Theory

1. **Introduction**
   * On this chapter the basics, that will be explained more on the detail on the next chapters, are mentioned briefly. It starts by mentioning the purpose of the book, which is “to supplement the PMBOK® Guide with knowledge and practices that can improve the efficiency and effectiveness of software project managers, their management teams, and their project members.” Then it explains what a project is, continuing with what project management is and why it is so challenging. On the 4th and 5th subchapters the authors describe relationships between different PM entities. On the 4th is described the one between projects, programs, and portfolios, meanwhile on the 5th the one among project management, operations management, and organizational strategy. The subchapter 1.6 introduces the concept of “Business Value”, and the 1.7 explains the role of a project manager. The 8th subchapter explains what this book, namely PMBOK is and is not. Quality management is mentioned briefly on 1.9 as it will be gone more on detail on a whole chapter, the 8th one. The same is done on the 1.10 with “Project Life Cycles and Agile Methods” as they also have a designated chapter, namely the second one. The last subchapter of the first chapter explains software extension processes, i.e. inputs, tools and techniques, and outputs for each project management process.
2. **Project Life Cycle and Organization**
   * The second chapter analyzes how an organization and its structure influences a project and also the tools and techniques that are used for it. The first subchapter describes the organizational influences on project management and the information provided is divided in five further sections: Organizational Cultures and Styles, Organizational Communications, Organizational Structures, Organizational Process Assets and the last one is the section named “Enterprise Environmental Factors”. The second chapter gives concisely information about project stakeholders and governance. Even though, the matter is described shortly, its essence is explained certainly well. The third subchapter is called “Project Team”, and like the name suggests, it introduces the team entity of a project and all the different structures that it can take dependently on its members. While the first two subchapters provided information about the organization, the last one introduces the project life cycles as a concept. On its two sections it goes more into detail about its characteristics and phases respectively.
3. **Project Management Processes for a Project**
   * On this third chapter each of the five project management process groups (Initiating, Planning, Executing, Monitoring and Controlling, and Closing) has its designated subchapter where it is explained how they are incorporated into the management of software projects. The starting subchapter makes the distinction between process groups vs project phases and also the coexistence and interaction between the process groups mentioned above, hence the chapter name “Common Project Management Process Interactions”. The second one describes all the process groups graphically together, while also simultaneously describing the dependencies between them. The first process group, namely “Initiating Process Group”, starts the series of subchapters that go in detail about each one of them with 3.3. The other ones, i.e. Planning, Executing, Monitoring and Controlling, and Closing are explained relatively more in detail on subchapters 4,5,6,7 respectively. The subchapter “Project Information” describes the three types it is divided into, i.e. work performance data, work performance information, and work performance reports. The 47 identified project management processes from PMBOK(the original book, not this one: software edition) are mapped into 10 categories. Each one of them has its own chapter starting from the next one, namely chapter 4. They describe the inputs, tools and techniques, and outputs for most software projects.
4. **Project Integration Management**
   * The chapter is started by providing the definition of PIM on the PMBOK book. It is defined as the knowledge area that “processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups”. To differentiate it, it doesn’t mean how software components are integrated in a system, but the integration of processes and activities on a project. The first step of Integration Management and hence the name of the first subchapter is “Develop Project Charter”. It allows the management entity to allocate enterprise resources to the (software) project. The second subchapter is “Develop Project Management Plan” where the whole project is divided on subprojects, for each of those is developed a plan with all inputs, outputs, tools and techniques , and lastly all of these plans are pieced together into a master plan. The following four chapters, simultaneously steps of PIM are: “Direct and Manage Project Work, Monitor and Control Project Work, Perform Integrated Change Control and Close Project or Phase”. For each of these sections the inputs, outputs, tools and techniques are to be written.
5. **Project Scope Management**
   * Scope Management is defined on PMBOK as the entity that “includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.” The same definition can be used also for this extension, i.e. the software PM. Then the authors differentiate between product scope and project scope, and their bidirectional dependency. As is the custom of each of the 10 categories of the project management processes, every step of a category gets its own subchapter where the inputs, outputs, tools and techniques for every one of them are also to be written. The first section is the “Plan Scope Management” which is defined as the “process of planning for, defining, and documenting stakeholder needs to meet the project objectives”. The other step is called “Collect Requirements”, a very well-known step to developers, also known as “Requirements Elicitation”. It is very important that the requirements are clear and well understood, even though as it is known on software world : “change is the only constant”, and the they will very likely change during a projects lifetime. After this process is accomplished, the team creates a detailed description of project and product, a step known by the name “Define Scope”. On the section 5.4 of PMBOK, the original one but also on the software extension, the Work Breakdown Structures, also known by the abbreviation WBS, are introduced. The next section is concerned with validating the scope. It starts by differentiating between validation and verification, and then like usual the inputs, outputs, tools and techniques are mentioned. The last step is called “Control Scope”, monitors, like the name suggests, the “status of the project and product scope and managing changes to the scope baseline”.
