Exploratory Study: Project Management in Scrum IT Project

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Declaration

Declaration: I, Melissa Lee, declare that this research is my original work and that it has never been presented to any institution or university for the award of Degree or Diploma. In addition, I have referenced correctly all literature and sources used in this work and this this work is fully compliant with the Dublin Business School's academic honesty policy.

Signed: Melissa Lee

Date: 22nd August 2016

Abstract

Scrum does not provide full coverage of all software development activities, especially not for larger projects and the gaps had to be filled with complementary activities from standard development approaches. Some organizations had effectively embraced Agile, harvesting benefits such as reduced costs, higher-quality systems, and more satisfied software development staff and customers, while others had experienced significant problems and even project failures directly attributable to the transition to Agile. It is due to that not all aspects of project management that are considered in PMBOK, are covered in Scrum. To a certain degree, Scrum covered some aspects of project management such as Scope and Time Management; however as a project that exists in an environment that broader than the project itself, there are other aspects of project that are both crucial and require management. Thus, in order to promote project success, a project running Scrum may require to consider the aspects of project management in PMBOK to be taken into account. Depending on several factors, implementation of project management aspects from PMBOK into Scrum project may vary. The factors are depending on, but not limited to participant's experience in managing project, depth of knowledge on the importance & impact of PMBOK knowledge areas on project's success and the project's needs. The purpose of this study was to understand the aspects of project management that are considered in PMBOK, specifically the knowledge areas, and Scrum, and analyse where each framework fit/stand among each other by recognising their differences, lack-off, interrelations, mutual exclusivities or complementary characteristics, to explore the right incorporation between the two, in order to drive a successful IT project. The conclusion of this research will help project manager that is transitioning to Scrum to recognise that Scrum does not covered all aspects of project management and he/she will still need to oversee the uncovered aspects.

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1. Introduction

1.1 Background

Contemporary software development practice is frequently characterised as runaway projects, late delivery, exceeded budgets, lesser than approved functionality, and questionable quality that often translate into cancellations, reduced scope, and significant rework cycles, resulting an accumulation of waste typically measured in financial terms (Dalcher, 2014) (Gingnell et al, 2014). This is because, in most cases, the end product is not well defined where project sponsor envision product features that they felt they need to have only to realise along the development stages that the features are no longer necessary (Larson & Gray, 2012). In other cases, there are addition of new product features that they didn't realise they need to have, at later development stage. Apart from unclear end product, rapid advancement in technology resulted in obsolete technology and compatible issues to be encountered along the development stages, thus this directly introduced complexity to IT development projects. Through literatures by Gingnell et al, the following decompose the complexity of IT development projects:

- IT infrastructure changed rapidly
- IT architecture changed rapidly
- Software development tools changed rapidly
- Project involved multiple technology platforms
- Project involved multiple software environments

The uncertainty nature of IT development projects caused this type of project to meet disastrous end if traditional project management is imposed to manage this type of project. In traditional project management, project manager determines project scope and plan, at the initial stage of the project, follows by implementation and monitoring and control. This planning, monitoring and control nature, limits allowable scope change after project implementation started. The rigidity of traditional project management prevents new features and technology changes incorporated into running projects, consequently, project failure. Through literatures

by Gingnell et al, the following are common causes of project failures that are related to traditional project management rigidity:

- Poor planning
- Unclear goals and objectives
- Objectives changing during the project
- Unrealistic time or resource estimates
- Lack of executive support and user involvement

Agile methodology was introduced to respond to the uncertainty and unpredictability, through incremental, iterative work cadences. Agile is ideal for exploratory projects in which requirements need to be discovered and new technology to be tested (Larson & Gray, 2012). In other words, Agile has advantage in accommodating change due to volatile requirements (Coram & Bohner, 2005) (Hoda et al, 2013). Agile clearly show significant improvements in IT development projects and thus widely used in recent years. Practitioners have regarded Agile as the solution to the high rate of IT project failures (Jenson et al, 2013). It emphasizes on: individuals and interactions over processes, customer collaboration over contracts and formal negotiations, and responsiveness over rigid planning (Serrador & Pinto, 2015) resulting in faster time-to-market, improved change management, and higher satisfaction with the overall process. There are different models for Agile methodology, namely Scrum, Extreme Programming (XP), Lean, Crystal and etc (Vijay & Ganapathy, 2014). Scrum is chosen as the focus of this research as it is the most widely accepted model (Nyfjord, 2008) (Ashraf & Ali, 2013) (Rahmanian, 2014) (Popović, 2015).

