Fontys
University of Applied Sciences

Plan of Approach

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Preface.

"Predicting is difficult, especially when it comes to the future". (Niels Bohr)

This statement by Niels Bohr *(Danish physicist and one of the founders of quantum mechanics)* shows exactly where the difficulty lies in writing a Plan of Approach. You are asked to indicate what your project will look like, how long it will take, what it will cost, what you need, etc. Regardless of how much experience you have in working in projects, it remains difficult to look into the future and to assess what will come your way. This reader will help you to do that as structurally as possible.

This reader describes what must be included in a plan of approach. In order to ensure that the working method in this reader applies to all projects (Sim, eXPo, Stage, IPD, S7 and graduation), the content has been kept as complete as possible. A plan of approach for an internship assignment is of course different from the plan of approach for a sim project. The Plan of Approach for a small and simple project can therefore be more compact than that of an internship or graduation project. In this reader, we tried to create clarity on **why** certain matters should be included. The essence of the Plan of Approach is that you think before you start, about how your project should be run. Always use your common sense and make the Plan of Approach not a simple fill-out exercise.

Good luck

1 Table of Contents

2 Introduction.

During your training at Fontys you are almost continuously active within the various project groups. Project work is one of the best ways to test your theoretical knowledge. During the projects you will also discover that you lack knowledge or skills, and that you have to learn this needed knowledge and skills yourself. It is also most likely you will work in project groups at your future employers. This is because a project is an ideal way to achieve a development result. To bring a project to a result, not only technical knowledge is needed, a project also needs to be managed. Before you start a project you have to think about how you want to organize the project, who do you need, what resources / facilities do you need. How do you report, and to whom. Before you start the technical development, you must create the organizational conditions to start this technical process

What is a Project?

A project is a process in which we work towards a set goal with limited means. It is by definition a one-off and is characterized by a limited timeframe, within which the set goals have to be achieved. A project is usually carried out in collaboration with people with different backgrounds, knowledge, skills

The fact that projects are a suitable way to achieve your goals does not mean that all projects will succeed. On the contrary. Many projects fail due to:

- The lack of a clear Business Case (business justification).
- The lack of ownership (Client).
- The lack of support within an organization.
- The lack of acceptance criteria and quality criteria.
- Inadequate involvement of the project members, rivalry or even a fight.

A good project must meet a number of conditions in order to be successful. Simply putting a group of specialists together and hoping for a brilliant solution will not often lead to success.

That is why the first step for a successful project is making a project plan. The "Project Plan" is also called the "Plan of Approach: PoA". We will use the term PoA in this reader.

The PoA states, exactly as the name says, how you will carry out your project. So it does not yet contain any answers and / or solutions for the problem that you have to solve with this project.

The PoA has several functions:

a) You are forced to think carefully about what needs to be done in the project prior to your project activities. By thinking carefully beforehand, your project will run better and you will encounter unforeseen events less often.
b) A good PoA is often required to convince the client that you are the right person / project group to run this project. When it concerns projects that are carried out by people outside your company, the PoA is often used as a sort of quotation.
c) If your PoA is approved by the client, the project can start. The PoA then has the function of a contract. After all, you have recorded what you are going to do, when you are going to do it and what you are going to deliver. In this way you make the client equally responsible for the project.
d) Because all agreements, circumstances and conditions have been laid down prior to the project, you can respond better to changed situations. If these agreements, circumstances or conditions change during the project, the consequences can be judged immediately and you can determine the alternatives and consult them with your client.
e) It is your roadmap throughout the project to meets the goals, the terms and conditions that have been made.

A good plan of approach is therefore essential for a successful project.

But, when do you now have a "good" plan of approach. In short, you can say that: a PoA is good if all goals, agreements, circumstances and conditions for the successful realization of the project are unambiguously written down.

This is of course very vague and every project is different. That is why we say that each PoA must contain at least the following elements:

1. Header, Preface, table of contents, Introduction
2. Project definition.
3. Project boundaries.
4. Phasing.
5. Project Controle Factors: Quality, Time, Money, Organization and Information.
6. Risks
7. Planning
8. Closing, Explanations

You also write the PoA in this order. The content of one chapter is input for the following.

