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How the customer explained it	How the Project Leader understood it	How the Analyst designed it	How the Programmer wrote it	How the Business Consultant described it
How the project was documented	What operations installed	How the customer was billed	How it was supported	What the customer really needed

Project Governance

a research study on Project Scope Change

Master of Science Thesis in the Master's Program International Project Management
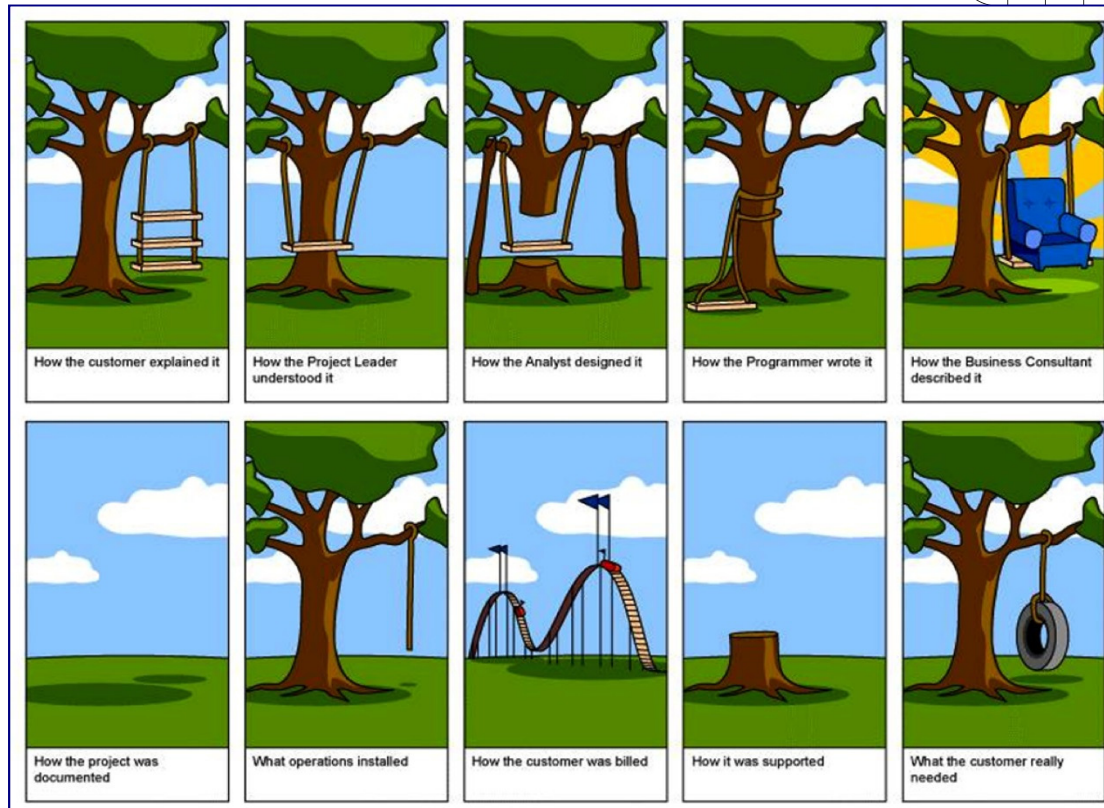
RICKARD SKOGASTIERNA

MASTER'S THESIS 2012:165

Project Governance a research study on Project Scope Change

Master *of Science Thesis in the Master's Program International Project Management*

RICKARD SKOGASTIERNA

Department of Civil and Environmental Engineering

Division of Construction Management

CHALMERS UNIVERSITY OF TECHNOLOGY

Gothenburg, Sweden 2012

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Cover:
A project cartoon that illustrates the complexity of different views within a project.
[http://www.projectcartoon.com]

Chalmers University of Technology/Gothenburg, Sweden 2012

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Abstract

Projects often fail, or do not deliver what was expected of them. The project environment changes and uncertainties are high with temporary organizations having a restricted possibility to learn from past experiences. By managing the scope change processes and the people involved wisely not only the necessary tasks will be done but also the project will be able to react if circumstances change or opportunities for greater value emerge. The two project management organisations having the biggest influence of processes and tools were put in focus, IPMA & PMI.

A case study about scope change management was executed in which 11 very experienced project managers have contributed with their experiences through interviews. The pragmatic data was analysed and synthesized with support from a literature study in the field of project management.

The awareness about project scope change and its central role was confirmed along with identification that no general processes or tools were used. This was identified as a possible improvement area for most of the involved organizations, especially identification and management of scope creep, uncontrolled change of project scope. The chance of project success can be improved by raising the awareness about the importance of scope change management, implementing processes and tools and actively working with the soft processes supporting the human influence of scope change.

Key words: Project, project tracking, scope, scope change, change management, scope control, change control, change process, change tools.

Contents

Preface

This master´s thesis is a final part of a two year dual master programme called International Project Management at Chalmers University of Technology, Gothenburg Sweden and Northumbria University, Newcastle, United Kingdom. A parallel thesis with similar content is handed in to Northumbria University as a part of the examination procedure with the name "Project Governance, a research study on Project Scope Change" 2012.

The author has worked as a project manager at Volvo Cars and Ericsson for more than six years prior to conducting the master program. During the last year of work a deepening interest of formal project knowledge was felt. The author meets his mentor regularly who works as a senior project manager and through several discussions with the authors mentor a special question arose: how does effective scope change management has its effects on project success? This question has its roots in an analysis of failed project deliveries. It forms the start of what would become the research question for this thesis.

In order to get a practical perspective of the result, which would be useful in future projects, the case study with vast number of interviews from many different organisations was an important part of the prerequisites. The findings from the interviews along with reflections from the literature review were to form an interesting "product" in order to get involved organisations interested.

The tutors Sven Gunnarsson (Chalmers) and Eric Johansen (Northumbria University) guided the work with vast amount of patience while the overwhelming scope of the thesis was formed in to this final document.

Gothenburg January 2013

Rickard Skogastierna

List of Abbreviations

APM	Association for Project Management
BOK	Body of Knowledge
PMI	Project Management Institute
PMBOK	Project Management Book by PMI
IPMA	International Project Management Association
PSCM	Project Scope Change Management
APM BOK	Association for Project Management Body of Knowledge
HSE	Health, safety and environment
PMP	Project Management Plan
WBS	Work Breakdown Structure
PM	Project Manager
PMO	Project Management Office
IT	Information Technology
CPM	Change Project Management
PDCA	Plan Do Check Act
R&D	Research & Development

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1 Introduction

The two biggest Project Management organizations, PMI and APM gather knowledge and manage the certification of Project Managers which are shared through their respective Body of Knowledge (PMBOK & APM BOK). This dissertation will put these two BOK´s in the centre focusing around the key role of project scope change. Through a case study of 11 organisations and a literature review an overview of the term Project Scope Change Management (PSCM) from both a pragmatic and theoretic point of view will be created. The aim of this dissertation is to add a wider understanding of the term Project Scope Change Management (PSCM), focusing especially, but not only, on the two biggest influencing project management organizations.

1.1 Purpose and research questions

This paper will focus on project scope and in particular the change of the project scope. One of the major reasons for choosing this topic is because the PMBOK has handled scope management in an ambiguous way. The literature is lacking the connection between project success and a good handling of Project scope change. In general, it is hard to get a good overview of how project scope change can be managed with project success from the current literature. Since a project by definition has resource constraints, the possibilities to fulfil the project requirements of a customer are restrained. This is why an effective and "lean" way of doing right things at the right time to maximize customer value should be a central goal for every project. Managing the scope of a project is of critical importance. It is easy to see if the project is dimensioned from the start for a specific scope. But later when circumstances change leading to scope changes it might be critical for a project manager to handle the scope changes in order to deliver a good project result and a successful project.

A definition of Project scope in order to form an initial understanding is: "The work that needs to be accomplished to deliver a product, service, or result with the specified features and functions" (Project Management Institute, 2010). There are several definitions that draw the borders of project scope slightly different, but keeping this basic definition in mind while reading this report might help the reader initially. Scope management has a central role in project management which is demonstrated in its complexity and the interconnectedness as the picture below shows. Keeping this picture in mind while reading this report can help the reader to understand the connections to other dimensions of a project (Forselius, 2007).
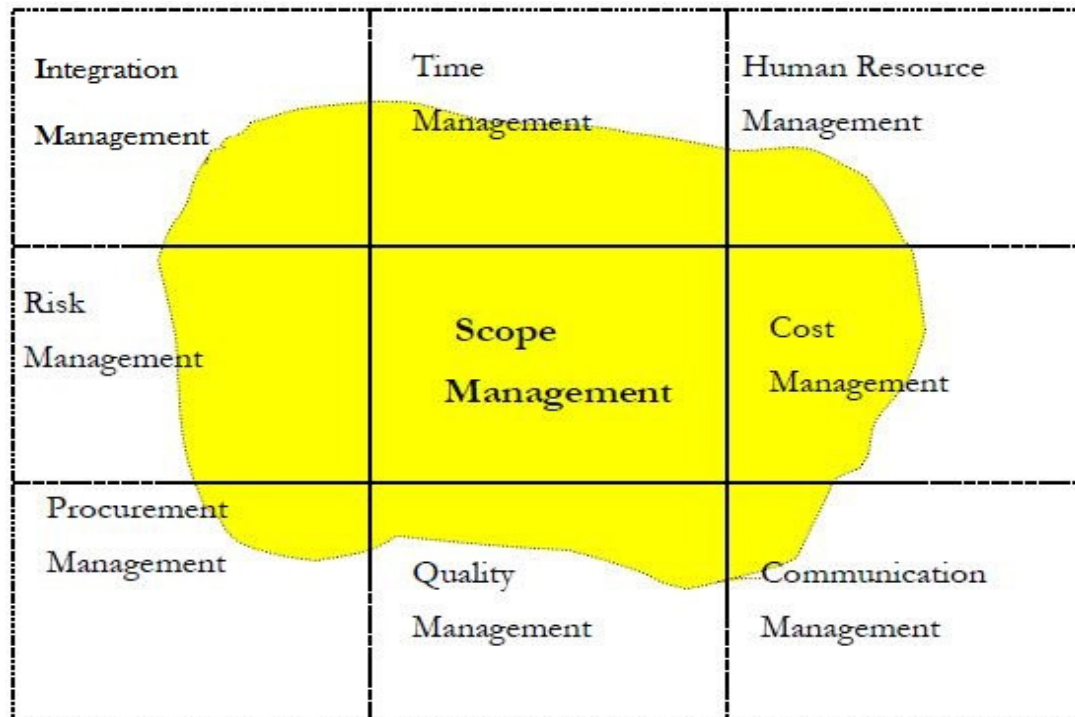
Figure 1 Scope Management borders

The picture above describes how hard it may be to define the borders of scope management and that the topic has many interconnections to other areas of project management. To fully understand scope management and its changes one need to understand its complex nature and how it is coexist with other areas of project management.

The leading bodies of knowledge, PMI and IPMA BOK's, are written to form a collection of "best practice", a one way track to successful project management. Even if these best practices exist projects do fail. Even if the organizations manage to define the scope for the project many different things in executing the project might affect the scope during project execution. When the project is under time pressure it might be hard to follow up and monitor project scope change in the way it is supposed to be handled. People tend to focus on the short term goals in a stressful situation and then it is necessary to have a simple and practical process that effectively deals with project scope change.

Does other knowledge exist that could be collected from the industry professionals, either processes that are working better than the PMI or IPMA standards or does there exist tools or other controlling entities that might add to the current knowledge of Scope Change? These questions form the research focus, the basis of the dissertation, and are broken down into four research questions.

1. What is meant by project scope change?

2. Are there differences between description in literature and usage of processes and tools? How do the used processes and tools relate to value adding?

3. Can a discrepancy between the different branches of industry and the literature in usage of tools and processes for PSCM be found?

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4. What recommendations can be given to the involved organizations on tools and processes of PSCM?

1.2   Limitations

The main limitations of this dissertation are time constraints and resources. The research is made by a single student thus restricting the research to focus on the two biggest influencing project organizations. A wider range of perspectives from other organisations and literature would increase the report's quality, for example incorporating the ISO standard (ISO21500:2012, Guidance on project management).

Also the lack of varied perspectives of scope change in the literature is a hindrance for a higher quality of the report.