Scrum Guide by Sutherland & Schwaber (2013) who were involved in creating and developing Scrum methodology, stated that Scrum is a framework, not a process or a technique for building products; rather, a framework within which one can employ various processes and techniques. Scrum employs an iterative, incremental approach to optimize predictability and control risk by maximizing opportunities for feedback. Project deliverables are divided into smaller chunks and each chunk is delivered through iteration called Sprint. At the end each iteration, deliverables are delivered

to project sponsor for evaluations and validations and any changes / new features will be implemented in future Sprints, thus reduces the risk of undesired feature or obsolete technology. In Scrum, the team consists of a Product Owner (PO), the Development Team (DT), and a Scrum Master (SM). Scrum Teams are self-organizing and cross-functional. Self-organizing teams choose the best way to accomplish their work, rather than being directed by others. Cross-functional teams have all competencies required to accomplish the work without depending on others who are not part of the team. The team model in Scrum is structured to optimize flexibility, creativity, and productivity. The PO is responsible for maximizing the value of the product and the work of the DT. The PO is the sole person responsible for managing the Product Backlog (which is an ordered list of everything that might be needed in the product) (2013) and is the single source of requirements for any changes to be made to the product. PO involves in ordering of the Product Backlog. No one is allowed to tell the DT to work from a different set of requirements, and the DT isn't allowed to act on what anyone else says. DT consists of professionals who do the work of delivering a potentially releasable increment of product at the end of each Sprint (2013). SM is responsible for ensuring Scrum is understood and enacted (2013).

Thus, through Scrum, many of the responsibilities of traditional project manager are covered by PO, SM and DT. In most cases, the distributed role leads to issue face by management in adapting to new role when transitioned to Scrum. Project managers were cited having problem with anxiety over losing power (Conboy et al, 2011). Javdani et al stated that "management should be corporative and open minded in their new role and encourage other team members to adapt to their new roles as well, in contrast of maintaining old project management style" (2014). According to Conboy et al (2011), some organizations had effectively embraced Agile, harvesting benefits such as reduced costs, higher-quality systems, and more satisfied software development staff and customers, while others had experienced significant problems and even project failures directly attributable to the transition to Agile. At first glance, it seems all project manager's responsibilities have been transferred to Scrum Team, however, the aforementioned project failures attributable to Agile

transition might be due to the assumption that all traditional project manager's responsibilities have been transferred to Scrum Team, thus, ignoring certain aspects of project management that are crucial for project success but are not covered by Scrum. Thus, a project manager adapting to new role in Scrum means recognising there are present trade-offs in using Agile (Coram & Bohner, 2005) and taking necessary action in order to prevent failures due to the transition.

1.2 Problem Statement

Scrum iterative, incremental approach to optimize predictability by maximizing opportunities for feedback, is great for risk management, however, this type of 'requirements' risk is only one type of risk that exist and there are more sources of risks that need to be identified, logged and actively managed. In certain cases, Scrum or any Agile's benefit of self-organising team is a risk (Bennison, 2008). In self-organising team, members are meant to be democratic, where all members are considered to be peers at the same level, with no strict hierarchy in practice, and are empowered with collective decision-making and cross-functional skills (Hoda et al, 2013). This non-hierarchical structure devolved decision making (Conboy et al, 2011) which does not accommodate junior and less experience team members, as Scrum is very lightweight and there are no strict guidelines and processes for team members to follow (Coram & Bohner, 2005) thus, resulting in unwise decision making by team member such as picking up tasks that shouldn't be taken (Conboy et al, 2011) by them. Furthermore, due to Scrum emphasizes on: individuals and interactions over processes, customer collaboration rather than contracts and formal negotiations, and responsiveness rather than rigid planning (Serrador & Pinto, 2015), collaboration and communication are the keys for success. Unfortunately, there are team chemistry risks such as a single strong-willed developer who likes to work on his own, developers who do not work well together, a customer who doesn't engage with the team etc (Coram & Bohner, 2005). There are also risks from stakeholders. For enterprise projects, which almost always a part of a larger projects are high profile, strategically important projects that often have to deal with a

complex political/organisation environment where different stakeholders may have competing priorities for the project.

The aforementioned challenges with using Scrum can be offset by adding back some formality (Coram & Bohner, 2005), using knowledge areas codified in PMBOK, namely Risk and Stakeholder Management. The formality are considered to be added into existing Scrum to tackle the aforementioned challenges because, as per seen within Scrum Team responsibilities, there is no role that could be assigned to manage the aforementioned challenges, as PO focuses on prioritising and managing requirements change, SM focuses on advocating Scrum processes, while DT focuses on product development and testing. SM maybe the best person to manage aforementioned challenges, but due to the nature of SM's role of advocating Scrum processes, a SM may resolve the issues by making judgement purely based on the scope of its role. For example, a single strong-willed developer who likes to work on his own may be fired due to his/her inability to work in a team that is against Scrum avocation for collaboration and communication, regardless the technical ability the developer posses, which could be very valuable skills in innovation project, especially in rapidly changing IT environment.