3 Header, Preface, Table of Contents, Introduction.

Like many other documents, the PoA has a fixed structure. After all, it is an important document within your project.

a) **Header**. Like most important documents the PoA starts with a header. The function of the header is to make the document recognizable by using the company logo or an image of the subject of the project. At the bottom of the page you write the name of the client, the date, the writers and further information that is important for a quick recognition of the document. The header is the first page you see when you take it to hand. The first impression is often decisive for the expectations of the reader. So make it look professional.
b) **Table of contents**. If a document consists of several pages, a table of contents is required. Every report must have a clear structure. The table of contents is a reflection of that structure of the document and helps the reader to read more easily through the report. If the document is also used as a reference work, the table of contents is required to quickly find information.
c) **Preface**. The preface offers the possibility to address the reader(s) personally. This is the only chapter in which the use of "I, we, me, you" etc. is permitted. The preface is always short (2 to 3 paragraphs) and contains items that do not directly belong to the structural content of the document, such as reading tips, thank-yous, etc. The preface is therefore not numbered and is placed before the table of contents.
d) **Introduction**: The PoA is a document dealing mainly with technical elements. The author has been busy for some time with the subject of the document. The reader therefore has a backlog compared to the author. The introduction is intended to give the reader sufficient information that he can follow the technical elements and place them in the right context. The introduction is always your first chapter.

The content off c) and d), must be meaningful. The content must add something to your document. It is about quality and not about quantity. So don't write nonsense just to make your report longer. A long document is not necessarily a good document. Too much and unnecessary information irritates the reader, which can be disadvantageous for the remaining part of your document.

4 Project definition.

The project definition is the description of your assignment. Here you indicate what you will do to make your client satisfied. You indicate what the problem is that you have to solve, why the problem occurs,

etc. After reading the project definition, the reader knows exactly what the problem is, when it occurs, why it occurs and what kind of solution you are looking for.

a) **The project result**. What is READY when it's READY? What should you deliver so that your client is satisfied? This is often very difficult because your client looks at the end result from a different perspective than you as a project member. The client only looks at the end result as a user. Has he become what he expected to get. On the other hand, the project group looks at the end result as the best possible solution with the means that were at their disposal. In order to ensure that the final result meets all expectations, it is necessary to define the project according the S.M.A.R.T. rules (Specific, Measurable, Acceptable, Realistic and Time-related). The project result is usually 1 long sentence in which the end result is S.M.A.R.T defined.
b) The **"user requirements"** are also part of the project definition. The user requirements are the supplement to the "project result" and are most of the time (partially) provided by the client. When you start a project, it is extremely important that you look critically at the requirements (as an engineer) and then make the total requirements as complete as possible in consultation with your client. The complete package (user requirements + your own requirements) must be included in the PoA. (if they are very long, as an appendix). The system requirements do not belong to the project definition. You write them at a later time and therefor it must be listed as an action in your planning.
c) All requirements must be categorized according to **MoSCoW**. This determines for each separate "requirement" how desirable it is for the design.
d) The **justification** of the project. What is the actual problem? When and in which situations does the problem occur? How does the project result solve the problem? During the project this justification must be checked several times. After all, if the justification expires, your project also expires. For example: if during your project the problem no longer occurs because it was solved by other reasons, or if the situations in which your problem occurs no longer exists, the project expires. It is necessary that you repeatedly check whether the justification is still valid during your project. The milestones in your planning are usually good moments to check this.