1.3   Thesis structure overview

This master's dissertation consists of six chapters plus references and appendix. The first chapter introduces the purpose and aim, four research questions which the case study is built upon and limitations of the research. Chapter two describes the methodology of the research, how the research is structured and how conclusions can be drawn from the result of the report. The third chapter deals about the literature that brings up scope change management. The fourth chapter presents the findings from the case study and the fifth chapter discusses the findings and the literature. Lastly the sixth chapter presents conclusions that can be drawn from the report. This last chapter also presents the author's recommendations to the involved organizations and the suggestion for future research that can be conducted in order to go even deeper in knowledge of Project Scope Change Management.

2 Literature Review

There are some key sources of knowledge in Project Management, used by project managers all over the world. These are the PMI BOK and IPMA BOK. These two are the biggest organizations and have an extensive influence over many project work processes. The two BOK's mentioned are of "best practice" type, thus giving one view of what the authors think. This literature review will give some other views as well in order for the reader to understand the place of project scope change within the field of project management. The literature review will start describing the literature concerned with project and focus successively down to scope change management through the description of project processes and project scope. This chapter will cover research question 1 and will be used as a literature base for answering the research questions 2-4 (see the Intro chapter for details).

Project has the tendency to fail states multiple research reports studying the project outcome. There are many reports and articles containing the same information of project outcome. One example is the Standish Group that yearly publishes the CHAOS Manifesto. In their 2011 report as many as 21% projects fail and 42% are challenged. The report is an icon in the IT project world and many of the Fortune 1000 organizations in the world is looking at their findings, according to the report "CHAOS manifesto" (The Standish Group International, Inc, 2011). There are voices that argue that the figures of the CHAOS Manifesto can be questioned due to their interpretation of the data collected, the reporting might be biased (Verhoef, 2010). Even if the CHAOS Manifesto is challenged, it is clear that there exist a real challenge for the projects to deliver success. But as the article "An ounce of prevention" states, most of the times IT project fails it is due to that the project team does not understand the scope or the objectives of the project (Cable, 2009). There might be many reasons why projects fail, but to understand why projects fail one need to first understand what a project is, and then what makes a project outcome count as a success.

There is a number of Project definitions, but if one starts at the definition by PMI (Project Management Institute); " A project is a temporary endeavour undertaken to create a unique product, service, or result" (Project Management Institute, 2010) or IPMA's (International Project Management Association) definition in the APM (Association for Project Management) BOK; "a project has a clear objective and deliverables, with a defined start and end, that must be completed on time, within budget (cost) and to the agreed quality and, of course, it must deliver the agreed benefits" (Association for Project Management, 2006, p. 19). These might act as a foundation of this text since, even if there exists different versions of the definition of a project, most of them have the similar structure as PMI and APM.

Project success is another key project term. The PMBOK (Project Management Body of Knowledge) describes its view of project success: "Success is measured by product and project quality, timeliness, budget compliance, and degree of customer satisfaction" (Project Management Institute, 2010, p. 40). The APM a project success as the fulfilment of success criteria agreed with the project sponsor at the outset of the project. The success criteria are managed by benefit management, or in other words value management (Association for Project Management, 2006, pp. 36-37). The area of value management has a key influence on scope management, but is not covered in this dissertation due to resource restrictions.

In order to make sure a project endeavour will be successful a clear scope needs to be defined, otherwise how can one tell the project was a success?

The project scope management is defined by PMBOK as: "…the process required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. It is primarily concerned with defining and controlling what is and what is not included in the project". This definition points to that managing the project scope is both the initial definition of what the project is, the project scope, and the continuous change of the scope, even if the latter is not explicitly mentioned. The dissertation will primarily focus on the latter part; the change management of the project scope. A solid base has to be established from the strategy all the way from general definition of project to the primary subject in order to understand why and how changes might be needed.

2.1   Project Definition

The PMBOK describes a project to be: "*A project is a temporary endeavour undertaken to create a unique product, service or result. The temporary nature of projects indicates a definite beginning and end. The end is reached when the projects objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists.*" The definitions of a project can work as a definition of what is a project success or not together with what is decided for the specific project to be success definitions. According to PMBOK a successful management of projects includes balancing the internally competing demands of scope, time, cost, quality, resources, and risk (Project Management Institute, 2010, p. 37). To do this the project should pick and follow appropriate processes. There are two categories of processes described, project management oriented processes that deal with the flow of the project thorough the entire project life cycle and product oriented processes that is specific to the project and that might have a key function in dealing with the scope. These two types of processes have to be joined into the specific project to ensure high quality flow of the project management but also that the process fits the specific industry group it is supposed to be operating in. As complement to the project definition Graham M. Winch (Winch, 2010) describes that the only certain in the society is the change. The projects central role is creation of this new value and to act as an information processing mechanism. Another perspective of project definition is "a project is simply a defined set of deliverables that will be accomplished by a defined set of tasks to which resources and time have been allocated" (Morgan, et al., 2007, p. 184). This perspective can be said to be a strategic one, seen from whom that are investing in projects and thus require a value creation output in line with their strategy.

The APMBOK describes a project as "*a project is a unique, transient endeavour undertaken to achieve a desired outcome*" (Association for Project Management, 2006, p. 15).The BOK describes project management to be used to bring about change in an organisation, dealing with none "business as usual" tasks and processes. It is describing projects from a value perspective and is not down to details in how each process should operate in contrast to PMBOK. Another field of knowledge dealing with organizational change is change management. This field of knowledge is said to have a stronger theory base compared to project/programme management that have big professional bodies. The project/programme managers can use this fact to gain "new" knowledge supported with strong theory (Crawford & Nahmias, 2010). One example of that is the paper "Changes of organizations by projects" describing. A

change model is described which have much in common with the project/program structure of the two main bodies of knowledge. The paper states that the borders for change are important as well as the dimensions of the particular change (Gareis, 2010). This statement can be seen as a description of how projects can be structured to reorganize organizations in contrast to the two major Bodies of Knowledge PM & IPMA's BOK.

2.2 Project Management Processes

Graham M Winch (Winch, 2010, pp. 207-208) explains that the classical approach of controlling cost, time and performance have to be looked upon in a broader perspective. Projects have two distinctive challenges. The first challenge is appropriate intention, describing how to capture and define the project. The second challenge is Predictability of realization, how to realize the project through planning and managing projects on site. This is described as if the project was divided in two parts, process integrity and product integrity having the three constraints earlier mentioned as framing dimensions. Graham M. Winch further describes the project to consist of five generic project processes springing from BPA (business process analysis) and lean thinking. These main processes are; defining the project mission, mobilizing the resource base, riding the project life cycle, leading the project coalition, and maintaining the resource base.

The APMBOK describes project management work to include the planning and execution of a project task given to him/her from the project sponsor or similar. The project management task is to balance the dimensions of the project, scope, time, cost and quality in order to deliver the required benefits. The BOK also discusses the aspect of project success. In chapter 2.3, Value management is highlighted to be an important part of the project management process (Association for Project Management, 2006, p. 40). The project managers may work with value management in order to improve the decision-making framework within the project. APM BOK describes the project and its "process" not as process oriented as PMI BOK, but still the project is divided in two parts. Four sub-areas that prepare the project (Scope management, Scheduling, Resource and cost management) and four sub-areas that deals with the project execution phase (Change control, Earned value management, Information management and reporting, Issue management) (Association for Project Management, 2006).

The PMBOK describes a project to have 42 different processes which are grouped in 5 process groups:

- The initiating process group consists of processes to be used in defining a project or a new phase of an existing project.

- The Planning process group consist of processes dealing with establishing the scope of the project, refine the objectives and define the course of action necessary to achieve the project objectives.

- Executing process group is presenting how a project should complete actions stated in the project management plan to fulfil the project objectives.

- Monitoring and controlling process group is dealing with processes that track, review and regulate the progress and performance of the project. Identification and initiation of any changes during the project.

- Closing process group is the processes dealing with the finalization of all activities in the other four process groups to formally close the project or phase.

The scope change which this dissertation will examine is first defined in the planning process group but have roots in the initiation of a project. This initiation is the place where the need for the project, its goal, is created (for example in order to make sure the right understanding of the scope is achieved the high level sources of information has to be checked while defining the scope). In the Executing and monitoring and controlling process the scope change is most present and the result of a successful scope management is shown in the closing process where feedback is generated on the overall success of the project (Project Management Institute, 2010, p. 39).

The two BOK's described above have both strengths in that PMI have a very clear process flow which might be easy to build one's own project from, but all the process might become a heavy burden if the processes are not critically dimensioned according to the actual project. The strength in APM BOK is the connection to value creation and high level of goal visualizing, even if their information is not strictly connected to any processes in detail. This is why the both BOK's can be very good to use in these aspects for a PM that is to construct a project along with other sources of project forming that can help creating an optimum project. (Maylor, 2010)

2.3   The Project and its scope

The term Scope of a project can be compared to be a "wicked problem", as described by Graham M Winch (Winch, 2010, p. 228). Problems that are not completely defined or have a tendency to never be completely fulfilled are examples of these types of wicked problems. Problems that might never be solved no matter how much resources that are thrown into the solution. This is why one should strive to define the project scope as not to become a wicked problem. The problem definition has to be clearly defined and the result should be measurable to be able to compare to stated project goals. The project is as mentioned earlier, a way for organizations to execute strategy in order to create greater value. This value is described in the scope and the value creating process should be a core process that controls everything the project undertakes since the projects definition is based on producing this stated value. (Winch, 2010, pp. 68-69)
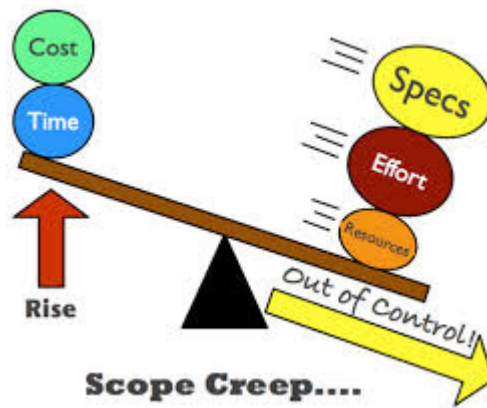
Figure 2 Balance the scope

Setting the scope early in the project is important, by focusing on the most important parts of the scope suggested by the paper "Building project scope definition using Project definition Rating Index" (Cho & Gibson Jr., 2001) the project can gain solidness early while effectively using the resources. The paper divides the scope in details and suggests a rating of the details in order to prioritize where the effort is to be spent. Another paper forming a method of rating project scope is "Goal based project scope determination approach" which stipulates that a clear picture of the project goals and their internal detailed prioritization can help the creation of a solid project scope (Sikdar, 2009). A well stated project scope can help the project use scope change processes later in the project life. Even so the report "Projects as the content and process of change: The case of the health and safety laboratory" describes a rich case study that shows that the current project and programme best practice are not well suited to cope with emergent processes of change in contrast with a project having a well-defined project scope (Winch, et al., 2011).

The book "The Right Projects Done Right" highlights the importance of defining a solid project scope: "…*where the most common set of failure factors cited is the lack of appropriate scope definition for the business change project*" (Dinsmore & Cooke-Davies, 2006, p. 148). This not only points to that scope is important for the project, but also that the sponsor has to make sure the scope is feasible and well connected to the business case (in order for the project to have a chance to generate benefits). The importance of setting a solid scope for the project is also exemplified in the article "Poor planning, altering project scope adds cost" which describes that about 95% of the cost increase in a project can usually be traced back to project scope changes. By being proactive and making sure that that changes necessary to do is compensated for by additional funding and changed project goals will help the project to be successful (Buck, 2006).

The scope of the project is as said earlier one of the six constraints for a project to deal with. This is described in the PMBOK processes where the initial phase of the project stipulates the connection between what the project is supposed to deliver. The project scope is what it is supposed to do, the mission given by the project board or its sponsor. This is not to be interpreted as an exact list of what needs to be done, but a "frame description" of the expectations that the project is going to deliver within. The person or persons functioning as project sponsor or project board have a crucial role in not just stipulate what the project is supposed to deliver, but also follow its progress and take active decisions on changes needed. The book "The Right projects done Right" explains the project from a corporate perspective and puts the project in a

multi project context. It describes that the sponsor has to continuously review the project with its project manager to ensure the fulfilment of the scope, even if, or especially if it changes. This can be done through stage gates or heartbeat reviews in order to ensure that the project is developing according to organization strategy. An important note here is that the review of the project is adding to the overall burden of the project and does not add direct value to the output, hence the review gates has to be weighted very carefully. (Dinsmore & Cooke-Davies, 2006, pp. 153-159)

Since the project by its very nature (definition) has limited time and resources the optimization of these limited restrictions are essential. Doing the right thing in the right time with the right people is one of the balancing acts a project manager has to do. This makes the scope management a central part of every project. This is illustrated in the book "The Right Projects Done Right!" (Dinsmore & Cooke-Davies, 2006) by claiming that managing projects is not only managing the cost, time and quality but also scope and HSE (Health, safety and environment). This statement is drawn from extensive search of what makes projects successful. The result from the research was concluded in two paradoxical statements: *"You don't control time by controlling time – you do it by assigning accountability clearly and by managing risk effectively"* and *"You don't control cost by controlling cost – you do it by controlling scope and maintaining a performance measurement baseline, whereby time, cost, and technical progress are monitored simultaneously"*. The discussion around these key areas reveals an interesting aspect: *"they measure the result but don't guarantee to deliver them"*. From this insight of what might be the key for project management, keeping a close eye to scope changes will help the PM to deliver project success. There are six groups of practice: clarity about the project's goals, clear technical performance requirements, effective planning and control, realistic risk management, adequate resources, and a capable and effective project team. This is especially true when reflecting over what makes a project successful. The success of a project is seldom just the successful management to ensure that the project is kept within given frames, but also that the project output is successful in relation to its surrounding environment. The example from the book "The Right Projects Done Right": *"A hard-nosed project manager might declare, -We brought the project in on time, up to quality standards, and under budget; therefore, it was a whopping success. On the other hand, a business strategist might muse, -Even though the IT people went over budget by 500,000, we will earn 40million in the next year thanks to timely completion of the project, so the project is one of our all-time great victories."* The project manager needs to adapt a holistic view that incorporates the initial business mission to the after-delivery stage. (Dinsmore & Cooke-Davies, 2006, pp. 217-218) This simple example shows that project success is a very fluid goal and is highly dependent on the changing environment of where the project is to be delivered to.

A projects scope is defined as *"The scope comprises the project deliverables and the work associated with producing those deliverables"*. It is determined according to the APM BOK in the project business case with a high-level statement of scope which is forming the breadth of the scope. The projects depth of scope is defined throughout the project in different levels using requirement management and the PMP, Project management plan. Equally important as what's in the scope is what is decided to not be included (Association for Project Management, 2006, p. 34). It is also described that the scheduling process includes continuous work of the scheduling function to deal with constraints for the solution that might affect the timings. These are dealt with and decisions are taken and synched with the key stakeholders during project

execution in order to cope with the daily changes of the project. The baseline of the time synchronization can then be used as a reference point for measuring changes as well as a source of error tracking later on in the project (Association for Project Management, 2006, p. 54).

2.4   Scope change management:

The organization PMI defines scope change management in their PMBOK as:

- *"Influencing the factors which create scope changes to ensure that changes are beneficial*

- *Determining that a scope change has occurred*

- *Managing the actual changes when and if they occur."*

The PMBOK explains in chapter 4.5 how a change in projects can be managed. The PMI guidelines push that a configuration handling system with integrated control mechanism should exist. The system works, as the name suggests, so that one of the two parts is managing the specification for the deliveries and the process. The second part, change control, is focusing on identification, documenting and controlling of the changes in the referencing plans for both the project and the product (Project Management Institute, 2010, p. 94). This process should be integrated in the daily work and in contact with all parts that might affect project scope.

The APMBOK deals with issues connected to scope change mainly in two chapters, excluding the handling of WBS, Change Control and Issue Management. The change control describes that any changes to the project should go through the same robust process as it did initially when the project was defined. Any proposed changes to the project need to go through the stages: identification, evaluation, approval, rejected or deferred. The process should also be properly documented and effectively communicated. The project must have an effective change control process that is actively used and should include:

- Change Request: a stakeholder reports an issue and provides relevant information for a decision. The issue is tracked in a change log.

- Initial evaluation: a quick evaluation whether the issue is worthwhile to investigate further.

- Detailed evaluation: a detailed evaluation if the change to the projects four dimensions is worthwhile the benefit the change is providing.

- Recommendation: A recommendation to the project sponsor is made out of the findings from earlier evaluation. The sponsor then takes decisions which have to be properly communicated (and documented).

- Update plans: If a change is approved the plans have to be accordingly adjusted.

- Implement: The necessary actions to implement the changes are made.

If an unauthorized change is identified the change has to go through the above mentioned process. The scope change management can also be influenced by APM BOK's Configuration Management system which describes a project's configuration. The different areas are: planning, identification of configuration details, control, status accounting and audit. The paper "Controlling the work scope in organisational transformation: a programme management approach" describes the scope to be a key for project success and includes it in a list of nine fatal project mistakes that have to be avoided – to miss defining the scope correctly. (Braganza & Levene, 1996) Even with these defined process and key areas of success problems with scope changes might occur. As the article "completing turnaround projects faster with full scope" describes, the project personnel might be affected in their prioritization of the daily tasks by for example a big workload resulting in ad-hoc prioritization and rampart multitasking. Also the ones screaming the loudest might be prioritized instead of the tasks that by the time would bring the most value to the project (Gupta, 2011).

Figure 3 Scope creep, a part of the project

The textbook "Project management techniques" (Burke, 2011, p. 119) summarizes how the scope change process can be designed. According to Rory Burke the project manager is responsible to put up a system to monitor, evaluate and approve changes before any changes are implemented. He also lists what a change control process (or in his words, configuration management system) can do: "

- *A change control system that formally documents a procedure defining the steps by which official project documents may be changed*

- *List the only people who have the authority to make changes to the scope of work, in both the client and contractor organizations.*

- *A current and up-to-date description of the product*

- *Traceability of previous baseline configurations*

- *A record and an audit trail of approved changes*

- *A framework to monitor, evaluate and update the scope baseline to accommodate any scope changes. This will ensure that the revised baseline always reflects the current status of the project.*

- *Automatic approval for emergency situations*"

The book also defines two areas of scope change, one during the initial phases that will be included in the project, before the project go-ahead decision. The other type of scope change occurs after the project has been launched and the impact of the project should be carefully weighted in the light of the different project dimensions (Burke, 2011, pp. 119-120).

The comparison of wicked problems to scope of a project in the sub chapter "The project and its scope" highlights an important factor in the world of projects. In the beginning of a project when the information is scarce, the need for information is the greatest when judging what path to take. During the project lifetime the knowledge of the project increases and makes some aspects of the wicked scope problem to become solvable, but at that time some decisions might have been taken earlier that inflict upon the current situation in a negative way. This point to that an active scope change process has to be in place for a project to deal with changing circumstances, continuously adapting to the changed perceived environment not letting the earlier bad decisions to further inflict the current situation. (Winch, 2010, p. 228). This scope change process has its foundation in project management designing processes so that information will arrive as early as possible to everybody involved to minimize uncertainty and to put in reviews of the project progress and to take action if the project slips. Another aspect suggesting the need for project scope change is that in order to get funding for the project sponsors might describe the project in the earliest phase in the best of lights in order to secure the project funding (Winch, 2010, p. 66). Another aspect of uncertainties in projects is described originating from different sources in the paper "In search of relevance: Project management in drifting environments". This paper states that for a project to have relevance it needs to manage the environment that will judge its success. Having the view that the environment relative to the project might drift the project can make sure its relevance stays intact (Kreiner, 1995). Another paper dealing with uncertainties is the paper "fundamental uncertainties in projects and the scope of project management" which brings up additional sources of uncertainty and also brings light to that the uncertainty not only is dependent on the source but also how it is received and interpreted (Atkinson, et al., 2006). To protect the project from changing circumstances the book Managing Projects describes that having senior management to secure the project from scope changes is an important task for the PM (Boddy, 2002, pp. 196-197). The paper "Project Scope Management" states that it is most important to manage the scope, both a controlled scope change, but also to identify and manage scope creep or unauthorized scope changes (Khan, 2006). By controlling the scope changes and relating them directly to the cost that they might mean to the project the project – client relationship can be managed in such a way that the relationship can stay positive. The paper "Scope change Negotiations, are write-offs inevitable?" argues that by managing the five areas proactively can the scope changes be turned to positive for the client getting what it needs while the project can earn additional money (Ertel & Sudner, 2000);

- manage client expectations,

- negotiate internally and communicate openly,

- negotiate early and often,

- employ joint problem solving and learn from each other

In the previous sub-chapter the central role of value creation process is highlighted and this leads to that a basic structure for any scope change system is to also follow a value creating process. The decision to implement any changes to the scope has to be founded upon a firm understanding of how the change contributes to *greater* value for the project. In other words, all cost including risk contingency has to be covered in order to accept the change to the scope if the initial project decision is to be valid – lead to expected success. (Winch, 2010) Another aspect of this can be seen in the paper "Plans are nothing, changing plans are everything: the impact of changes on project success" which states that while changes are unavoidable, changes to plan has to be kept at a minimum and filtering out the ones not bringing any positive effects to the project goal (Lechler & Dvir, 2003). This might be seen as a contrast to the progressive stance to actively work with value management and changing the project actively in order to incorporate new information and changed circumstances that might affect the value of the end project output. The need of flexibility in later stages of the project is presented having great importance for the stakeholders of the project. The importance to the project management was related to weather the incentives were connected to fulfil the direct project outcome like cost, time and within specification frames or the project purpose (Olsson, 2006).

The book "Executing your Strategy" describes project management from a strategically perspective and press on the importance for project sponsors (strategy responsible, whether they are in PMO office or portfolio management position) to keep track on where the project are and that it doesn't drift away from the intended strategy fulfilment. Also the strategy might change as the strategic environment changes which demands correction of the projects. The tight contact and synchronization between these operational positions needs to work well. (Morgan, et al., 2007, pp. 181-213)

The part of scope changes connected to minimize the possibilities of finding out scope change late in the project is not that detailed described in the two BOK's and other reviewed literature. One might see scope change management to be built up by two parts. One part is taking care of scope changes that are recognized along the way – a reactive approach, while the other part is to minimize the unknown scope changes that might lead to project failure. Said in other words, not reaching stipulated expectations in the four project dimensions that are earlier mentioned. This way of looking at scope change is very similar to the minimizing risks and increasing of likelihood for value creation in the field value management briefly described above. The task for the management of scope changes this way can be titled a proactive approach and acts as to identify and deal with the scope changes as early as possible in the project, thus minimizing its impact.

If the major project risks are identified and dealt with as early as possible the scope change need could be minimized in a number of aspects. One example of using risk avoidance and value creation in the project process is in the initial stages of project as was described earlier in this text. That success of the project is not only measured by the sponsor and His/hers benefits, but also on the different project stakeholders. By including the important project stakeholders into the scope and success definition of the project the risk of later changes due to unhappy project stakeholders can be avoided, and at the same time greater value can be created from the project outcome. The risk management should consider all the aspects of the project, both product and

process, and especially the human factor (Association for Project Management, 2006, p. 44). The book Project Management (Tonnquist, 2008)deals with how risk management can be used in a project environment going through the phases; risk identification, qualitative and quantitative risk analysis, risk response planning and risk mitigation. If the risks are taken care of early in the project, chances are that this risk management will help to minimize later scope change and/or impact of the same. (Tonnquist, 2008, pp. 148-160)

Another source of how to deal with unauthorized changes, or project creep comes from the book Project Management Techniques (Burke, 2011, p. 278). The book stipulates a need to work very actively early in projects with risk management and identify possible big impact risks and work with parallel developments in order to minimize the impact to scope change when a change is unavoidable.

While leading, managing and motivating the project team while focusing on dimensions of the project it is very important to also focus on five areas according to the book "The Right Projects Done Right": clarifying goals and objectives, clarifying technical requirements, planning and controlling the project effectively, managing risks, and assign enough resources to the project (Dinsmore & Cooke-Davies, 2006, p. 243). Analysing the five areas they bear some resemblance of the findings from Standish report.