6. **Project Time Management**
   * As mentioned, on the previous sections(reference here), a lot of project are often delayed and one of the main reasons of project failures is time management.(Write also something about timeframe estimation, the additional resources that are required with all these delays etc.) It can be aggregated to seven processes, and for each one of them the authors have devised a chapter. The first one, on the same fashion as in scope management, starts with the planning, and is called “Plan Schedule Management”. All the activities that are going to produce the deliverables are defined on the second subchapter. The on the previous section defined activities and their dependencies, now are identified and documented on the third section, known by the name “Sequence Activities”. Like mentioned, an enterprise allocates resources to a project. The mapping of resources to activities is done on the 4th step of PTM. Determining the duration of each activity is an art form on itself. Even though two projects can be compared in terms of magnitude, complexity etc. that ratio does not manifest itself on the duration. On section 6.5 this subject is discussed. The 6th section, namely “Develop Schedule” hints how to create it, by always keeping in mind that the requirements will change, and flexibility should be the essence of it. The last step is as usual the controlling, which is not always that easy, especially on projects that don’t use the waterfall model, or any linear one for that matter. The “How To ” is given briefly on this closing subchapter.
7. **Project Cost Management**
   * This is one of the most important disciplines of project management. Managers don’t want to repeat the “NHS Connecting for Health”, which cost the United Kingdom taxpayers an estimated £12bn from an original cost estimation of £2.3bn or other sister projects failed[[1]](#footnote-1). If this could be somehow tolerated by a government or a big enterprise, for a small to medium sized company, a failure can mean total shutdown. The first step, as usual, is to plan the management of costs. It includes the foundation costs, the ones during the development and eventually the one for maintenance after the delivery. After each type of cost is defined the next step is to estimate the each and every one of them. This one is done on the second step of PCM, obviously called “Estimate Costs”. After this step, the management allocates a budget to the project, a procedure described on the third subchapter, with all the respective inputs, outputs, tools and techniques. Costs control is the final step, in which, keeping in mind that the requirements are always changing, they don’t initiate out of scope costs, or at least, if arisen, to keep them at a minimum.
8. **Project Quality Management**
   * As introduced on PMBOK PQM “ …includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken.” It is divided in three sections: “Plan Quality Management, Perform Quality Assurance and Control Quality”. Each one of them gets a subchapter. The first step, as mentioned, is to plan quality management. It is defined as “The process of identifying quality requirements and/or standards for the project and its deliverables and documenting how the project will demonstrate compliance with quality requirements.” It defines a baseline array of quality requirements that a deliverable must have, and plays the fine art of balancing the tradeoffs between features, schedule and cost amongst others. The following step is “Perform Quality Assurance”. On it the appropriate standards and milestones are defined, that every partaking process has to accomplish. The next and final step, works with the mantra “measure, control, and report”. In it is evaluated if these standards are met and then these assessments are documented. Even though some standards may be more powerful than some others on their global definition, to a project is very important that the quality conforms the client’s expectations.
9. **Project Human Resource Management**
   * Project HR Management is defined on PMBOK “… includes the processes that organize, manage, and lead the project team.” But software “workers” or “employees” differ in a lot of aspects from the “normal” ones. They usually have a better understanding of the technical facets of a project, than the manager. As it was stated in the introduction page of software HR management chapter: “Successful software project managers typically put less emphasis on directing the work and more on facilitating the efficiency and effectiveness of project teams.” The first step described is the planning of HR Management, in which the roles and responsibilities, but also the required skills are laid out. Aspects that are also considered is the report structure, i.e. “who reports to whom”. The next very important step is to “Acquire Project Team”. The software development world is mostly about novelty, in other words creating an entity from requirements collected by a client, who usually doesn’t possess a technical background. That requires a team of individuals, who have to be invested in the undertaking. Because of that it is very important that the pieces chosen to form the team, not only carry with them the necessary tech skills but also fit together and are on the same wavelength. The next step is to put together the team after finding the pieces, hence the naming of the step “Develop Project Team”. The goal is to be able to go through the Tuckman's stages of group developments[[2]](#footnote-2), ”forming–storming–norming-performing”, as smoothly and quickly as possible. Some of the techniques used by software project managers include: pair programming, test driven development(TDD),colocation and also developing trust. The very last step is “Manage Project Team”, where the delicate issue of performance measuring is discussed. Because software development is a collaborative endeavor, the strong dependency makes grading individual contribute highly difficult. Measuring team production rate is the way to go. That will motivate all the members to help each other more.