5 De Project boundaries.

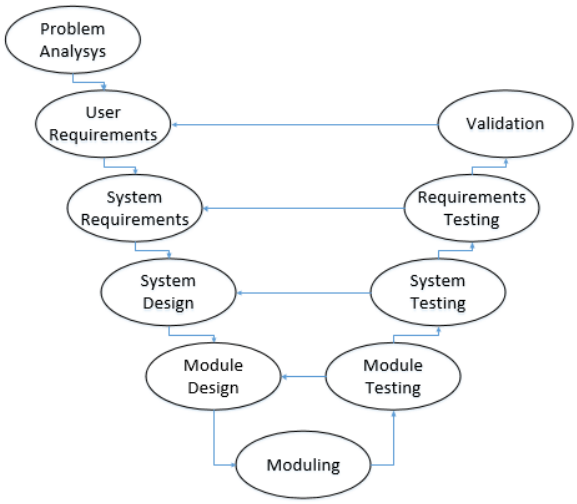
The project boundaries determine what is, and what is not included in the project. If you have to design a robot that can move product x from A to B, does that also include that you write the software or is designing the hardware enough. When this robot needs a gripper to grab product x, must that gripper also be able to grab product y. Must the training of the production staff that will operate the robot be included in the project, etc.

When writing the boundaries, make sure that these boundaries are not yet mentioned in the requirements. If the same sort of requirements are mentioned in several places, this often leads to confusion. The boundaries always relate to the project result and not to the circumstances during the project. These "circumstances" will be handled in the chapter "control factors" (see later in this report). For some projects it is very difficult to clearly define the project definition. In that case the chapter "boundaries" offers an extra possibility to record what belongs within the project definition. Sometimes it is easier to define something by telling what it is not than by trying to specify it. If you are going to design a product you can, for example, indicate which materials may be used. You may need an endless long list. By indicating which materials should not be used (and why) your list may be shorter and it leaves room to be innovative.

The project definition and the project boundaries together determine the final project content. The project content must be unambiguous and complete. What is not included in the Project definition will not be developed. What is not excluded by the boundaries can be developed.

6 The phases.

Running a project always happens in phases. At Fontys we use the phases of the V-Model.



This does not automatically mean that you have to go through all the phases of this scheme. If you start writing the PoA, the problem analysis phase is already done. It does not have to be done again. If you receive the user requirements from your client, you can also skip this phase. But, check that they are complete enough. For small projects, the test phases can be combined. For your PoA you then make an alternative (shorter) V-model. Combining does not mean that you can simply skip elements from the V-model. The remaining phases must still cover the entire design process.

Every phase must be defined. That means determining what you want to achieve in this phase, how you will do that and what the input and output for this phase is.

The test phases must clearly state what needs to be tested, how to test and what the criteria are for approval and / or rejection.

Every phase has a beginning and an end. If a phase is closed, it is definitely closed. Everything from that phase is then recorded (in a deliverable) and frozen. The output from the previous phase is the input for the next phase. If you are going to make changes to a previous phase, this means that you started with the wrong input in the next phase. As the phases are further apart, the negative consequences of a change increase.

7 The Project Control Factors.

The previous chapters (4 to 6) of this reader mainly relate to the technical side of the project. However, a project is not only technical. The project control factors must also be determined in order for the project to be successful. The project controle factors are: Time, Organization, Information, Quality and Money. These factors are different for each phase of the project. In order to gain insight into which control factors you need during the project, you need to determine these per phase. When you start your project you do not know what you will encounter. That means that you have to make estimations. Especially the first times this will be difficult because you do not have any references or experience. The more you do this, the easier it will become. However, it remains an estimation and there are no certainties. You will therefore have to build in margins to absorb setbacks.