Projects have a tendency to fail, if you are to believe what the CHAOS manifesto by the Standish group. The latest manifesto from 2011 states that only 37% of the reported projects were deemed to be successful. 21% of the projects in the report was cancelled or delivered but never used and 42% were challenged during the project. The projects in the report is mostly different types of IT projects and even though a general problem identification can't be made solely from this report it still transfer the knowledge to a broader public that it's hard to reach success with projects. The Standish report, CHAOS manifesto, is challenged by the article "Rise and fall of the Chaos report Figures" (Eveleens & Verhoef, 2010) that is criticizing how the data is collected and handled by the Standish group. The biggest criticism is that the figures might be biased by the organizations in the way the collecting of the data is done. Still the article doesn't erase the opinion that many projects have problems in delivering a successful result. The four areas that the Standish report from 2011 is focusing on being key areas for improvement are:

- Executive sponsorship, having a close relation with the sponsor during the whole project lifetime not only does the scope get right in the beginning, but also the unforeseen changes can be dealt with smoothly and the target to fulfil the project goal can be kept

- Decision making, has to be effective in deciding what is good and not for the project. Not only delivering the right decisions when needed, but the information on where the decisions will be taken has to work in the project's best interest

- Compliance and governance is the overhead for projects that might enable a critique and alignment with organizational objectives, managing the scope accordingly

- Optimization is the identified area that focuses on true user requirements. If the scope is optimized towards the true requirements of the user the project have the chance to keep the path of value creation and make the project benefits optimized for the customer

Even if the 2011 CHAOS Manifesto (The Standish Group International, Inc, 2011) is a report that has a main purpose to sell "knowledge" to organisations with the promise to improve the success rate of the projects it is interesting not least as a source of statistical information. The way they measure and judge the data they are building their statements on can and are being criticized even though the findings they show are not necessarily bad if one wants to increase the awareness of scope management as this dissertation is doing.

There are many ways in which a project can fail and giving a complete picture over all areas and all possible failures will not be possible. But in order to start somewhere the biggest issues found in the CHAOS report can act as a starting point. The way to deal with the biggest issues presented might give an indication of how other problems can be dealt with. Also the impact of the yearly report have become massive in an international perspective and the focus they envision on the success areas as they frame with thoughts that lead back to Leonardo da Vinci *"..how to channel creative thinking and innovation for improving project delivery and value."* And this the report describes is done through seven principles: *"..having conversations and trying to ask the right questions..", "..puts the answers to work and demonstrates the results in a business sense.", "..turns uncertainty into opportunity by focusing on high-value items, thus striking a profitable balance and continuing to integrate success through the iterative process and feature velocity.", "..makes breakthrough connection by focusing on real user needs and demonstrating value"* (The Standish Group International, Inc, 2011, p. 48). The areas for improvement do have a strong connection to scope management and the alignment of value creation during project execution, scope change management.

Burke (Burke, 2011, pp. 278-279) describes common failure sources of a project and one of these causes of failure is originating from the Scope of the project. The scope can be compromised by:

- *"Misinterpretation*

- *mixing and confusing tasks, specifications, approvals, and special instructions*

- *no good structure like when using WBS or CPM methods*

- *a misuse of WBS*

- *a wide variation of how to describe work details*

- *failing to get a third-party review, or verification from important stakeholders*

- *not working closely with client*

- *poor estimation*

- *inadequate planning*

- *Insufficient reviews and controls*

- *Incomplete information for decisions*

- *Lack of understanding PM techniques*"

A number of failure sources above can be traced back to scope of the project and managed by an effective scope change management.

The sources of scope change that have been explained are brief glimpses of what scope change might mean in different literature. The author of this report see that there are sources that describe a very clear process for handling with scope change, and other sources that open up for other aspects than lack of processes that lead to project failure. What the report earlier mentioned are that scope creep, or uncontrolled scope changes are not very easy to force into the scope change process. It requires more of the project team than the clearly stated processes can grasp.

This chapter has explained how the theories describing scope can support the managing of the project and in particular its scope. Even if the explained theories exist, projects still fail and the next chapters will investigate how theories are applied in practice and if it exist other parameters affecting the scope change than what is seen in the project management literature. The chapters will also investigate if the processes can be improved further.

3 Research Methods

3.1 Introduction

This chapter will explain what methods were used in the study thus securing the reader that the information given is clear and unambiguous and that an equal study can replicate the findings. (Biggam, 2008, p. 79)

Next chapter will cover research question1 and this chapter will describe how the answer for research questions 2, 3 and 4 will be developed:

1. (What is meant by project scope change?)

2. Are there differences between description in literature and usage of processes and tools? How do the used processes and tools relate to value adding?

3. Can a discrepancy between the different branches of industry and the literature in usage of tools and processes for PSCM be found?

4. What recommendations can be given to the involved organizations on tools and processes of PSCM?

3.2 Research approach selection

There are three approaches to research that can be used in the study: Quantitative, qualitative or mixed method. The Quantitative questions are where a question can be answered with a Yes/no answer or a number as being of the nature of a "how" question, for example "how many". This way of using closed questions will benefit the quantification of the answers giving the researcher the opportunity to use the quantitative data in, for example, statistical interpretations of the data collected. The Qualitative question is of the "why" nature and will be open for a deeper explanation of the answer. The usage of open ended questions is common in order to get the respondents deep opinion. The usage of the different methods depends on the question, when for example a question is specifically asking for measurable information, quantifiable data a quantitative approach might be best suited due to the well-developed analytical tools that exist, for example in statistics. When the question is of a non-quantifiable nature the method is not possible to use, at least not at first. The qualitative approach is then a method to use in order to collect data that can be analysed in different ways apart from the statistical analysis. The qualitative approach can be used in order to form quantitative questions which are called a mixed method. The methods have their origin in different philosophies. The philosophers supporting the qualitative research method argue that the world can be interpreted differently depending on a person's view while the philosophers supporting the quantitative method argues that only the things that can be measured is "real" knowledge (Yin, 2009), (Brinkmann, 2009), (Hart, 2005). A simplistic way of explaining the different approaches is "In general, quantitative research answers *how* questions, whereas the *why* questions are left to qualitative research" (Biggam, 2008).

The research objectives for this study are about searching, finding and presenting current and new knowledge in the field of scope change management. The search for a deeper understanding in the subject of scope change management has its

background in that a large number of projects seem to have problems handling project scope change according to the CHAOS report (The Standish Group International, Inc, 2011) described in the Introduction. The nature of the research objective is of "why" rather than "how many" and thus the main focus is to conduct the data collection in a qualitative way.

To further explain the nature of the current study a clarification is hereby given. The questions asked might be influenced by the participating project/program leaders' current project or his/hers experiences and feelings about the current job for example. To describe a phenomenon from the view of a person (or situation) is called Interpretivism. It is related to the philosophy of qualitative research and asks the question why and how, rather than what where, when. This fact is unavoidable in this study since the knowledge asked for in the research questions are inseparable from the individual holding the knowledge (Sue Newell, 2009) and the information gathered from the interviews will spring from the knowledge of the interviewed persons. This is why the interviewed persons in this study are asked to answer the questions using the whole of his or her gained knowledge, not solely from the perspective of the current project or organization. Another term for this view is Phenomenological research, and in this particular study the term holds the explaining and describing content (Biggam, 2008, p. 93). Another description of this is; "..this family of approaches typically involves several long, in-depth interviews with individuals who have experienced the phenomenon of interest" (Catherine Marshall, 2011, p. 19).

This study will be collecting information from individuals that might be biased by their current situation and context, but actions are taken to avoid this as explained above.

3.3   Research strategy

The research strategy used for this study is the Case study. Manion describe a case study to be: "The case study researcher typically observes the characteristics of an individual unit – a child, a class, a school or a community. The purpose of such observation is to probe deeply and to analyse intensely the multifarious phenomena that constitute the life cycle of the unit". (Manion, 1995, p. 106)

In this report 11 organizations participated with data to form input to the case study.

The choice of the overall research strategy for this study to be of a case study nature is not to be mixed up with choosing the method of using case study as a way to gather data. There are a number of methods to be adopted for other aspects of the dissertation, such as the collection and data analysis which will be described in subsequent chapters (Biggam, 2008, p. 86).

Since this study is aiming to collect data from different branches of industry a number of people have to be interviewed in order to investigate whether the industry knowledge contains information not described in the literature dealing with scope change. The people to be interviewed have however to be of a particular kind, experienced project or program managers that have extensive experience from a number of projects in order for them to have enough experience to explain how they tackle scope change management. This type of collection from a small part of the population is best done using case studies according to above definition. The choice to use the case study method for the study of project scope changes is done due to the complex nature of projects and in particular their scope changes. Only an in depth

data collection can reveal what the experienced project and program leaders do in order to control scope changes which then can answer research questions 2-4.

Below is a list of strategies, their strengths and weaknesses in relation to the research objectives of the study (Biggam, 2008, pp. 83-85):

Table 1 Strategies; strength and weakness

Strategy	Strengths	Weaknesses
Case Study	The study of one group in detail	Only represent one part of the org.
Survey	A representation from the population of a particular type from a defined group	Might be time consuming thus using questioners instead of interviews
Ethnography	Usually used to study cultures, closely interpreting collected data.	Might be biased by the researcher, hard to perform without bias impacting
Experimental Research	Testing of a hypothesis through experiments	High level of knowledge of statistical knowledge and tools
Historical Research	Research about historical facts, usually without first hand data	First hand data sources are usually missing, which makes the researcher dependent on secondary or lower grade of sources that might be biased by previous collector.
Action Research	Research where the researcher takes a part of the researched study	Might be biased by the researcher looking to show himself in the best of lights
Grounded Theory	A research where the research goal is incrementally built up during the study and the findings	Very exploratory in nature, might be hard to define the borders for the research, especially the end of the study.

3.4 Case Selection

In addition, Quota sampling is used. The reason to pick this sampling technique was that the number of interviews conductible was very limited both due to the time available for the study, but more so that the attendants of the interview were really hard to find and book for an interview (Biggam, 2008, p. 89). This is not a random sampling technique nor is it any convenience-sampling due to the very hard task to find relevant interview persons with enough knowledge and experience to participate in the study. The organizations that were asked to participate were displaying their organization in a Chalmers job-fair in the spring of 2012. These organizations were asked if interested to participate in a study of scope change management. About 40 organizations that showed interest from the two job-fairs were asked to participate through an invitation letter (appendix 1, first letter to organization). The invitation letter described the dissertation, its research objectives and that the data should be collected through interviews with experienced project managers or people with similar knowledge and experience. 16 organizations responded positively to participate in the study and were given a second letter via e-mail informing in detail about the interview and asking to return with a date and time for an interview. 11 project and program managers were interviewed with an average project experience of 17.5 Years.

The usage of quota sampling fits the research objectives in that the sampling will be limited to the persons conducting the interview as will the data and its analyse result be limited to the collected data in the literature review and the interviews. Even with these restrictions the research questions does not have the nature of finding *every and all* data about scope change but conducting a search to see if any new info can be found and if there exists a discrepancy between theory and practice. Having said that, future studies might build upon the findings of this study by going deeper into a particular phenomenon/ variable or aspect in branch of industry.

3.5 Data Collection

The use of multiple data collection techniques and sources is in general beneficial to the study of a subject because the use of the triangulation method is possible. Getting data from multiple sources helps the researcher to analyse the subject under investigation through different angles. There are six main sources of data that could be used presented in the table (Yin, 2009, p. 80):

Table 2 Main sources of data

Collection method	Strengths	Weaknesses
Documentation	Stable, Unobtrusive, Exact, Broad coverage	Retrievability, Biased selectivity, Reporting bias, Access
Archival records	Precise and usually quantitative, Stable, Unobtrusive, Exact, Broad coverage	Accessibility due to privacy reasons, Retrievability, Biased selectivity, Reporting bias, Access
Interviews	Targeted, Insightful	Biased in questions, Response bias, Inaccuracy, Reflexivity
Direct observations	Reality, Contextual	Time-consuming, Selectivity, Reflexivity, Cost
Participant-observation	Insightful into interpersonal behaviour and motives, Reality, Contextual	Biased due to participant event manipulation, Time-consuming, Selectivity, Reflexivity, Cost
Physical artefacts	Insightful into cultural features and technical operations	Selectivity, Availability

In this dissertation interviews through semi-structured questions are used as a data collection method. (Data collected from interviews is triangulated with data from literature study in order to strengthen the answers to the research questions. The strengths of this method fit the data that the research questions are requesting. The research questions are targeted in order to get a high level of quality in the answers and they are insightful because the data asked for in the research objectives are embedded deep inside the knowledge of the interviewed person. Other sources of data were not used due to it being very hard to get access to this kind of data from the different organizations involved. (One could, if the restrictions mentioned were removed, bring in other persons and functions in the organization connected to the original interview person and ask them the same questions, or collect statistics about changes in projects or failure rates or afterlife performance of the projects in order to

put another perspective into the study. This collecting of data is not possible in this case due to the unavailability of data and persons from the organizations.)

Audio taping is used which, according to Yin (2009), can be a strong help if the permission is given to record. The data collected is taken care of, the recording does not disturb the interview and that the recording is an addition, not a substitute to listening. (Yin, 2009, p. 109). Ethical issues were dealt with by asking all participants if recording is acceptable since the recording will form an important part of the data, the recording was practiced beforehand to minimize disturbance as well as the usage of audio taping the interview protocol was used to collect signals and interpretations of the answers given.

When collecting the data, there are three principles to be taken care of during the use of one or several of the six sources in table 2 in order to strengthen the problems of trustworthiness dealt with in depth later in this chapter; using multiple sources of evidence, creating a case study database, and maintaining a chain of evidence (Yin, 2009, pp. 100-101). The usage of multiple sources were not possible in this case due to that documentation on how organizations work with scope change management does not exist in open sources besides the information collected in the literature review. The sources that might carry this information are usually classified project information and are not open to the public, if existing at all within the organizations in written format. The way this study handled this issue were to gather as many different organizations as possible, limited to accessibility of people and time constrictions of the dissertation. The choice to use a big number of organizations instead of studying a few was made after reading a previous dissertation (Tenggren, 2011). The obvious lack of diversity of the processes and tools presented using one organization was why this dissertation was to be focusing on several organizational sources avoiding this obvious weakness. The issue with case study data base is handled according to Northumbria University rules, providing evidence file at the submission date to the Blackboard webpage. The chain of evidence from the report to the collected data will be traceable from the report to the interview transcriptions via the interview sheet that shows all the questions, (Appendix 2), and the question overview (Appendix 3).

Semi structured questions were used. There were a number of main questions divided in four categories. The interviewed person were allowed and also told to speak freely while the interviewee noted down on a tracking sheet which questions were covered. Each category had 5-6 questions which had a number of sub questions. The sub questions were not spoken out directly, but used as a prompt for the interviewee to track if the interviewed person did answer all the aspects of the questions that were expected in the case study. This is to be able for the data collection to be as similar as possible but still letting the interviewed person answer freely on all the questions. The prompts were only seldom used if the first answer did not incorporate one particular angle of the main question. The negative side in using open-ended questions brought up by (Biggam, 2008, p. 102) is that it might be difficult to answer in an exact way. The respondent wants to describe oneself in best of lights or to please the interviewee, or the answer might not be as thought through as it should be. This possible source of fault was minimized when first showing and explaining the interview, then letting the interviewees answer in their own pace while covering many questions in one answer. Later in the interview the questions covered earlier were asked in a different way with help from the sub-questions. This made the respondents to reflect upon their answer from a different perspective than earlier.

The questions were developed from the four research questions in order to obtain deep but still time restricted answers. The questions were divided in three layers and during the interview the upper two layers were visible to the interviewed person. The lowest level of questions, having the greatest detail was constructed in order for the interviewee to be able to check during the interview and make sure no aspects were left unanswered in the two upper layers. The full questionnaire with all three layers is presented in the Appendix 2, as well as the presentation material showing only the two upper levels of questions visible to the interviewed persons.

According to Steinar Kvale (Brinkmann, 2009)interviews should start softly letting the interviewed person feel secure thus being more open to answer the questions. This was achieved by a personal presentation of the author and a general description of the dissertation and the topic. The second part of "softening" up the conversation was that the more structured and non-personal questions were in the beginning of the interview and the more personal and harder questions were placed later, when the respondent felt more secure and tension was less obvious.

3.6 Data analysis

The data analysis can be divided into three parts, the understanding phase, the analysing phase and the interpretation phase (Biggam, 2008, p. 118). The first part of the understanding phase is really when the collection of data is designed. This step will ease the next step of grouping the data collected into themes. (Jacobsen, 1993, pp. 70-84)

The four research questions raised in this dissertation are requiring data input from the case studies. According to Yin an analytic method has to be chosen in order to analyse the collected data in a structured way (Yin, 2009, pp. 128-129). Yin also says that the most preferred strategy to use is to rely on theoretical propositions structured from the literature review (Yin, 2009, pp. 130-131) and these are visible in the four research questions. The research questions were therefore broken down into smaller pieces, sub questions that could give a broad explanation on each of the questions stated.

The questions in the interview are grouped into six areas, 'headline' questions that will paint the understanding of the context of the answers from the interviewed person, then the understanding of a few key concepts are asked about, Definitions. Tools and processes are the third theme describing which tools and processes are used and not used. Fourthly the Value theme describes what value the tools and processes bring and not bring to the scope change process. Fifthly the unfulfilled needs are asked about, whether the current processes can be improved. Lastly the ending questions are asked, whether there are any open questions and the wrapping up of the interview (Brinkmann, 2009). The questions were structured to let the interviewed person have freedom to explain with his/her own words, and later the interview would go deeper into the subject with detailed and targeted questions if the first explanation didn't contain the needed details. All these areas are interrelated and often the answers will be covering many themes and sub questions in one answer but the interviewee were deliberately letting the interviewed person to express his/her understanding of the question without breaking the flow in order to avoid bias from the interviewing researcher.

According to Yin (Yin, 2009, p. 127) using assisting tools for the analysing of the gathered data can greatly help the researcher. That is why Nvivo 9 (QSR International, 2012) was decided to be used to split the long interviews and code parts

in the interviews that are connected to the four research questions and its sub questions. The tool was very helpful to gather the large amount of data and especially because answers to the questions were not given in a structured way but could be both given in the form of a direct question, but also in particular, as an explanation of a bigger explanation of an earlier question. In other words the different answers are to be found in several places in the interviews and together they paint a colourful answer. The exploratory nature of this study with data collected from audio recordings of long and complex interviews points to the usage of logic models to analyse and generate answers to the four research questions. Using the logical model description from Yin (Yin, 2009, pp. 149-156)the different questions and answers could be described, compared and analysed to bring fourth answers to the four research questions.

 The analysis highlights the connections to the different interviews and interesting aspects are highlighted along with reflections and similarities/ dissimilarities among the interviews. The synthesis will reflect the analysis in the literature review. The interview questions are grouped in three levels, first level of questions is supposed to give relevant data to the four research questions. The second level of questions is supposed to break the questions down in details covering different aspects of each first level question. The third level of questions is constructed to give support in the interviews in order to make sure no aspects are missed. The research question along with first and second level of questions is presented and the third level is asked only if the answers to the first and second level of questions did not cover all the aspects that the third level stipulates.

As was mentioned in the description of data collection the interviews were audio taped. The reason for this is that the interview person would feel better when a lively interview were made rather than that the interviewing person did not actively participate in the discussion, feeding with correct and well placed questions to steer and control the interview to follow the interview protocol. Also the aspect of bias in the writing part were minimized in doing the collection this way, not letting the interviewing person miss comments or interpret wrongly when later transcribing the interview (Brinkmann, 2009). The data were then transcribed using Nvivo9 gathering all the answers from level two and three into the structure of the first level of questions. The gathered answers were then analysed to reflect the varying answers given.

The case study results are of great value containing more than 60000 words with 669 references to the 11 interviews. The presented results are therefore a product of the analysis, which are divided among the four research questions. The fourth research question will form a conclusion of the first three research questions along with the input received connected to the fourth research question. The conclusions and discussion chapter will also contain the discussion of the dissertation, discussing the process and product of the dissertation.

3.7 Ethical considerations

To deal with the ethical considerations the interviewees were first informed about the dissertation, its purpose and content. The detailed questions were not revealed before the interview in order to not bias the answers by letting the persons prepare the answers that perhaps would match organizational politics. At the interview a presentation about the interviewer, the background and purpose of the dissertation and interview and also that the organizations and interviewed persons had the right to be

anonymous. All interviewed persons filled in a consent form according to Northumbria University rules.

3.8   Limitations and potential problems

When reading the literature dealing with qualitative research one potential problem of the choice of research method is identified. The qualitative study, as a method, has historically drawn its foundation of reliability, validity, objectivity and generalizability from the quantitative method in order to handle the area of trustworthiness. In recent times there have been voices from different sources to change the historical perspective. The book "Designing Qualitative research" put forward the possibility to tackle the issues of trustworthiness by following a number of procedures; to handle validity/credibility one should be engaged in the setting of data collection for a long period of time, data should be shared among research colleagues in order for checks of data to be done, triangulation of data should be used, gathering data from separate sources through different methods and analysed through different theory lenses (Catherine Marshall, 2011, pp. 39-41). This is the main reason to incorporate the vast amount of sources and case study data. Using the literature review and the case study for the analysis to answer the four research questions will create triangulation of the data for this dissertation.

4 Findings from the Case study

4.1 Introduction and overview

This chapter will present the findings from the case study. The case study were conducted through interviews asking detailed questions connected to the four research questions in order to build up a strong base of knowledge for the analysis/discussion and conclusion phase. The case study results are structured in a similar way, using the interview questions as a base structure which are divided between the relevant research questions and presented respectively. The organisations that were participating in the interviews range from different industries such as; finance, energy production, infrastructure building, telecom, IT and medical industry. The person's interviewed in the organisations were both top managers in the project organisation with extensive experience and project managers with less experience. The four research questions raised in the introduction chapter is found below:

1. What is meant by project scope change?
2. Are there differences between description in literature and usage of processes and tools? How do the used processes and tools relate to value adding?
3. Can a discrepancy between the different branches of industry and the literature in usage of tools and processes for PSCM be found?
4. What recommendations can be given to the involved organizations on tools and processes of PSCM?

The interview questions are grouped in three levels. The first level is supposed to give relevant data to the four research questions. The second level of questions is supposed to break the questions down in details covering different aspects of each first level question. The third level of questions is constructed to give support in the interviews in order to make sure no aspects are missed. The first, second and third level of questions asked was summed up under the respective research question.

In order to understand if the literature concerned with scope change and the industry working with projects share the same understandings of processes and tools for the scope change management a broad knowledge collection had to be conducted in the form of a case study. Some of the interview questions were asked to put the topic of the case study in perspective in order to understand the specific organization or project managers view, for example: do you see a correlation between scope change and value creation in the project? The answer to this question will for example indicate an awareness of scope change management as a part of the whole project process or an unaware handling of scope changes.

This report has three appendixes. The first appendix is the invitation letter to the interested organizations. The second appendix is showing at a detailed level three questions that acted as a support for the interviewer to make sure all aspects were covered during the free flowing interview. The third appendix is showing an overview of the interview questions.

4.2 RQ1: What is meant by project scope change?

No participating organization uses a scope statement as the name might suggest. The awareness of scope change was not different between the industries. The difference lay in the experience of the involved PM's. Usually the scope definition is referred to

the content of a project and how that is defined in a particular project, not as the company's general definition of the term. The scope is presented for the project at a high level and the project can usually answer with the required resources before the project execution is decided. In the initial phase the project team breaks down the project and creates a detailed budget and time plan. One organization described the scope management as an iterative process where the scope is checked at every gate. For another organization the scope was described to be deliberately created in high detail and then broken down successively as information gets available (ad-hoc scoping).

The term Project Scope Change was not a common term, at least for the organizations participating in the study. The changes in the organizations are mostly done from a strategic perspective through projects. Often a project control board is used to take decisions whether to change or not. The change decision is not always prepared before the control board receives the change request which some PM's identified as a problem. Especially the dependencies of the change, and its consequences on the other project dimensions were not judged enough in the pre decision preparation.

No special risk/value analysis was mentioned in the interviews. The value measurement is done in a monetary way as a dimension of the decision to increase/decrease the scope, but the project aftermath is not calculated to the same extent as the original scope. In some organizations the main goal is not to earn money in the first place, it can be of a strategic or quality nature and these projects are judged similarly to the monetary goal projects, but with a different focus. One big organization even expressed the scope changes as something bad but necessary. Most of the communication was handled either in meetings or by mail. In a few rare cases a shared information platform was used. Often the important decisions were written down and saved in these platforms.

4.2.1 RQ2: Are there differences between description in literature and usage of processes and tools? How do the used processes and tools relate to value adding?

Many of the organizations did not have dedicated tools to handle scope change. Some tools could help the management of scope change, but was not seen as effective. Mostly the few tools that were decided to be used were actually used, for example MS Excel which was not viewed by some of the participating PM's a good tool to communicate with. It is a simple solution when time and knowledge are missing in the projects or in the mother organization, (no better solution exist in the project's immediate environment).

In general, projects working with construction have a less standardized set of tools and processes. The lack of generally standardized tools and processes was compensated by the experienced PM's who have self-developed or decided tools. The tools that were decided by the "mother organization" to be used were mostly dealing with economics and time reporting.

Time planning tools are often used, but with a wide variety with MS Project and MS Excel as most common tools. A few used Primavera, which is a more complex tool. Often the big organizations used common tools decided by the mother organization and the smaller organizations trusted on MS Excel. Most organizations use meetings, MS office and the mailing tool for communication. One used a common communication platform but also stated: "Value creation is not in the tools, it is in the

personal meetings". One PM expressed the feeling that if similar tools were used everywhere in the project benefits could be drawn. Tools that collect and automatically share data to feed a reporting system was searched for but not found. Trials with Primavera plugins were partly successful.

Generally there existed no common formal process to handle project scope change. The processes connected to project scope were often decided by the project sponsor or board in the form of decision meetings. This person or persons set the requirements on the project to report and use the same economic systems and processes that the rest of the organization used. The details and width of the forced usage were very different. In about 50% of the organizations studied there existed an overall process. Those were not adapted to suit the project, but the overall organization. Thus the processes were not seen as optimal for the projects, they were often slow and imprecise. The forced usages of processes were mentioned by several PM's as one of the biggest restrictions for projects.

It was interesting to see that the usage of WBS were not from a scope management perspective. The most similar process found was springing from the need to create budgets, which is in sharp contrast to the literature that focus on creating the scope as a foundation of the project, not in opposite way by creating the project from a cost and budget perspective. Almost all PM's used some kind of own developed processes to deal with the sharing of information. Usually the common MS office tools along with reoccurring meetings and mail communications. Not many used the WBS structure which some thought are due to lack of understanding of WBS in a scope perspective. Time planning and budget processes are developed but no one uses value/risk process judgements or decision processes that were specific for the projects.

The question "How well do you think the processes are working" rendered a lot of different answers. A majority of the PM's expressed in different ways that the projects were often forced to handle information from and to, for example, the mother organization in a way not optimized for the project. The information received was affecting the project time plan, budget or its scope in a negative way. The changes the new information led to were seen as the major source of problems. For example a PM described that decisions of scope change often were not weighted as to whether or not the changes would further strengthen or weaken the project which meant a big risk for the project result. Many PM's expressed that the biggest problems, not by frequency, but by impact often were connected to scope changes that were forced upon the projects. Also the unforeseen changes, the project creep, even if the exact term was not mentioned in general were a big issue.

One PM said that their most important organization task last year was their deep dive into the area of scope creep. They performed a workshop to highlight the consciousness of the issues around scope creep. This PM used the same pre-project persons as in the actual project in order to boost the knowledge transfer. Also the mixing of experienced persons within the organization was told to be an important way to help the knowledge transfer.

Most of the experienced PM's noted that the processes that were optimized to fit the actual project were creating value with good efficiency, but at the same time the ones not optimized were ineffective and counterproductive. Some went as far as to say that those processes did not fit the project and felt that it was lowering the morale of the workers. The workers did not see any benefits in data input to the processes which was indeed of a low quality and further strengthened the weak output of those

processes. About 70% of the PM's interviewed did create their own processes to optimize the internal project workflow. The ones that were most successful had acceptance by the line managers and could influence the information and decision processes in order to optimize the project efficiency.

In general the PM's used different tools that in one way or another support the generating, gathering and sharing of data that contribute to the determination of the four project dimensions (time, cost, quality and scope). Often the economy and time tools are more developed, but not always in synch with each other or with the actual project. Often MS office tools such as MS Excel are used, which in a big project easily creates a vast number of different information carriers, for example time plans. Multiple documents without version control are problematic due to the fact that the project stakeholders does not know whether the information is valid or of the latest version. Also it might be hard to find the required information when the information is hard to overlook. A standardized tool for information sharing was on the wish list of tools for many PM's. The tools that did create value were for example Primavera, MS Project or a shared area where the latest information were placed.

4.3 RQ3: Can a discrepancy between the different branches of industry and the literature in usage of tools and processes for PSCM be found?

Most of the PM's used own developed processes that translated the required information from the external processes dependent into the project. But where the extent of organizational process demands in some organizations was strict the PM often felt the processes to be very ineffective, having too much over-head. The PM's who expressed less frustration had the freedom to develop new processes for the R&D in order to create bigger value with less people. They experienced a strong positive feeling of being effective and self-fulfilled. Most of the experienced PM's had a degree of freedom to create own processes within the project while still feeding the external world with required information and in a required way. One PM made clear that it was very important to demand a reporting format that suited the project. He believed this was possible due to his experience and influence. Two PM's involved in overall project management tasks pointed out the importance of all PM's to follow a base line of reporting in order to ease the collection of status reporting. One PM described a process of problem reports that was in use in the overall organization, but he pointed out the danger that if this process were to grow too much then overhead might take time from the real benefits of the process. Another experienced PM pointed out that the purchasing and pre-study processes must be of extra importance in order to succeed.

Most of the Project Managers connected to the building industry used weekly detailed meetings and oral communication both at meetings and on site to ensure the project proceed. This was in contrast with other industry branches that usually used documentation, even for more detailed tasks/ information. The PM's expressed a divided picture of the situation. They expressed in different ways that the tools used can be good but if they are generating too much overhead the users might take short cuts in order to still deliver. These shortcuts might be bad for the project in terms of quality, traceability or common effectiveness. The follow up of the project might also be jeopardized and some PM's have created own tools or changed existing tools in

order for the projects to work better while others want to do this but were forced to use the mother organization's tools. One PM commented that learning how to use the current tools are better task to focus on than creating new tools. Another statement from the interviews is "tools doesn't solve problems, people do".

4.4 RQ4: What recommendations can be given to the involved organizations on tools and processes of Project Scope Change?

This sub-chapter is divided to follow a number of questions in order for the reader to get a better overview.

4.4.1 Is there any need that is not covered by current processes?

In the interviews the PM's commented on what they thought was important to focus on based on their experiences in order to manage the scope change process, both existing and not existing. The needs that the interviewed PM's felt were uncovered by current processes in order to have an effective project scope management are listed and grouped below:

1) "Base the WBS on scope definition and the WBS structure in all other planning in the projects".
2) "Designing of the scope change process to secure an effective value management in the project and make sure that the scope is possible to change accordingly to fit the restrictions on time, cost and quality"
3) "The creation of an effective information process that makes sure that the decided scope and its changes are communicated efficiently and fast. Use the rule of thumb, 80% standardized and 20% free process space to make room for improvements"
4) "The adaptation of processes and tools to the current project were for some organizations an important identified need. This might lead to the minimization of overhead and optimization of resources to achieve the project goals."
5) "The active role of the sponsor to protect and support the project in order to create clarity of requirements and resources as well as processes and tools used in the interfaces of the project and the project environment."
6) "Working with focus groups such as key users in a continuous way in the scope management."
7) "One speaking partner for each stakeholder"
8) "Make sure that the stakeholders of the project are using correct processes and tools to ease the information transfer with the project."
9) "An active stakeholder management in order to control the expectations of the project connected to avoidance of big scope changes"

4.4.2 Is there any need that is not covered by current tools?

A tool is needed that helps the management of all four project dimensions and in which the entered data is presented easily, accessibly and visibly, showing the current status. The entered data should have as short lead-time from occurrence to visibility in

the tool as possible to be able to react with shortest delay possible. This actual data should be accompanied with some type of prognosis function that can help the decision makers to take decisions on a solid data baseline. An active risk management would be a helpful tool complementing the decision process. The sorting and prioritization of problems occurring should help the tracking of scope changes and help the management of these based on input from several key areas, for example scope responsible, purchase and time planners.

4.4.3 What do you think are the biggest barriers for change of processes and tools?

From the case study barriers for the management of scope changes were brought into the light. These are equally important to manage along with the particular goal for the changes in order to achieve success. The numbers of barriers for project success brought up by the PM's during the interviews are divided into two groups below. One group links the first three statement barriers connected to processes that do not work as the PM's want them to do, and the other group that is connected to the involved persons perception or attitude. To the first group is possible to give examples and suggestions based on the literature as is done below. In the second group, statement 5-13 have the common theme of not being solvable by processes and/or tools, but with soft skills like leadership or "cognitive abilities".

1) "A strict pressure on the project to use none project optimized processes and tools for its internal workflow".
   Explanation follows in the interview: The PM expresses the organizational pressure to use processes and tools that the rest of the organizations are using. The PM means that this is not effective and does not create enough value compared to the resources spent. The gain for the overall organization must here be assessed. Is the project value creation more important than the coherent working of all the organization? The PM has no possibility to optimize the project's processes and tools to optimize the value output from this situation.

2) "When the value of the project result is shared, different persons deciding about the project's cost, time, quality and scope might pull the project in different directions".

3) "Sponsor or line management forces changes upon the project".

4) "Work actively to resist, for the project value, unhealthy changes of scope"

5) "Some people have a strange affluence against admin which have to be dealt with in order for the project to work properly".

6) "The difference in how people in the project react upon changes, as being positive or negative".

7) "An active management of scope and scope creep along with increased knowledge of the term".

8) "It might be a problem with increasing project scope and adding resources. People need time to learn and work effectively in the project, as well as the whole project group are affected by a new player entering the team".

9) "Some people might hide occurring problems not to look as if they can't deal with the issues themselves, all relevant problems must be reported in order to

be dealt with accordingly. The correct and unbiased information transfer has to be supported actively".

10) "That all use the decided tools and processes as they are intended to be used. Often more discipline or teaching is needed rather than new or improved tools and processes along with motivation through explaining why the tools and processes were to be used".

11) "One should strive to a careful handling of the soft side of project management, caring for the control of the soft scope management. Working towards an effective project team and individuals motivated to deliver optimum value to the project."

12) "Work against the perception that: my way is the best since I have worked much longer than everybody else."

13) "A skew distribution of resources and spent resources in the project due to personal opinions of what is important or not, or what is fun and interesting to work with"

5 Discussion

This chapter will describe, compare and contrast the findings of literature review with industry practices.

5.1 RQ1 What is meant with project scope change?

According to the PMBOK, project scope is important to be thoroughly defined and understood so that all involved in or affected by the project have the same understanding of what the project is supposed to do and not to do. The boundaries between the project and its environment are of vital importance to the project scope definition. This is not always clearly shown as seen in the case study. This fact is highlighted by (Lynn Crawford, 2010) who explains the necessity of creating boundaries for the change, which will be an important part of the scope definition for the particular project. The case study also brought up change management in order to investigate what other processes could work parallel or in conflict with project change that were indicated by Lynn Crawford (Crawford & Nahmias, 2010). No strong connection or awareness could be traced in general terms. This might be an improvement area for the involved PM's, to use knowledge from change management BOK's.

Another idea from the literature is brought forward by Graham Winch (Winch, 2010), who describes a problematic project to be similar with a "wicked problem", a problem without simple solutions. He argues that it is important to avoid creating situations where a project can become a wicked problem. Focusing resources on the early project phases creating the frame and definition of the project can help the later stages of the project by avoid such issues as wicked problems. The book "The Right projects done right!" (Dinsmore & Cooke-Davies, 2006) argues that changing the scope is the best way to control the project instead of using cost as a control tool. This is only seen in one interview and can act as a good area in which the readers of this report can learn a clear difference between literature and practicing PM's.

Finally most of the organizations involved don't follow the PMI standard when influencing the factors leading to scope change, determining if a scope change has occurred and/or to manage the occurred scope changes. Here many of the involved organizations might have to strengthen their processes and tools. Also the preparation of decisions and the possibility to save the pre-requisitions of a project decision has to be looked upon in order to create a learning platform (a process of learning from the past) and in time minimize faulty decisions. The decision process described by PMBOK (Project Management Institute, 2010) is one example of how decisions can be prepared properly in order to minimize the scope creep (undesirable scope changes). Finally the securing of information transfer and a clear statement of what information and decision making that is valid in any given moment is a field that the literature is highlighting that is important for the project to avoid misunderstanding of the project scope.

5.1.1 RQ2 Are there differences between description in literature and usage of processes and tools? How do the used processes and tools relate to value adding?

The first part of the question is described in the literature review. The second part will be discussed in this subchapter.

The decided tools to be used by the projects were not efficient in highlighting the value of the different choices of a particular issue when the project were about to decide about a scope change. Winch (Winch, 2010, p. 228) explains that creating higher value should be the main goal for a scope change. But when you do not have a tool to measure the additional value, how can one then decide upon a scope change? The lack of a common understanding of the scope was visible in the case studies, which is an important base for every project (Dinsmore & Cooke-Davies, 2006, p. 148).

The APM BOK (Association for Project Management, 2006, p. 34) describes a usage of a PMP (Project management plan) where the scope is clearly defined, what is in and what is out of the project. The sponsor or program manager have to make sure that the scope is clearly stated and that everybody understands the scope, what they expect from the project, which can be done using a common information sharing system. There are a number of tools that might be usable for the management of scope changes. This information management is important in order to ensure project success, but also to learn from the decisions taken. Collecting information and later analyse if the intended benefits of a project scope is materialized as planned is of key importance for learning.

The overall control of what processes the projects have to use might be implemented as controlled frames that the projects have to fulfil. It is described in the literature review chapter how PMBOK (Project Management Institute, 2010, p. 94) deals with the process of scope change; identifying, documenting and controlling, which is a part of an overall change process. This process was not clearly seen in the case studies. Often one or two of the three process parts existed in some form, but not as an identified and controlled process. Here the PDCA (Plan Do Check Act) cycle known from quality processes could be used to ensure that the organization/project strives to develop a process of continuous improvement. The APMBOK (Association for Project Management, 2006) describes that a similar process has to be set up, but also adds that the changes of scope should go through the same strict procedure as the initial scope did. Even the unauthorized changes, in other words project creep, have to undergo the same procedure, even if those already have been "implemented". The handling of the WBS described above is a clear improvement area and is according to Burke (Burke, 2011, pp. 278-279) a compromising factor for the project.

The way the PM's used processes, developed by them or not, often solved the problem at hand. On the other hand this construction meant that learning from the decisions taken was very hard to do. Sufficient data were not stored to be able to analyse whether right decisions were taken or not and learn from this experience, especially from past projects. This might be influenced by the fact that a project is of a temporary nature. This is nevertheless an important improvement area both for the organization that control the project, but also for the individual project member. Being able to learn from earlier experiences requires that information is handled in a predefined process that is mostly general for all projects in the organization. Not to mention that the process within the project should be stable to be able to identify and

learn from earlier experiences, for example decisions of scope change and their decision basis.

The stringent follow up by cost and time was seen as especially important for the PM's to control. If those processes that exist can be placed in a bigger format similar to the change processes described in the literature review with the PMI and APM as primary role models a more solid change process and in particular the scope change process could be improved to deliver greater value to the projects. Even if sufficient processes adopted and implemented are in place, the daily prioritization and big workload could affect the scope management negatively. How planned tasks and additional work is prioritized in the daily work can easily be affected by the persons screaming loudest if the focus on keeping the scope mutually understood and accepted is not thoroughly managed (Gupta, 2011).
Many of the PM's judged some of the processes they have to work with as being ineffective and having too much of overhead in comparison to the value they provide. These processes are often forced upon the projects which they have to work more or less with. Maintaining the value creation in the projects is vital for project success according to the APM and PMI BOK's. Also Winch (Winch, 2010, pp. 68-69) describes that wasting resources to tasks that not contribute to the value creation have to be avoided by focusing on value management.

The early usage of models in the projects were a key factor for a common understanding of what the project was supposed to do, creating an increased mutual understanding. The communication of the project scope is very important in order for everybody to understand the path and goal as Roger Atkinson (Atkinson, et al., 2006) explains it.

5.2 RQ3 Can a discrepancy between the different branches of industry and the literature in usage of tools and processes for PSCM be found?

It was not possible from the results to see a difference in the usage of processes and tools among the industry branches. The difference was visible in how much experience the involved PM's had of project management work. The more experienced PM's used own developed tools that correspond in greater detail to the processes and tools described in the literature review chapter. The exact processes and tools are not presented due to censuring of the sources. But in general the process of scope management was known even if the detailed usage of all parts of scope management including value management were not used in practice more than in the daily work. The processes were usually not written down. The less experienced did not use scope management if they knew the term at all.

In general the literature is describing the scope change processes in high detail, while the actual usage was not at all to the level of detail in all of the involved organizations. The most experienced PM's did use adapted versions of PMBOK descriptions of processes related to scope change. The key for success in their case was the balancing of the overhead and value creating operations within their projects. Here the critique can be turned to the literature to first argue about the usage of value management while detailing, thus creating much overhead. On the other hand many of the projects involved in the study could gain much on becoming clearer in their processes and tools. They will work more effectively when all personnel are working

correctly and with the right tasks in the right time as the book "The Right projects done right!" (Dinsmore & Cooke-Davies, 2006) describes.

The literature can be said to incorporate everything that can be good for a project, while the projects need to manage its processes and tools with restricted resources. This is why the careful balancing of processes and tools to be used is very different for different sizes of projects. The size and complexity is seen to be a much more important factor, when having to use a precise and detailed project structure, than the fact to what industry the project is belonging to.

The lack of identification of project scope creep is especially important to highlight in this discussion. As the change processes of both PMI and APM BOK's (Association for Project Management, 2006) (Project Management Institute, 2010) along with Burke (Burke, 2011, p. 278) and Kahn (Khan, 2006) stipulates, the identification and management of unauthorized changes should be targeted in order to have control over the scope. Also how decisions are taken influence the value creation of decisions taken which the project managers need to focus on. The quality of decisions will increase even further if a database is created along with a reoccurring process of reflection and learning sessions with the goal of avoiding future mistakes.

5.3 RQ4 What recommendations can be given to the involved organizations on tools and processes of Project Scope Change?

This section of the discussion is created around a number of statements from the interviewees. The statements can be found in chapter 9.5.1.

5.3.1

Statements 1-3 in chapter 9.5.1 is about creating a solid and effective scope change process. The first statement suggests that the basic structure of all four dimensions in the project should be according to the WBS which in turn is based on the scope definition. This is a step further than the project construction described in the literature review. But constructing it like that would mean that the communication among the dimensions could be made clearer. The second statement hints that the scope could act as a fine tuner for the project in order to secure the targets on the other three dimensions. If this is done together with an active prioritization of the scope activities it would mean that the project delivered would be flexible enough to handle the changing surrounding of the project. This helps to secure that the project is working with the most important parts while reaching the project goal. Even if the original scope is not fully achieved, the scope achieved corresponds to the actual need of the customer.

Statements two and three might reflect a particular case, but in general the project board, including the project manager, concerned line managers and the sponsor should together decide whether the changes are beneficial for the project value or not. If so the decision to implement has to be visible in the total scope and to be seen through the scope definition process. According to the book "The Right projects done right!" (Dinsmore & Cooke-Davies, 2006) there is a responsibility to make sure the project and its scope is feasible and connected to the business case. This change has to be feasible, which the PM has to argue about. A proper preparation of every decision has to be done, where the PM delivers the suggested project impacts for the project board

or sponsor to take a well-balanced decision to implement the change or not. The third statement is displaying the need to have an effective information process that secures that correct information is delivered to all affected by the project. The information process should be adaptable enough to fit the special needs of the project personnel and circumstances.

Statements 4-8 in chapter 9.5.1 can be reflected through the success for the project manager to deliver the projects benefits. The delivery of project goals within the four dimensions of scope, cost, time and quality should be stated in the project management plan which is approved by the project sponsor. This might not always be sufficient in order to rate the project as a success. The project has more stakeholders than the sponsor and this has to be dealt with when forming the project and its scope. In other words, the project benefits must be defined together with the important stakeholders. The benefits from a project are often judged after the project closure and are often dealt with by the sponsor. So the direct connection between the success of a project and its organizational benefits might not be clearly defined at the handover to the stakeholder. Project success criteria should be defined in the start of the project. This can then act as a value creation goal for the project which the project success will be measured by. This need reflects some of the processes described in the literature review like in the in PMBOK (Project Management Institute, 2010, p. 37) that for a successful management of projects the "internal competing demands of scope, time, cost, quality, resources and risk" needs to be balanced in order to achieve project success.

The PMBOK then goes further to say that if their presented processes are followed the success might be achievable. Similar to this the APMBOK describes how to manage a project in order to achieve success (Association for Project Management, 2006, pp. 40-41) (Burke, 2011, pp. 119-120). This is in contrast with the above result that shows that many PM's having problems with too much overhead. The very careful balancing between these two needs of the project has the possibility to achieve an optimized effective project. Balancing these requires good information in order to take the right decisions. This leads to that creating the tool above requires a very solid information gathering process to be put in place. Statement four calls on the PM to take an active role to minimize scope change that is not valuable to the project. (The value for the customer is the responsibility for the sponsor who should secure the overall delivery using the project scope or goal definition).

5.3.2 What do you think are the biggest barriers for change of processes and tools?

The statements 9-13 found in 9.5.3 are of a different character than the rest of the answers/statements received. These are related to person to person communication, opinions or other similar emotion related issues and are not easily taken care of by processes and tools. The soft barriers, related to human interaction, are the majority of barriers from this study. These "soft" barriers were not clearly described in the literature and would be interesting to work with from other literatures than the project management literature that was targeted in this dissertation. This suggests a future area to investigate in order to complement the project management literature and avoid some of the significant barriers for success. Future research could investigate how a better handling of motivation, leadership and empowerment as examples could further strengthen scope change management. This knowledge might be found in psychology and social science.

6 Conclusions

In this chapter the conclusions of the report is presented. The chapter is structured using the four research questions (RQ 1-4).

As the name of the report suggests careful consideration of a projects scope and its change before, during and after the project should be done in order to increase the probability of a successful project outcome. Reading this chapter might bring some insights that can help the reader to identify potential improvements in their project organization.

6.1 Summary of findings and conclusions

6.1.1 RQ1 What is meant with project scope change

Summary: The literature review identified the important role of scope change management which is not reflected in the processes and tools of the involved projects even if almost all PM's clearly agreed on the central role of scope change after an explanation of the term. The definition and distribution of the scope is an important factor for the PM if the projects are to be effective in doing the right things. The focus on identifying and taking care of scope creep during the project is a particular lack in the study at the involved projects as seen in the interviews.

Conclusion: The awareness of project scope and its change is quite low in PM's with less experience. Taking the knowledge presented by literature review and the more experienced PM's the solution would be to raise the awareness and work actively with project scope management. The definition and active management of the scope is important to focus on, making sure everybody in the project really understands and accepts the project scope. All participating projects should strengthen the scope change management process to involve especially the identification and management of scope creep (unauthorized scope changes).

6.1.2 RQ2 Are there differences between description in literature and usage of processes and tools? How do the used processes and tools relate to value adding?

Summary: The important role of scope management points out a general way of managing project scope with more or less strict processes. This is not what the case study is showing clearly. The PM's often use some processes and/or tools but the variation is rather large. Usually the processes and tools used were either forced upon the projects or were a result of active adapting to the individual projects. Many PM's did not like the tools and processes that were forced upon them because they felt that it did not contribute enough to the value addition due to big overheads while the own developed tools was seen as adding good value.

Conclusion: The difference between what the literature describes and how the PM's used processes and tools is that in general no common set of processes and tools were used. Many of the processes and tools used were constructed special to the project based on mainly excel. This weakness is an improvement area for all involved projects. The adaptation of standardized tools and processes can maximize the value output of the projects, minimizing the overhead and non-value providing activities. Adapting standardized tools and processes might also lead to that the learning from the external project world can increase. For example, finding and implementing an effective change management tool, which includes all four project dimensions, might

help the daily scope work. The collecting, sharing and archiving of data concerning scope change would be the task for this tool. If this is done a learning process could be built up that will support the scope management process and minimize the problems connected to project scope.

6.1.3 RQ3 Can a discrepancy between the different branches of industry and the literature in usage of tools and process for PSCM be found?

Summary: There was no significant difference between the different industries in the usage of tools and processes. Any difference lay in the experience of the PM's where the experienced PM's used scope management actively mostly using PMBOK inspired processes. Their success was not through the usage of processes and tools related to any BOK or theory, but by the careful balancing of theory and practicality to achieve maximum value. The PM's that had a large degree of freedom to optimize their projects expressed that this was one of the most important factors for them to be successful.