10. **Project Communications Management**
    * PCM is defined on PMBOK as “Project Communications Management includes the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information”. Like mentioned on the previous chapter, developing a solid communication structure is paramount to the managers, because software development is a collaborative problem-solving endeavor. The communication structure should not only be established between the team, but also with the stakeholders of the undertaking. As stated on the first subchapter, called “Plan Communications Management”, face-to-face (FTF) communication is the preferred way. On collocated teams that is very well doable and should be incented. Thanks to technology, like video calling, this synchronous way of information exchange is also achievable in this day and age. The next step is called “Manage Communications Management”, and in it the different tools and techniques are discussed, like for example information radiators. They provide information about tasks accomplished, the ones in development phase and also the ones still to be accomplished. The last step is known by the name “Control Communications”. On this subchapter it is discussed how this communication and reporting to stakeholders structure is performing and the tools and techniques used. For predictive life cycles, milestones are a very often used metric, because of its simplicity but the majority of software projects these days use adaptive life cycle models, hence the milestones are not suited as measurement. Number but also importance of accomplished user stories which increment the product is used instead.
11. **Project Risk Management**
    * PRM is defined on PMBOK as “Project Risk Management includes the processes of conducting risk management planning, identification, analysis, response planning, and controlling risk on a project”. One of the main duties of a project manager is risk mitigation, because hazardous factors are always to be accounted for and the uncertainty, that they carry with themselves makes the job that more difficult but at the same time interesting. The first step is to plan for risk management. Before a project is given the green light, risk is an aspect that is considered. Because of their iterative nature, it is relatively easy on adaptive life cycle models, to mitigate risks, because the team can choose the next step on the backlog, and decide how to deal with the respective risk. After planning comes the doing, and the first step of dealing of mitigation is to identify the type, as described on the subchapter 2 called “Identify Risks”. The ambiguousness makes the identification that much hard, but the most common types are: technical, safety, security, team, schedule, costs, costumers and stakeholders. The next step of PRM is to perform qualitative risk analysis, i.e. to predict the probability and impact of the future risks. Here is where experience of a manager comes into play. After qualifying it, the manager hast to conduct a quantification analysis. Usually the monetary value is used as gauge. On the next subchapter called “Plan Risk Responses”, an array of solutions for each identified risk is created. The risk exposure of an untreated risk, the residual risk and the cost of risk treatment is calculated. If the impact of the risk is less than the cost of treatment than the risk is accepted. How to control risks is discussed on the closing section of PRM. Various threshold limits are settled from the management, like for example defects per thousand lines of code (KLOC). One other way of controlling it is through meetings like daily, retrospective etc.
12. **Project Procurement Management**
    * PCM is defined on PMBOK as “Project Procurement Management includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team. The organization can be either the buyer or seller of the products, services, or results of a project.” While large organizations and governments have designated departments that deal with it on a more larger scale, procurement happens also on medium to small enterprises, and usually the handling of it is a responsibility of the manager. The first step, as usual, is to plan it. After thoroughly studying the situation that needs to be solved and the market alternatives, the management should document the process and then come to a make or buy decision. The steps are usually: Identify suppliers, come up with a statement of objective or statement of work, establish proposal evaluation criteria and lastly prepare terms and conditions. After deciding, the next logical step is to “Conduct Procurements”. The management, which is the buyer, contacts the selling enterprise and the contract negotiations ought to start. Costs, which usually is the most important and delicate aspect, is discussed. But also technical support, its timeline, delivery procedure etc. are also taken into account and agreed upon. The next section called “Control Procurements”, describes exactly what the name suggests. Software is constantly updating and newer versions are released periodically. To be able to yield full performance constantly a lot of effort should be put into incorporating these updates, and if necessary, patching should also be considered. The closing step is called, of course, “Close Procurements”. A manager should always keep in mind that after the Go Live of a project, it usually requires maintenance, and the support of the external acquired software component, used to build the product, can expire.
13. **Project Stakeholder Management**

**NOTES: Maybe insert the graphs for each one of the 10**

1. https://en.wikipedia.org/wiki/List\_of\_failed\_and\_overbudget\_custom\_software\_projects [↑](#footnote-ref-1)
2. https://en.wikipedia.org/wiki/Tuckman%27s\_stages\_of\_group\_development [↑](#footnote-ref-2)