Traditional project manager has been following structured and widely accepted Project Management Body of Knowledge (PMBOK) (Rahmanian, 2014) by The Project Management Institute (PMI) that codifies the role of a project manager in a project. PMBOK defines the knowledge areas, phases and activities of a project that are conducted during the life of a project (2013). Bennison (2008) concluded that Scrum offered little support for Scope Management and Communications Management (outlined in PMBOK, refer to Table 1). On the other hand, Sliger & Broderick (2008) stated that, Scope Management is done iteratively for every deliverable and attempted to map some PMBOK knowledge areas to Scrum. Griffiths (2004) attempted to utilise PMBOK knowledge in Agile, again, did not cover all PMBOK knowledge areas. The failure of literature to map PMBOK knowledge areas to Scrum may indicate that Scrum methodology does not cover all facets of project management that are considered in PMBOK. Nyfjord (2008) stated that Scrum does

not provide full coverage of all software development activities, especially not for larger projects and they had to fill the gaps with complementary activities from standard development approaches. Furthermore, Fitsilis (2008)'s study proved that Agile methodology does not define all facets or cover all aspects of project management. As a result, hybrid project management involving more than one frameworks are used. "The reality of Agile adoption is not complete adaptation of the methodology but rather a hybrid form with areas that remain within other methodological philosophies" (Burman, 2015).

1.3 Research Question & Objective

As mentioned in Section 1.1, through Scrum, many of the responsibilities of the traditional project manager are distributed to PO, SM and DT, however as mentioned in Section 1.2, not all of the responsibilities are covered by Scrum, hence not all aspects of project management that are considered in PMBOK, are covered in Scrum and driving a project only with Scrum may lead to project failure. Thus, in order to promote project success, a project running Scrum may require to consider the aspects of project management in PMBOK, to be taken into account. With the recognition the importance of PMBOK knowledge areas (will be described further in Section 2.3.2) and the agility of Scrum in driving a successful IT project, the purpose of this study is to understand the aspects of project management that are considered in PMBOK, specifically the knowledge areas, and Scrum, and analyse where each framework fit/stand among each other by recognising their differences, lack-off, interrelations, mutual exclusivities or complementary characteristics, to **EXPLORE the incorporation between the two**, in order to drive a successful IT project.

The research question guiding this study is as follow:

1. How are different aspects of project management managed in Scrum?

1.4 Methods

Interpretivism philosophy was considered as the most suitable for the exploratory of project management in participant's Scrum project. The thoughts, ideas and perceptions of participants can vary and a critical understanding can be only obtained through subjective interpretations. This subjective interpretation was suitable for this research because depending on several factors, project management in participant's Scrum project may vary. Interpretivism philosophy underpins Induction approach to research which uses interpretation to drive conclusion under research. Induction is more exploratory and open-ended thus suitable for this research that aim at looking into how project management processes are handled in Scrum oriented processes. The research aim is not exploring method of implementation but the context of implementation. Due to Interpretivism philosophy and Induction approach of this research, Qualitative is the most suitable Research Strategy. According to Natchayangkun (2015), the main characteristics of data collection method used in the data collection of Interpretivism philosophy are small samples, in-depth investigation and qualitative. Based on this, this research should apply unstructured interview, however, due time constraints, semi-structured interview was applied as using unstructured interviews require significant amount of data collection and analysis time.

1.5 Significance of the Study

As mentioned in section 1.1, the distribution of traditional project manager's responsibilities to Scrum team leads to anxiety over losing power. To a certain extent, project manager does lose some of his/her power, but not in all aspects of project management. Scrum emphasis on iterative deliverables and self-organising team, thus, there is less monitor and control on schedule and progress status. In other words, Scrum focuses only on execution aspect of a project through team self-organising. As per codified in PMBOK, there are more aspects to manage than the execution aspect, and thus this study will help project manager that is transitioning to Scrum to recognise that Scrum does not covered all aspects of project

management and he/she will still need to oversee the uncovered aspects while under-taking and performing a new role in Scrum (project manager may undertake PO or SM role in Scrum depending on many factors that will not be covered within this study). On the other hand, for organisation that started off with Scrum and have never gone through traditional project management, may see Scrum as all they need to manage a project. This study will provide a perspective for recognising there are more to managing a project than what's define in Scrum and Scrum only fit into the execution aspect of project management.

1.6 Structure of Dissertation

This dissertation consists of five sections. The 1st Section gives an outlook of the background and research problem. The 2nd Section critically reviews existing literature on the factors that determining IT project success, the importance of PMBOK in contributing to project success and the relationship between project management processes by PMBOK and product oriented processes by SDLC & Scrum. The critical review of the literature helps the researcher to form an understanding of the role of each process in a project and analyse the impact of the processes to overall project success. The 3rd Section goes on explaining the methodology for the research. The research philosophy, research approach, research strategy, sampling, data collection and analysis methods are explained in detail. The 4th Section reports the finding from the semi-structured qualitative exploratory interviews conducted with participants who involve in Scrum project that were selected through convenience sampling. The 5th Section discusses the findings from the analysis of the qualitative information collected from the participants. Finally the 6th Chapter concludes the dissertation with the implication and contributions of this research, future research recommendations and concluding remarks.