a) **Time**: How long will each phase take? When can it start and when can it be closed? (the standard phases are the phases of the V-Model).
b) **Organization**: How much manpower do you need for each phase? Do not only think of the people within your project group but also about the experts that you need from outside the project group. Are these people also available at the times when you need them? How is decision-making organized? Who is authorized to make certain decisions? Who reports to whom? How often and what sort of consultation do you need. Who should you consult with? Write only those matters that are important. Don't make a complete organizational model with non-related departments or individuals who are not relevant. This is usually more disturbing than clarifying. Do indicate which position your project group has within a larger organization.
c) **Information**: What information do you need in each phase and what will you document at the end of each phase so that it can be used in the next phases. How do you register this documentation and how will you communicate with those who need this information? Is it sufficient to register decisions in a whatsapp message or are you going to use a real decisions list. The way you will communicate is also part of the chapter "information".
d) **Quality**: Quality does not mean whether your product will work properly in the future. Every client wants his product to work well. The quality of the product is covered by the user requirements. With quality is meant a control factor of the process. For example: The drawing agreements on the drawings. The way you built your generic models in your CAD system. Templates for your minutes, agenda and action lists. How are tests performed and how are tests documented? Which standards are used. How and with whom should I communicate in order to ensure that the process runs smoothly (make a communication plan).
e) **Money**: If you have completed all previous steps you can make a cost estimate for every necessary activity. All cost estimates per phase added together are your project budget. You need people at every phase, but this may differ per phase. The material costs of, for example, building one or more (test) models must be included in the relevant phase (moduling and testing). Often you also need material to carry out activities, like cad stations, measuring equipment, office equipment, communication facilities, office or test rooms, etc. A project budget mostly contains only cost for the development of the product. A project budget can only contain cost for production if this is specifically included in the project definition.

8 The Proces Risks

With the risks in the PoA the process risks are meant and not the product risks. The product risks cannot yet be estimated because you still have to start developing. You do not know how your product will look like. Only when you know how a product is going to be (end of phase system design) can you start creating an FMEA to estimate the product risks.

The process risk:
- A Process risk is an event of which we are not sure whether it will take place, but if it occurs, it will have a negative impact on the process.
- By being proactive, we can reduce any negative consequences of these risks in advance. Waiting for a risk to become a problem (being reactive) will almost always negatively affect a project.
- However, there will always be risks we have not anticipated to. They make us vulnerable

Common process risks (in practice) are:
a) Bad communication. Bad communication is the main cause of project failure. It often appears that the communication is not adjusted to the different target groups.
b) Incompetent team members and project leaders. Without the right people, a project has little chance of success. Even a perfectly planned project is killed in the event of a shortage of talent.

c) No project management. If there is no method in handling the projects, there is a growing risk that tasks are not or not properly carried out, that projects have to be redone and deadlines and budgets are exceeded.
d) Ignore problems. Contrary to what is sometimes thought, problems in project management do not resolve automatically. In fact, in most cases it only gets worse.
e) No clear objective. If the objective is not clearly defined and framed, a process can get seriously out of hand. Moreover, due to lack of direction, the project can be delayed and cannot meet the goals.
f) Incomplete project schedules This means that members of the project team do not know what to do when at what moment. It will then be very difficult to complete a project in time.
g) Accept unreasonable deadlines. To high the expectations of the client, almost always leads to greater delays or worse results.

By being proactive, we can reduce any negative consequences of possible risks in advance. Waiting for a risk to become a problem (being reactive) will almost always negatively affect a project. We can influence these process risks by using the techniques of risk management.

The diagram above shows the steps that must be taken to control risks:
- Identify the risk.
- Determine criteria with which you can assess the risk.
- Assess the risk using these criteria.
- How likely is it that the risk occurs.
- Assign a value to each risk and rank the risks in order (risk level).
- Determine your action if the risk occurs.

Let's assume that we can assess the degree (severity) of a risk by two factors: impact and probability. In order to be able to compare risks and impacts with each other, we are going to assign a value to both. We always do this according to pre-made rules. Appendix 1 contains examples of assigning values to impact and probability.

- The impact on my life by winning millions in the lottery is very big. However, the chance that I win that lottery is very low.
- The chance that it will rain soon is very big, but the impact this has on me is very low.

Both these examples will have little influence on me. I just keep doing what I did and only take action if the risks occur. For both examples, the risk rate is therefore LOW.

Risk rate = impact x probability (severity of risk, similar to FMEA)

The risk rate, that during a long-term project an important project member will be absent for some time (sickness, leave, ect.) is very HIGH. The impact is big and it is almost certain that it will happen.

In the PoA, you must therefore include the actions you will take at the moment that this risk occurs.

However, there is a third factor that influences possible risks and that is the vulnerability of your project. The loss of a specialist project member is disastrous for your project. However, if there are

several specialists within the organization, there is a possibility of exchanging capacity. If a large budget overrun is to be expected, but you are a very rich company, it will not influence the continuity of the company. If your company produces 10 products and the project for the new 11th product fails, the company simply continues with its 10 products.
Whenever external impulses are needed, the justification of the project must be looked at. How hard do you want the project to succeed and how much may I cost to complete the project?
The vulnerability must also be determined in a value according to fixed rules made in advance. Appendix 1 contains a table with a value allocation for vulnerability.
If we include the vulnerability in the risk analysis, the risk is as follows.

Risk priority = impact x probability x vulnerability

The risk with the highest risk priority must be looked at first. If the risk is unacceptably high, you immediately make changes to your activities so that the risk becomes acceptable. You only start your project if all risks are at an acceptable level. But before the project really starts you have to know what you will do if any risk occurs.

9 The Budget.

When you present your PoA to your client, he usually has two important questions for you:
1) How much does it cost?
2) When will it be ready?
We have already indicated for each phase how much time, capacity, resources and money are needed to complete each phase properly. Most clients like to see this data in a total overview and are very interested in the sum that is written at the bottom. This means that you not only add the "money" amounts here, but you also convert the capacity, resources and time (where possible) into money. In this way the total costs of the project, until the moment the project definition is realized, are visible. The budget is not about investments, inventories, or things that are needed to start production. In addition, you can indicate here whether there are conditions attached to this budget. For example, who has the authorization for the expenses, or how the costs must be accounted for.

10 The Planning

Failing to plan is planning to fail.

Planning is one of the most important tools in a project. The better you plan, the better the project becomes manageable. But estimating how long something lasts, if you do not yet know what will happen is one of the most difficult points of the PoA. In your project you will have to deal with things that are going according to plan, but also with activities that take unexpected much time. Despite the inaccuracy, it is important to make a planning. The lead time of your project largely determines its cost level. For instance: In case you exceed the estimated lead time, you will have to pay your project members longer, you will come to the market later, and you will receive your benefits later. If you have made investments, it will take longer before they are earned back. In the plan of approach, we usually only record the milestones. The beginning and end of each phase of the v-model is a milestone. Depending on the size of the project, more / less milestones can be recorded. The milestones are often communicated to the outside world and are therefore no longer flexible. Imagine that you need 5 extra engineers for your module design and that you want to hire them from an external engineering firm. The engineering office will reserve these people for you at the times indicated. If you need them

at a later time, you will have to pay them anyway. Do you need them longer, then the question arises whether they are still available.
By determining the milestones you have set the lead time of the project. By determining how long each phase may last you can make a good estimate of the total lead time. The milestones are the minimum that should be in the planning of a PoA. Within the milestones you make detailed planning during the project. The detail planning is a further specification of your planning. The detailed planning is often a bit more flexible. This is also necessary because no project runs exactly according to plan.

11 Closing, explanations.

When all process-technical elements have been discussed, a document must also be closed. The explanation gives you the opportunity to write down things that do not fit directly into your chapters. To write down items that can contribute to the better reading / understanding of your PoA. In addition, this is the ideal chapter to present your company / project group. Here you can tell something about your specialization, your experience, your reliability, the culture of your company, etc.). Aspects that can contribute to the credibility of your plan of approach.

12 Appendices

12.1 Appendix 1

Example: scale for impact.

Illustrative Impact Scale		
Rating	**Descriptor**	**Definition**
5	Extreme	• Financial loss of $X million or more[3] • International long-term negative media coverage; game-changing loss of market share • Significant prosecution and fines, litigation including class actions, incarceration of leadership • Significant injuries or fatalities to employees or third parties, such as customers or vendors • Multiple senior leaders leave
4	Major	• Financial loss of $X million up to $X million • National long-term negative media coverage; significant loss of market share • Report to regulator requiring major project for corrective action • Limited in-patient care required for employees or third parties, such as customers or vendors • Some senior managers leave, high turnover of experienced staff, not perceived as employer of choice
3	Moderate	• Financial loss of $X million up to $X million • National short-term negative media coverage • Report of breach to regulator with immediate correction to be implemented • Out-patient medical treatment required for employees or third parties, such as customers or vendors • Widespread staff morale problems and high turnover
2	Minor	• Financial loss of $X million up to $X million • Local reputational damage • Reportable incident to regulator, no follow up • No or minor injuries to employees or third parties, such as customers or vendors • General staff morale problems and increase in turnover
1	Incidental	• Financial loss up to $X million • Local media attention quickly remedied • Not reportable to regulator • No injuries to employees or third parties, such as customers or vendors • Isolated staff dissatisfaction

Example: scal for probability.

Illustrative Likelihood Scale				
Rating	**Annual Frequency**		**Probability**	
	Descriptor	**Definition**	**Descriptor**	**Definition**
5	Frequent	Up to once in 2 years or more	Almost certain	90% or greater chance of occurrence over life of asset or project
4	Likely	Once in 2 years up to once in 25 years	Likely	65% up to 90% chance of occurrence over life of asset or project
3	Possible	Once in 25 years up to once in 50 years	Possible	35% up to 65% chance of occurrence over life of asset or project
2	Unlikely	Once in 50 years up to once in 100 years	Unlikely	10% up to 35% chance of occurrence over life of asset or project
1	Rare	Once in 100 years or less	Rare	<10% chance of occurrence over life of asset or project

Example: scale for Vulnerability.

Illustrative Vulnerability Scale

Rating	Descriptor	Definition
5	Very High	• No scenario planning performed • Lack of enterprise level/process level capabilities to address risks • Responses not implemented • No contingency or crisis management plans in place
4	High	• Scenario planning for key strategic risks performed • Low enterprise level/process level capabilities to address risks • Responses partially implemented or not achieving control objectives • Some contingency or crisis management plans in place
3	Medium	• Stress testing and sensitivity analysis of scenarios performed • Medium enterprise level/process level capabilities to address risks • Responses implemented and achieving objectives most of the time • Most contingency and crisis management plans in place, limited rehearsals
2	Low	• Strategic options defined • Medium to high enterprise level/process level capabilities to address risks • Responses implemented and achieving objectives except under extreme conditions • Contingency and crisis management plans in place, some rehearsals
1	Very Low	• Real options deployed to maximize strategic flexibility • High enterprise level/process level capabilities to address risks • Redundant response mechanisms in place and regularly tested for critical risks • Contingency and crisis management plans in place and rehearsed regularly

Nr.	Risico	Impact (A)	Probability (B)	Risico Degree. (AxB)	vulnerability (C)	Risc priority (AxBxC)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

12.2 Appendix 2

Project name

(Fill out the title of your project)

Document:	……..…..docx/pdf
Document type:	……..……..
Pages:	……...
Autor:	……
Date:	……..……..
Version:	……

Preface.

1. Table of contents
2. Introduction
3. Project definition
   - 3.1. Justification of the project
   - 3.2. Project result
   - 3.3. User-requirements + MoSCoW
   - 3.4. Project boudaries
4. Phasing
   - 4.1. Phase 1 *(What do you want to achieve in this phase, how are you going to do that and what is the input and output of this phase?)*
   - 4.2. Phase 2 *(What do you want to achieve in this phase, how are you going to do that and what is the input and output of this phase?)*
   - 4.3. Phase …..
5. Project Controle Factors
   - 5.1. Phase 1 *(Time, Organization, Information, Quality and Money)*
   - 5.2. Phase 2 (Time, Organization, Information, Quality and Money)
   - 5.3. Phase …….
6. Risks
7. Budget and Planning
   - 7.1. Budget (Totaaloverzicht van alle kosten)
   - 7.2. Planning (Minimaal de milestones van je project)
8. Closing / Explanation