Conclusion: The discrepancy between the different industry branches was not significant, the difference in how the PM's worked with project scope change was between experienced and less experienced PM's. The discrepancy between literature and the studied PM's usage of tools and processes were that the literature in general describe detailed processes and tools, pushing to that projects should be organized with rigid processes. The PM's argued that the usage had to be in the light of value adding, minimizing inefficiency and overhead, using the processes and tools necessary for the particular situation while making sure that discipline in the usage of decided processes and tools were enforced.

6.1.4 RQ 4: What recommendations can be given to the involved organizations on tools and processes of PSCM?

Summary: There are a number of issues to improve for the involved organizations listed, analysed and synthesized above in chapter 5.3. One area that is not covered in detail by the project management literature, but is clearly visible in the interviews is the human side of scope changes. The leader and the individual's impact on the scope are significant and should be regarded as a parallel topic beside the hard facts of processes and tools.

Conclusion: The scope change process is by definition outside the original scope, and something that the project needs to do on top of delivering the "original" result. This issue might be a problem for project members as beside their designated job they have to put down time for working with other, non-scheduled work. This might have complications depending on how the project member decides to act upon the situation. If the project members does not have extra free time scheduled, which is rather unusual, the extra work will affect the original scope before a decision is taken whether or not to incorporate the change. It is important to clearly show the added project benefits in order to get the acceptance on the added scope but also making sure all understands how and why the scope will be added. This is an issue to highlight and be aware of in the planning of the project start-up phase. Organizations can draw benefits from, as was seen in one participating organization, the raising of awareness and understanding of scope change management. These benefits can help the projects to handle scope changes more effectively while adding value to the project delivery.

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8   Appendixes

0.   Presentation [Picture no 1] [90min]

0.1. Agenda, [Picture no 2]

0.2. Rickard Skogastierna presentation [Picture no 3]

0.3 Work & Education [Picture no 4]

0.4 Goal with the thesiswork [Picture no 5]

0.5. Description of the purpose of the interview [Picture no 6]

0.6. Whats the value for you? [Picture no 7]

0.7.Decription of the layout of the interview with main topics and goals [Picture no 8]

0.8. The Interview [Picture no 9]

1.3.   Description of the interviewers view of the key terms [Picture no 9]

1.3.1. Connection between Value and risk

1.3.2. Scope, What does that mean for the interviewed

1.3.3. Processer, what does this mean to the involved?

1.3.4. Tools that support the process, how do they work?

1.3.5. Projekt, "a Project is a temporary endeavour undertaken to create a unique product, service or result" (PMI 2004)

1.3.6. ......

0.9. Summary and overview [Picture no 10]

0.10 Interview ending and ethics [Picture no9]

1.   **Introductory questions [85min]**

1.1. The Interviewed persons name and organization or function

1.2   Does the interviewed person understands the purpose of the interview? (Yes/No)

1.3. Does the interviewed person wants to be anonymous? (Yes/No)

1.4. Does the interviewed's organization want to be anonymous?(Yes/No)

1.5.   May audio be recorded?

1.6. How many years have the interviewed peson worked with project related questions?

1.7. From what perspective will the questions be answered? (line, project, PM, PM associate)

1.8. What industry sector does the organization belong to? (Automotive, biotec, Energy, Finance, InfrastructureManufacturing, Offshore, process industry, Telecommunications and Telecom)

1.9. What size, counted in employees, is the organization and in the same way, how big is usually the projects? (from where does the knowledge spring that will act as foundation of the answers?)

1.10. How does the project structure look like in the organization? (entirely proj based, mainly proj based, partly proj based, not usage of proj)

1.11. Usually, what type of projects do you execute? (*long/short, novel/familiar, big/small*) and what business type? (businessproject, investmentproject,...)

2.   **Awareness of Projekt Sope Change Management [75min]**

2.1. Description of the interviewee´s project definitionan

2.1.1.   *How can you describe your organizational project definition*

2.1.2.   *Can you please describe your strategy execution, from strategy to product?*

2.2. Description of the interviewee´s *Projekt scope definition*

2.2.1.   *Do you have a procedure for dealing with project scope (change of: scope definition, WBS, Project delivery plan, procedure for scope change)*

2.2.2.   *What is the most common type of change, enlargement or downsizing of projects?*

2.2.3.   *Why do project scope increase, what is happening in that process?*

2.2.4.   *Do you and how do you make initial decisions of project scope*

2.2.5.   *How do you manage Scope creep?*

2.2.6.   *How do you handle Technical necessity scope changes?*

2.3. Description of the handling of project changes

2.3.1.   *How do you decide upon changes in the project*

2.3.2.   *What type of change is most common in your projects?*

Appendix 1 1Presentation agenda 1/3

2.3.3. Project creep (undecided change), how is that dealt with?

2.3.4. How do you avoid misintrepetations of requirements

2.3.5. Formal and informal decisions, are they well prepared, how and what information basis?

2.3.6 How do you manage persons affected indirectly by desicions taken?

2.4. Description of the relation between *Projekt scope change and value creation?*

2.4.1. Are you and the organization aware of, and do you use value adding processes (change processes) (Yes/No)

2.4.2. Are you aware of the connection between value management and scope change

2.4.3. Do you actively update the value process and meassurements to follow the customers need?

2.4.4. Do you follow up the value adding changes in the scope statement (and act upon it accordingly)

3. Tools and processes that support project scope change management [60min]

3.1. What tools are decided to be used?

3.1.1. What Info and Knowledge management systems are decided to be used

3.1.2. How do you work with risk management

3.1.3. Do you actively work with Iron Triangle balancing (when, what processes?)

3.1.4. Do you have a decision making tools to assist decision making?

3.2. Which tools arte used in the daily work and creates value for the projects?

3.2.1. What tools do you see not adding value to the project/customer?

3.2.2. What tools do you see are used?

3.2.3. What tools do you see not used as decided

3.3. Which processes are decided to be used?

3.3.1. What process are decided to be used

3.3.2. What processes are not decided but used anyway?

3.3.3. Do you have a decision making processes to be followed?

3.4. Which processes are used daily with value for the projects/ end customer?

3.4.1. What processes are infact used, not adding value

3.4.2. What processes are infact used and adds value

3.4.3. What processes are not used as decided

3.5. How are decided changes communicated?

3.5.1. Through E-mails

3.5.2. Through Meeting PM's

3.5.3. Through Updating of WBS

3.5.4. Through To-Do update and followups

3.5.5. Other?

3.5.6. How often are things (scope) changing

3.6. How are desicions in the project usually taken?

3.6.1. Through Pre-defined formal meetings

3.6.2. Through the usage of decision making process (formal written down process)

3.6.3. Through time take decisions (why?)

4. How effectively does processes and tools work in order to create value for the projects? [45min]

4.1. How well do you think the current processes are working in creating value for the projects?

4.1.1. Are the value chain clearly defined? (YES/NO)

4.1.2. Are the value chain represented in the processes (where?)

4.1.3. Who can critisize the process (and do something about errors?)

4.1.4. Are the processes effectiveness meassured?

4.1.5. What is the gut feeling using the processes?

4.1.6. Do you have a process to change the processes?

4.2. What is good and bad with the current processes, which creates value?

4.2.1. To what process is the process connected?

4.2.2. The whole process or a part of the process is bad in creating value?

4.2.3. What part ot the process is good/bad in creating value?

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4.2.4.   How do you do to change a bad process?

4.3.   Do you always follow decided processes?

4.3.1.   When are they followed?

4.3.2.   When are they not followed (any followup on not using the process?)

4.3.3.   Why do you think they are not followed?

4.3.4.   Do you have ideas for improvement to further increase value output?

4.4.   What is good and bad with the current tools, which creates value?

4.4.1.   To what process is the tool connected?

4.4.2.   Is the whole tool or a part of the tool is good in creating value?

4.4.3.   What part ot the tool is good/bad in creating value?

4.5.   Which tools does not create value today?

4.5.1.   To what process is the tool connected?

4.5.2.   The whole tool or a part of the tool is bad in creating value?

4.5.3.   What part ot the tool is good/bad in creating value?

4.5.4.   How do you do to change a bad tool?

4.6.   Do you always use the decided tools, which else?

4.6.1.   Which tools are used

4.6.2.   Which tools are not used?

4.6.3.   What can be changed to increase value output?

4.6.4.   What is used instead to deliver value to the project output?

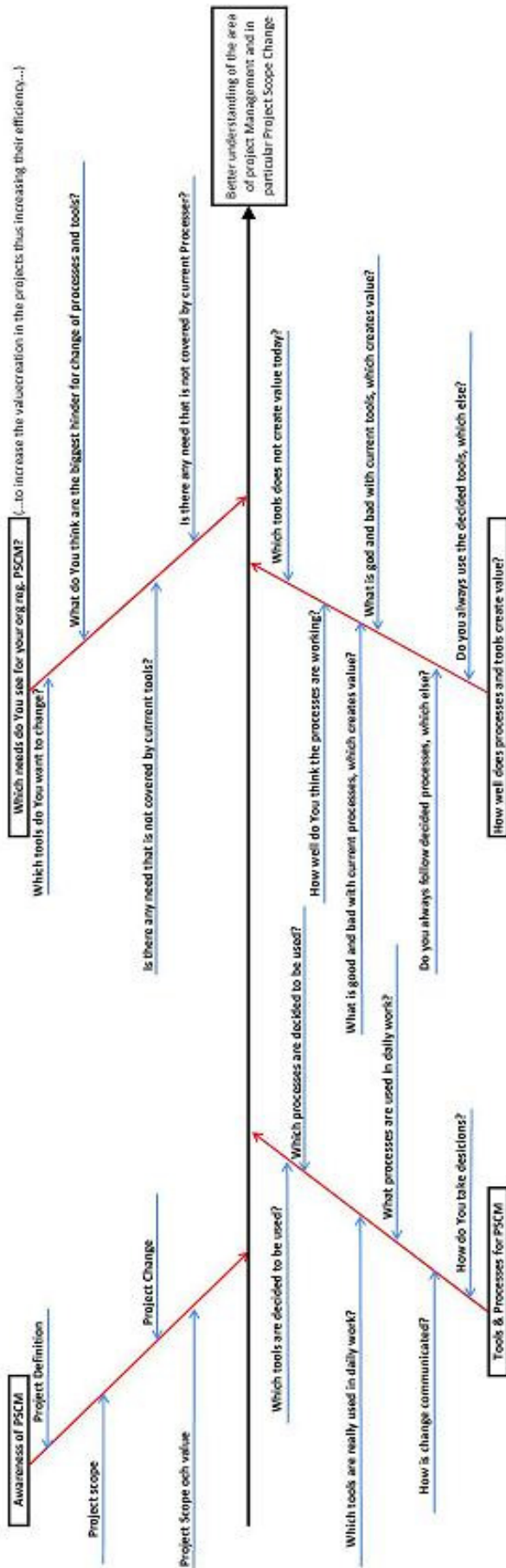5.   **Which needs do you see for your organization regarding PSCM? [30min]**

5.1.   Which process do you want to change?

5.1.1.   Do you want to change the whole process? Why?

5.1.2.   Do you want to change a part of the process? Why?

5.2.   Is there any need not covered by current decided processes?

5.2.1.   Political accepted needs?

5.2.2.   Not politically accepted needs

5.2.3.   Need to increase customer value?

5.2.4.   Any need that the team/org is not yet aware of?

5.3.   What is the biggest barrier for change?

5.3.1.   Political barriers?

5.3.2.   Awareness of alternatives?

5.3.3.   Awareness of the curent situation?

5.3.4.   Resources allocation?

5.3.5.   Other barrier?

5.4.   Are there any needs not covered by deciede tools?

5.4.1.   Yes, what?

5.4.2.   No, self awareness, reflections?

5.4.3.   Does all tools bring value to customer?

6.   **Ending of the interview [15min]**

6.1.   Summary of the interview, further explanation or clarification needed?

6.2.   Open issues?

6.3.   What will happen next?

-In the data analyze phase i might have to get back to the interviewed for clarification, is that ok?

-The report will be put together and revized.

-Only the participating organization will get a copy of the pragmatic dissertaion.

The academic report will ba published by Chalmers and Northumbria University. Anonymity will be secured for the participating interviewed persons if they state so in the Research participant consent form.

Appendix 3 Presentation agenda 3/3

Appendix 4 Interview overview