2. Literature Review

2.1 Literature Introduction

As mentioned in Section 1.3, the purpose of this study is to understand the aspects of project management that are considered in PMBOK, specifically the knowledge areas, and Scrum, and analyse where each framework fit/stand among each other by recognising their differences, lack-off, interrelations, mutual exclusivities or complementary characteristics, to explore the right incorporation between the two. Before diving into PMBOK knowledge areas and Scrum, it is best to understand the factors that drive a successful IT project, in order to be able to make judgement on the importance of certain area within PMBOK knowledge areas and Scrum on their contributions to project success. Thus, in Section 2.2, factors or determinants of IT project success are discussed. Next few sections, namely Section 2.3-2.5, critically review the literatures regarding PMBOK and Scrum on the importance of each of the framework and the relationships & characteristics (differences, lack-off, interrelations, mutual exclusivities or complementary characteristics) between them. Finally, in Section 2.6 explores the existing incorporation of the mentioned frameworks, in project.

2.2 Determinants of IT Project Success

The Standish Group, a primary research advisory organization that focuses on software project performance, publish annual publication about the state of software development industry, called "CHAOS Manifestos" (Hastie & Wojewoda, 2015). The Standish Group makes a distinction between 'success projects', 'failed projects' and 'challenged projects' where failed projects are cancelled before completion, never implemented, or scrapped after installation, and challenged projects are completed and operational projects which are over-budget, late, and with fewer features and functions than initially specified (Dalcher, 2014). It is true that project scheduling problems as well as planning techniques have been the topic of discussion for researchers and practitioners for decades as they believe that the development of better scheduling techniques would lead to better project management and, thus,

project success (Ika, 2009). Project success has long been considered the ability to fall within time, cost, and performance constraints, generally known as the triple constraint, the golden triangle, or the iron triangle. Time and cost are hard dimensions of a project and are tangible and measurable objectives, while the soft dimensions (e.g., stakeholders' satisfaction) are subjective, subtle, and more difficult to measure. The former dimensions are used to determine if a project has reached completion; hence, the tendency to measure project success by the triple constraint (Ika, 2009). However, projects have often enough been delivered within time, cost, and quality, only to be considered failures, in business terms. This leads to distinction between project success and project management success (2009). Semantically, project management success refers to internal efficiency and performance measurement and optimisation at the project level through the tracking of the cost, schedule and performance parameters to deliver project against the triple constraint or measures imposed on the project (Dalcher, 2014). On the other hand, despite the fact that triple constraint is still prevailing, project success has broader definitions (Ika, 2009) (Dalcher, 2014).

FACTORS OF SUCCESS	POINTS	INVESTMENT
Executive Sponsorship	15	15%
Emotional Maturity	15	15%
User Involvement	15	15%
Optimization	15	15%
Skilled Resources	10	10%
Standard Architecture	8	8%
Agile Process	7	7%
Modest Execution	6	6%
Project Management Expertise	5	5%
Clear Business Objectives	4	4%

Figure 1: 2015 CHAOS Factors of Success (Hastie & Wojewoda, 2015)

Practitioners have proposed and/or discovered a myriad of reasons for project success, including Standish Group, whose 2013 "CHAOS Manifestos" listed 100 IT project best practices and divided the best practices into 10 "success factors" – which are executive management support, emotional maturity, user involvement, optimisation, skilled resources, standard architecture, agile process, modest execution, project management expertise and clear business objectives (Dahlberg & Kivij, 2016). In 2015 "CHAOS Manifestos", top project success factors are executive sponsorship, emotional maturity and user involvement (refer to Figure 1) (Hastie & Wojewoda, 2015). Also, academic researchers have investigated variables that impact the success of IT projects from many perspectives such as project sizes, project phases, technology, team competencies, management perception of projects, relationships between stakeholders, project management approaches and relationship between business strategy and project management (Dahlberg & Kivij, 2016). Literatures indicate that project success involves more than project management success but also other factors at the business, and even on environmental conditions outside the control of the organization (Dahlberg & Kivij, 2016). At project level, apart from project management efficiency in achieving the triple constraint, a project is successful when project deliverables are considered to be beneficial to project sponsors and other stakeholders (Dalcher, 2014). At business level, a project is successful when internal business values are realised following project investment (2014). At environment level, for example, a project will likely be successful if there are funds availability, as adverse financial limitations could forced postpone and cut down IT investments (Dahlberg & