good overview of what is going on. Less time is lost because of the organization, the defined communication lines, the clear work descriptions, and control structure and project schedule. Task optimization and planning are possible and lead to important timesavings.

Work is done in a structured way
The project plan shows to all participants how the work has to be done and in which order and sequence. Everybody knows when to start working on which task and what exactly has to be done.

Clear task description
Every task has been identified during the project-planning phase and has been described in full details offering the people working to complete the task a perfect understanding of what has to be done to complete the task, when it can start and when it should be completed.

Better control over resources
Resources come and go when working in project mode, allocation of people to tasks has been done during the planning phase and the respective managers should have given their approval for the planned periods. The project manager has a detailed list of what people should work on what tasks from when until when. It becomes "easy" to

follow up if everything is done the way it is planned and managers who agreed can easily be contacted when they do not assign the people as promised.

Increased quality
Tasks descriptions are clear and include the quality standards to which they have to comply. A continuous follow up of this guarantees of course repeatability of first class performance. In the project process, integrated quality insurance enhances project quality.

Increased visibility
When we define a project and assign a project manager with team, the company communicates this through different channels. It gets even more attention when a Vice-President is assigned as project sponsor.

The project manager and the team members will get more attention within the company and this may have a positive effect. Visibility is great, nevertheless, we should not forget that when everybody knows you in your success, they will certainly know and remember you in your failures!

5.2   Disadvantages

Like we said before, project management does not only mean that we are getting advantages, unfortunately applying project management and introducing it as a process in your organization also has disadvantages.

Too much focus on tools and techniques
People may start to focus on the tools and the techniques and forget how to work with people. Hiding in an office, looking at reports and doing calculations may be more attractive for many

people than dealing with the problems of the people and finding ways to solve important issues.

Ramp up time

The idea of project management is to think about what you will do before you start and that may create the mistaken idea to some people for whom you are realizing the project that nothing is going on. I have seen it many times when implementing telecom projects with AT&T. The customer received a lot of attention during contract negotiations, but when the project was transferred to the implementation team, suddenly all contact was gone and the customer felt left alone. This problem can easily be resolved by explaining to the customer what is going on and what the next steps that they can expect are and then updating them on a regular basis.

No authority over resources

We already mentioned that the project manager will get his or her resources from different teams with each their manager who is in charge of them. The project manager unfortunately not always has a lot of authority about the people he or she is working with. A lot depends of course of the organizational model the project manager is working in as we will see further in this chapter.

Complexity

For small projects, the project structure may still be simple; nevertheless, for large projects this may become more complex. Introducing project management will in all cases add complexity to the work you are doing: you will have to follow specific rules, the work has to be done in a certain way, and you have to report to the project team and so on.

Overhead

The project team will manage how the work is done without contributing to the work itself. They are necessary to fulfill all the administrative and typical project work and are in fact overhead which would not be there when just doing the work without using structured project management processes.

Resources change regularly

Different people do different tasks. They are assigned to a specific task only for the duration of that task. The same people may have been assigned to other tasks too. People arrive when they are due to start working on the tasks they are assigned to and leave again when their mission has been accomplished. It is clear that the movement of the people doesn't make the work easier.

Time

To set up a project plan, we need time and preparation. The same is true for completing the specific project management tasks, which would not be necessary when we would work without using project management.

6   Benefits of project management

Past experiences clearly show that applying project management principles leads to improved project performance. Projects are completed within time, on budget, scope and with the promised or even better quality than planned.

Benefits of projects can be recognized in three areas: project client, project and people. In the following paragraphs we will have a quick look at these different elements.

6.1 Benefits relative to management and the project client

Management and the project client are interested in a successful project and want to know at all times where the project is and what the situation at completion will be. Knowing when it will be completed and how much it will cost, what problems occurred and may occur, what risk factors were and what risks may still influence the project in the next project phase. They also want to know the situation of the different project milestones.

Companies that have a clear project management structure provide a transparent overview of the situation of the project at all times. The stakeholders have an overview of what is going on and they feel happy because they know what is happening and know the project manager is in control of the project.

Systematically using project management also has the following advantages:

- The project definition document is clear and well understood by all parties;
- All deliverables are clearly described;
- All stakeholders are constantly informed about the process;
- The process builds credibility between project manager and the stakeholders;
- Quality is assured by strict controls and decision points;
- All stakeholders are actively involved in the process;
- The company builds a powerful database with past project data.

6.2   Benefits relative to the project

The systematic approach to projects when using project management offers the project manager and team members a systematic repeatable approach which guarantees an in depth study at the early stage of project definition, planning, execution and control and the close-out phases of the project.

Benefits are:

- The team plans for sufficient time to investigate the project thoroughly so that all the tasks will be identified, completely documented and budgeted;
- Each task will have an owner, supporting team members and other participants which are identified by name and for which management approval and support has been obtained;
- Risk management is conducted and a risk management plan is set up with allocation of responsibilities to assigned team members;
- The project manager is encouraged to evaluate, revaluate and re-plan together with the team and project client. This provides a constant update of project performance for all concerned parties;
- Potential problems and opportunities are identified early in the process so that the necessary actions can be prepared to reduce the impact of the problems and the enhance the occurrence of opportunities;
- Ensure the project client, management and stakeholders that all tasks have been identified to reach the project final goal and that the project is completed when all planned tasks are finished;
- The installed change management process ensures that all requested changes are

> thoroughly studied and consequences are know by all parties before they are accepted and a new project plan and baseline is set up;
- The project plan provides a baseline against which trade-offs can be considered.

6.3   Benefits to people

As we said before, people move around a lot when working on projects and some people may feel insecure because of the changing nature of the project work. However, once a project has been defined and people have been assigned, the project manager starts also building a team identity and people start feeling they belong to something important. Projects get a lot of attention and in many cases has a lot of visibility within the company or organization.

People may leave for different reasons and other people may be added for a short or longer time to the project. People may also move from project to project and they will have to take over tasks that have been done by other people before.

The major benefits are:

- The project creates a team feeling for the team members;
- The team members get a lot of visibility within the company which may have a positive effect on their career;
- A lot of work is done in a project way and people with project experience tend to find new and exciting jobs more easily and generally earn more money;
- The work done is clearly documented and can easily be passed on to other people;
- People are working within their level of competence;

- People have the opportunity to get additional training in specialized courses. They will improve their skills on the job because senior project and team members will mentor them.

7 The scope triangle or triple constraint

Projects are about completing a certain scope with a certain quality level within time and cost boundaries. This relationship is represented in what we call the scope triangle as shown in the figure 1.

Figure 1: The scope triangle

For a specific combination of scope, time and cost the quality obtained is given by the intersection of the three lines in the triangle. Whenever we change one of these parameters without changing the others, the quality level of the project will change.

We also refer here to what is called the "triple constraint". This means that when we will define the project we will also identify what constraints drive the project. Which of the three parameters is driving the project? It is very important to identify this during the project definition process since it

will determine how you will handle changes in one of these parameters.

8   Types of "Creep"

Creep is an unwanted phenomenon in project management, which refers to unwanted and uncontrolled additions to the scope of the project. In fact, the people working on the different tasks generally add some elements or do unscheduled work. Creep may be the result of the inspiration of the person or team working on a specific task or one of the stakeholders asks it directly without following the prescribed change control process.

This type of creep is also referred to as "scope creep" when additional work is done which was not included in the original scope or "feature creep" when additional features are added that were initially not required.

Both scope creep and feature creep create extra work and thus time and money. In fact people will be working on items that were not planned and they will spend more time to complete. The combined result of this is that the original timing of the task may not be met and will thus finish later and the extra work will have to be paid so the costs will be higher too.

It is clear that the combined effect will lead to schedule delays and cost overruns. The differences may not be significant for one task; nevertheless, we will also have to take into account what this unplanned work will do to the tasks that are following. Generally, scope and feature creep will endanger the final outcome of the project for which you, the project manager are responsible.

I do not have to say anymore that identifying and stopping creep is necessary. The team members perform their tasks as described. They report all possible issues to the change manager before implementing them. Once all stakeholders approve the changes, the new project baseline will take into account the additional time and cost and there will be no problem related to project success.

In projects, we also may recognize some other types of creep. You may already have observed this before in projects or you may remember some of these things from everyday life.

• Hope creep – relates to increasing levels of hopeful thoughts when approaching the end of a specific task. You still may have had a lot of work to do (generally more than possible in the available time), nevertheless you have good hope to complete it without any problems. Delays are not a problem since you have good hope to catch up and finish in a world champion sprint to reach the goal even ahead of time. Identifying hope creep will help you to identify potential problems and find resolutions for them:

• Effort creep – the team members are working hard on their task, nevertheless they do not seem to advance in the same proportion. It can be a result of scope or feature creep where people are working hard doing things that have not been included in the task description or they are just working without producing anything. We all know the saying that the last efforts are the most difficult and the last work on a book (do not tell me, I know what it is to finally finish this book and the others) to finish the last tiny details.

9 The pain curve

In order to demonstrate the pain curve, let us consider two approaches to a simple project like doing some small modifications in your apartment. As many people would do, you would just have some vague idea about what to do and then you just start doing the work without any prior planning.
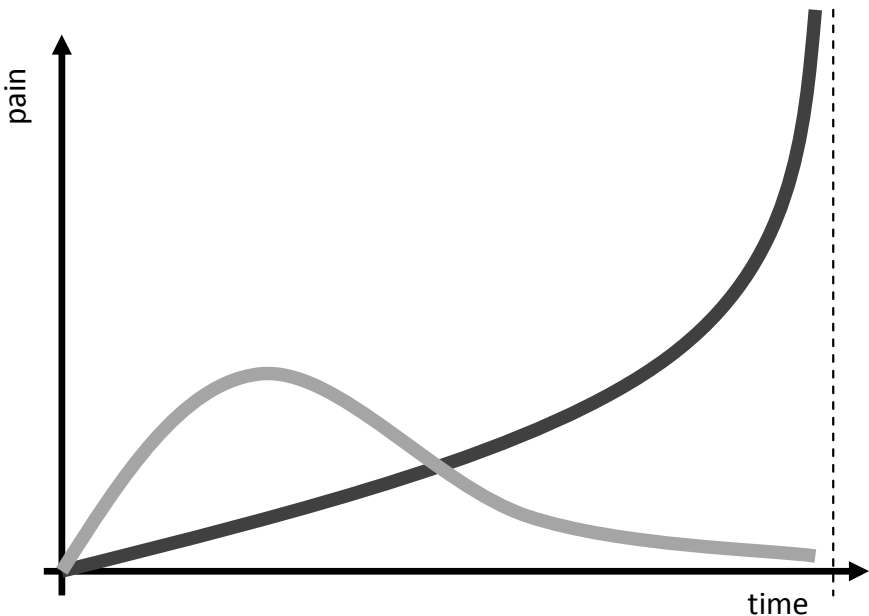
Figure 2: The pain curve

You will notice that starting to work is very easy and simple and not much effort is needed to do the work. You just do the things, buy what you need and continue. But, as you continue, you will see that you forgot some things and you cannot continue until some items are ordered – which may take some time – and in the meantime you are in the mess you created by just starting to work. The drama does not stop here and some more things happen, work that has been done has to be redone and extra costs incur. You see that the stress or pain level gradually increases and

becomes higher as farther you continue in the project. This is represented in figure 2 by the dark grey curve, which starts smoothly, nevertheless from one point it goes up exponentially.

On the other hand, when you apply project management to do the job, you would start by planning and preparing. Of course, you will see that the effort increases at the beginning, nevertheless after the preparation, you just have to execute the tasks as you planned and the work really becomes easier. It will not be done without pain and the final pain level depends from the quality of the preparation. A bad or incomplete preparation may resemble the first pain curve. Let us suppose that you planned everything well, then you will see that the pain level evolves like the light grey

Like in many things, a good preparation is very important. It will help you reach your goals in the best way. Napoleon was in his era considered a genius because he could change his plans very quickly and won almost all his battles. He did not consider himself a genius.

He said that the reason for his success was due to the preparation of every battle that he evaluated all possible scenarios before starting the fight. Knowing all possibilities, he was able to apply them very quickly with astonishing effects.

This would not happen if he would only have had one plan and he would have to improvise when something unexpected happened. The same is valid for any other endeavor or project we undertake.

Good preparation will help you to reach excellence and will astonish the people around

you. The project management process as we will describe it further in this book will show you how to get prepared and how to prepare for other scenarios.

10 Risk

Risk in project management is also referred to as uncertainty and may be negative or positive. Risk management will be discussed more in detail in chapter 10 and in other books in our project management series.

Negative uncertainties are referred to as threats while positive uncertainties are referred to as opportunities. It is clear that during the project management process we will pay extra attention to the uncertainties. We will evaluate how their effect on the project may be and will prepare special plans when necessary.

During my career, I encountered different kinds of people. Some of them really became nervous and angry when we started talking about risk and clearly proclaimed that they would not accept any risk at all! Of course this statement puts you in a very difficult position since risk is everywhere!

It is of course a sign of good preparation and serious work that you and your team thoroughly study the possible risks and prepare the necessary measures to counter the threats and to enhance the opportunities. Not knowing them before starting the project will put you on the side of improvisation the moment a risk event would happen and you would also not recognize the trigger events of several risks and would only notice the risk when it occurs. It is clear that such an attitude is not acceptable and will surely endanger final project success when it relates to

threats and you will not recognize the opportunities that could make your project better.

11 Quality

During the last decades, quality of what we do and deliver has become more and more important. Some of us may still remember the stories about the people assembling an engine and forgetting tools in it. They did not even take the action to take the tools out of the engine because they were not responsible for quality. The quality inspector at the end of the production chain has to verify for quality and repair the items that were not done properly. You can imagine the extra work and cost just to take the forgotten wrench out of the engine when the car has been completely assembled. On the other hand, the wrench will be missing and next to the cost of replacing the wrench, you also have to add the cost of loss of efficiency because the worker has to find a new wrench or use somebody else's.

Today, we integrate quality in the working process – or should integrate – and processes like Total Quality Management (TQM), Six Sigma and Kaizen have been introduced to improve quality. Improving quality not only improves customer satisfaction, it also improves the production process and the cost position of the company by reducing rework, repair and scrapping to minimum.

Quality in the industrial concept today does not refer to the differences between a Leica and Nikon Camera or Trabant and Mercedes. It refers to the ability to produce repeatedly as you promise. For example, the quality of a MacDonald's hamburger is not comparing it with high-class food. Quality relates to the repeatability

of hamburgers with the same quality, taste, temperature and other characteristics you promise to your customers.

Like everywhere around us, projects will also have to be delivered with a certain quality like the delivered products or services. The project management process and the concept push us to think constantly about how we can improve project performance and deliverables. Quality standards will be built in the process and into the task descriptions.

12 Organizational Structures

Companies may be organized in different ways. The most common and oldest form or organization is the functional organization, as we will discuss in the following paragraph. Many other possible organization styles exist and not all of them can and will be discussed as a part of this book. We will only describe the functional structure, matrix structure and project organization.

You may also encounter different types of organizations and combinations of the ones discussed hereafter. You can also find more information in publications describing organizational structures and their applications.

12.1 Functional

The typical functional structure is represented in figure 3. It is the oldest type of organization and organizes the people around the functions like Research & Development (R&D), Information and Communication Technology, Production, Human Resources (HR) and many others, which we did not represent in the figure 3.
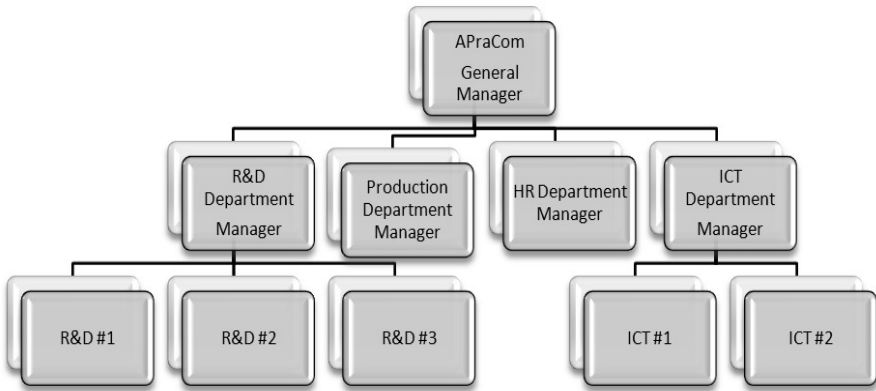
Figure 3: Organization chart for a typical functional organization

The communication model is not flexible since all communications from one function to another function has to follow the hierarchy and pass all levels up and then down again. It is clear that working on projects in this organization can be very frustrating for a project manager. Generally he or she will belong to one of the functions and all communication with team members belonging to other functions will have to go through the entire hierarchy. The functional manager keeps all the power and the project manager depends totally on them.

12.2 Matrix

The matrix organization as represented in figure 4 offers more possibilities to the project managers.

Next to the functional structure, project manager have assigned teams and authority to work with them as shown in the figure 4. Depending on the strength of the relationship, we can refer to a "strong" or "weak" matrix.
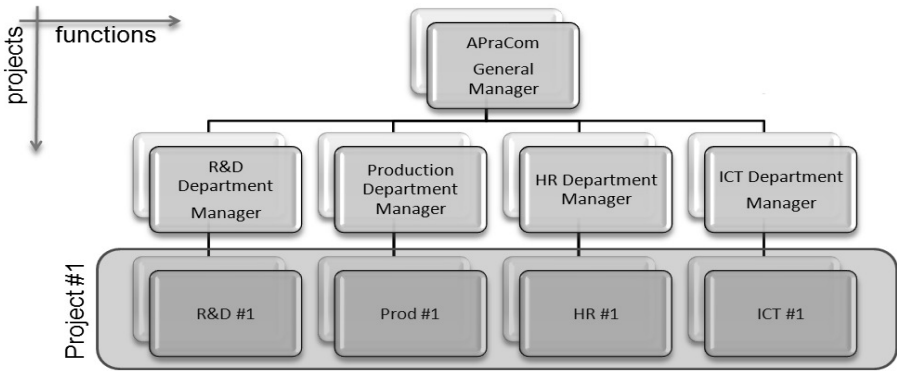
Figure 4: Organization chart for a matrix organization

The matrix structure recognizes the authority of the project manager and gives more authority to organize the project. The people themselves are organized in the functions which assure the best ways of keeping the people up to date within their specialty.

12.3 Project Driven

The "real" project organization is the project driven structure as shown in figure 5. Everything is organized around projects and the project manager has real authority on the people who are working on the projects.
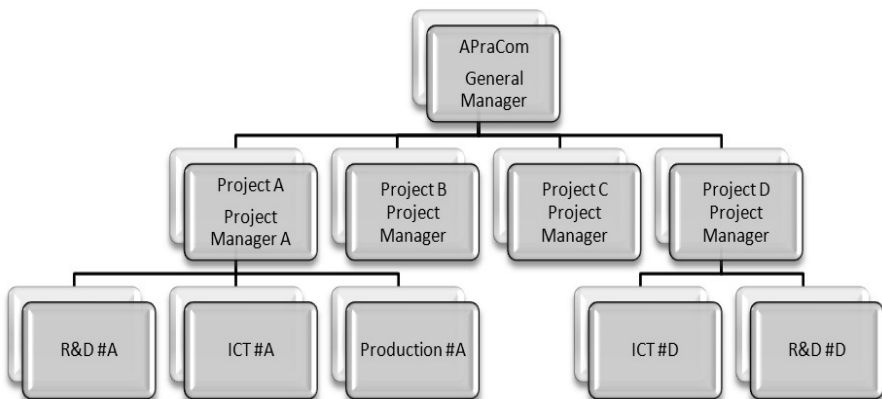
Figure 5: Organization chart for a project driven organization

Chapter II

Project Management Process and Life Cycle

13 The Project Management Process

The project management process describes how we will apply project management to the project in a repeatable and structured way and describes the different phases with the respective steps, tasks and deliverables.

The project management process consists of 5 steps which in chronological order are: initiation and definition, planning, execution, control and finally close-out. The process is represented in figure 6.
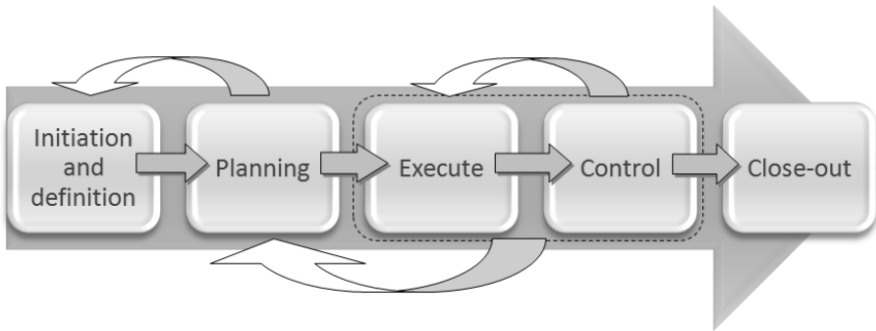
Figure 6: Overview of the Project Management Process

The arrows indicate feedback loops within the process. Once initiation and definition is completed, we can start with the planning phase. It is clear that during the planning step, we will encounter elements that we have to clarify and eventually, the previous phase will have to be redone and adjusted. The same happens between execution & control, which are in practice done at the same time until the project is finished. It is clear that we will adjust the planning due to elements observed during the execution & control phase, due to the occurrence of risk events or approved change requests.

13.1 Initiation and definition

The first step of the project management process relates to the initiation and definition of the project. This may be the most important step of the all project management process and is the foundation of everything we will do during the next process steps.

Defining what to do is crucial since it will describe what we will have to deliver when the project is completed and what the success criteria are. An unclear or incomplete project description will lead to misunderstandings, misinterpretation and finally project failure. During this step, project customer and project manager have to agree at least on following points:

- What is the problem or opportunity to address?
- What is the final goal?
- What are the objectives to be met in order to accomplish the goals
- What are the assumptions, risks and obstacles that may affect the project?

The result of this step is the project charter, project definition document or the business case. This document describes the contractual agreement between the project client and the project manager.

It is necessary to describe the opportunity and the final definition as clear and complete as possible. It is preferable to add a list of items or features that are not included and should not be developed. A "not included" list is necessary to avoid misunderstandings and misinterpretation.

During the following steps, hopefully only during the planning phase, it may become clear that

some items in the initiation and definition step has not been done well; we will re-open the project definition until all misunderstandings are resolved. Not reacting to weaknesses will lead to problems during the following phases and repair will become more difficult and more expensive as we go further.

A good project definition could remain unchanged during the total duration of the project if all needs remain unchanged. However, reality is not always like this. Things may change due to legal changes, changes in the business environment and identification of additional needs. In those cases, it may happen that the project will have to be changed to comply with the new needs and the project manager will start the change process.

In the previous chapter, we also described creep, which are uncontrolled changes. It is clear that whatever happens, changes can only be implemented after approval of the change request. Everybody working on the project that identifies change requests, in whatever form, has to send them to the owner of the change process.

13.2 Planning

Once the project definition has been completed and the project definition document has been approved, the project manager can start planning the project.

As shown in table 2, the planning phase is composed of five steps, which finally lead to the completed project plan. During planning, the project manager and team will study the project in detail and will obtain an in depth knowledge of the project and will identify possible issues and opportunities. They may also identify possible

weak spots in the project definition document, which will have to be clarified with the project client and may lead to a revised project definition document. We repeat this until both project client and project manager are satisfied.

Step	Deliverable
Generate Tasks	Work Breakdown Structure (WBS)
Roles, responsibilities and estimates	Responsibility matrix, effort and duration estimates
Task interdependencies and critical path	Project network and critical path analysis
Develop Schedule	Gantt Chart
Resource loading and leveling	Resource loading histogram
Generate project budget	Time phased and cumulative budget or S-curve
Develop risk management plan	Preventive and contingency plans

Table 2: Overview of the steps and deliverables of the project planning

The project planning itself is also an iterative process during which we will fine-tune tasks, available resources and other parameters to obtain finally the baseline plan for the project.

As we said before, the project plan is not written in stone and may be changed as if a ship will change its ideal course in order to avoid icebergs (we all know of who did not) and arrive safely at the destination. Each change of plan will lead to reviewing the planning phase and make a new project plan and baseline.

Some people may say that the planning work is a

loss of time since the project plan will change anyway. However, the following reasons and advantages may convince them of the opposite:

- Reduction of uncertainty: the project plan will show us where threats and opportunities may exist and the detailed overview makes us think about the project and ask a lot of questions about pricing and other issues. Like Napoleon, we have the possibility to prepare for all possible scenarios that may occur;
- Increase understanding: during the planning phase, we subdivide the project into small easy to assess tasks and we get a clear overview of the anatomy of the project;
- Improve efficiency: the identification of the tasks and order in which they will have to be executed, shows us which tasks are crucial for completing the project on time (critical path) and we know where we have to concentrate our attention. Without a clear and structured approach, we would have no idea about the critical path and we would be tempted to concentrate on all tasks even the ones that are not critical.

Project planning starts at the earliest stage of the project and for long projects, we may miss a lot of information. We will describe this later in more detail when we introduce the "rolling wave approach". It is clear that the project planning further in the project includes more uncertainty than the project plan in the near future. Once we reach a new planning horizon, we will rework the plan with all the new information and obtain a new plan with less uncertainty. We will repeat this for every planning horizon we reach.

13.3 Execution

Once the project plan has been completed and complies with timing and budgetary restrictions, you may get the final approval to start working on it. Everything depends on how well the project complies with the business needs and any other constraints that exist within your or the clients company at the moment you present the final plan.

Until now, you only got the approval to prepare the project and only limited funds have been reserved for this. You can only start working on the project once you get approval for the rest of the needed funds or perhaps only the funds to work until the first milestone.

The first thing to do after project approval is to organize a "kick-off meeting" where the entire project will be presented to all stakeholders and where everybody will informed about what is going to happen. The kick-off meeting is very important certainly, when you will be working on an international project and many of the teams will be "virtual" teams. Getting a budget for a kick-off meeting or perhaps a video conference should be included in your budget. The kick-off meeting may be the only opportunity for all team members to meet each other in person. The value of this is in many cases underestimated by many people.

From project execution, the teams really start working on the defined tasks, money will be spent and deliverables will be prepared. The tasks of the project manager change from a planning role to a more management and problem-solving role.

13.4 Control

Once we start executing the tasks, we also start controlling the work done and compare it with the baseline plan. Today, reporting periods are scheduled weekly and every week the project team members have to send in reports about work planned, work done and cost incurred.

The project manager will compare these reports with the baseline plan and investigate variances, plan measures if needed and report status, variances and planned actions to the stakeholders.

At predefined intervals different meetings may be planned like status meetings, risk management meetings, change control meetings or others. Different people may participate at these meetings depending on the task allocation done by the project manager at the beginning of the project or according to specific needs formulated by the stakeholders.

Some people may not like control much and they probably had bad experiences in the past where control was applied in a repressive way and was just used to catch people doing something wrong. I strongly believe in the positive application of control were we focus on problem resolution, helping people to improve and last but not least to learn when people did something good and offer an opportunity to reward them for the positive things they did.

I remember one of our secretaries when I was professor at the Belgian Aviation School who complained to me about the fact that nobody "controlled" her when she was arriving early morning and only made remarks when she was

leaving "early" compared to the others although she worked eight hours. She also made remark that nobody was looking at the work she was doing and never gave any feedback. She did not feel sure about the quality she was delivering and wanted to have somebody to confirm if she was doing well or not.

I also remember people who were fired after working more than one year on a job because they did not do all the work they needed to do and the work they did was not done how the manager liked. Unfortunately, the manager never told what was wrong or gave the person a clear task description, so what else could he or she expect. In my opinion, the manager should have been fired!

13.5 Close-out

People tend to leave the project once the execution & control phase are over and unfortunately, the project manager ends up alone while there is still a lot of work to do. I call the close-out phase sometimes also the "escape and runaway" phase just because of that.

In fact, the close-out phase is one of the most important steps of the project and should be treated as such. There is still a lot of work to do and of course, many of the people who have been working on the project may be released but not everybody. A number of people should stay available to complete the close-out.

Some tasks that still have to be done during close-out are:

- Verifying that all tasks have been completed successfully;

- Officially sign off remaining tasks;
- Obtain client acceptance and sign-off;
- Install project deliverables;
- Complete project documentation or as built plans;
- Complete post-implementation audit;
- Issue final project report;
- Reward people for their performance;
- Conduct a lessons learned session;
- Celebrate your success with a party.

Unfortunately, in many case all these tasks are not done because everybody thinks the project is finished, why still continue with some "unnecessary" work. The truth is that when you do not conduct the close-out phase you will lose a big opportunity to gather valuable information that can later be used to improve your projects by providing a treasure of experiences to your project managers when they start working on new projects.

It is clear that when you want to mature in project management, gathering all the historical information is one of the first and most important steps and it may be the first building stones for you new Project Management Office (PMO). The historical information will also provide you with a treasure of statistical information that can be used when establishing portfolio management in your company.

14 Rolling wave approach

Projects relate to new ventures and some may rather look very adventurous. New things include many unknowns and when starting with a project we will be able to identify a number of these unknowns in what we call the "planning horizon".

Our view is limited in time and some elements related to the project, which are further away from us, may be unknown.

In project management, we describe this as "the rolling wave concept" where the project manager only has a limited view into the future of the project. In addition, the project may be related to some completely new product or service or may take several years to complete. In that case, the project manager will not be able to foresee the far future (many of us would already be happy to foresee the near future).

Going through a project is like climbing a mountain for the first time. The mountaineer only has a limited view of the mountain and cannot see the parts of the mountain that are hidden and in the visible part; he cannot see all the details that are necessary to choose the safest passage. It is only after passing some obstacles, that the mountaineer will learn more about the hidden parts of the trajectory as shown in figure 7.
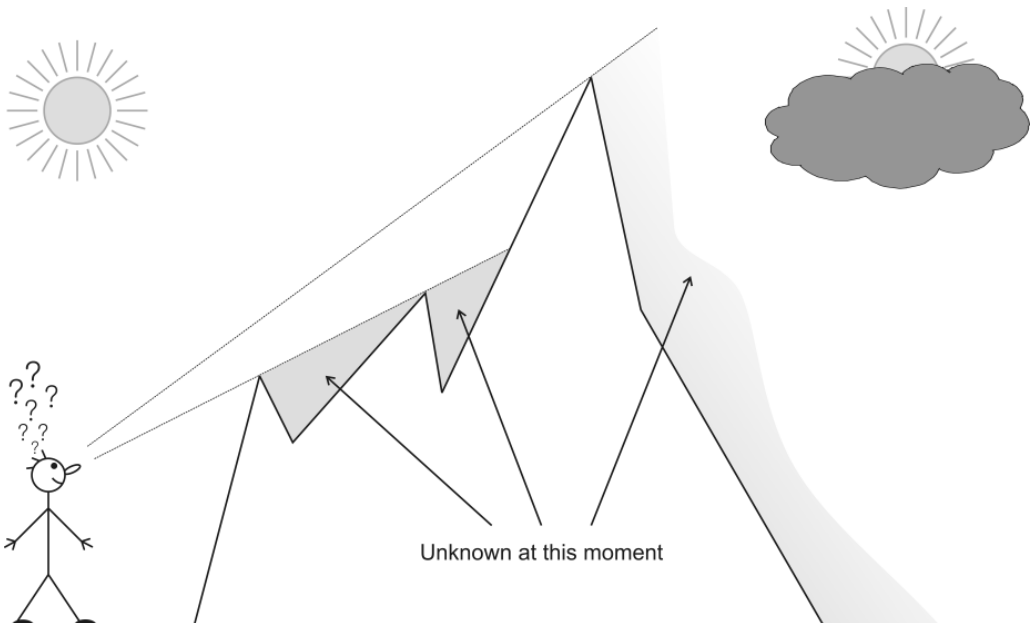

Unknown at this moment

Figure 7: Rolling Wave Concept

When we start with the project and more particular in the planning phase, we just can see the front of the mountain and do not know what is behind it.

At this time, many things have to be assumed or sometimes we do not even know there is a possible risk.

It is only when we start going, we will be able to see farther than the initial "planning horizon" and that we will have more information about the uncertainties. In some cases, we will see that some of the uncertainties disappear while others are worse or better and new ones may still appear.

15 Project Management Life Cycle

Next to the Project Management process, we can also have a look at the Project Management Life cycle.

Each project is characterized by a number of steps that each has its place within a certain phase and which have corresponding life cycle tasks and specific deliverables.

Table 3 shows the overview of Life Cycle tasks and deliverables, which correspond with a specific project phase.

This overview will be the basis for the next ten chapters in which we will describe the chronology in which we have to work in order to complete all tasks to guarantee project success.

When executing all steps in the order as described, we will not forget any important steps during definition, planning, executing & control and close-out.

The sequence to follow is divided in logical steps, which may be subdivided even further in sub-steps.

Initiation and definition:	
1. Define the project	*Deliverable(s)*
Describe the opportunity Determine the project goal Define the objectives Identify success factors List assumptions, risks and obstacles	Project Definition Document, Project Charter, Business Case
Planning:	
2. Generate Tasks	*Deliverable(s)*
Identify project activities	WBS Task Descriptions
3. Roles and Responsibilities	*Deliverable(s)*
Estimate effort Estimate activity duration Determine resources requirements	Responsibility Matrix Estimates
4. Task Interdependencies and critical path	*Deliverable(s)*
Determine task interdependencies Construct Network Diagram Calculate Duration, Start and Finish dates and slack	Project Network Diagram Critical path
5. Develop Schedule	*Deliverable(s)*
Present tasks in timed schedule Document work packages	Gantt chart Milestone chart
6. Resource loading and leveling	*Deliverable(s)*
Set up project team Time phased resource usage Identify and solve resolve issues	Resource loading data

Planning continued:	
7. Generate Project Budget	*Deliverable(s)*
Estimate costs of tasks Calculate time phased budget Calculate cumulative budget	Budget at completion
8. Risk Development Plan	*Deliverable(s)*
Identify threats Identify opportunities Qualify and Quantify risks Determine action plans	Risk Management plan
Execution and Control:	
9. Track and Manage	*Deliverable(s)*
Set up progress reporting system Change control process & tools Define escalation process Monitor progress versus plan Revise project plan and baseline when necessary	Status reports Action plans Status meetings Change request log
Close Out:	
10. Post Project Review	*Deliverable(s)*
Client acceptance and sign off Install project deliverables As Built Documentation Post-implementation audit Issue final project report	Project History As built plans Project Documentation Lessons learned

Table 3: Overview Process Steps, Life Cycle Tasks and Deliverables

Chapter III

Define the Project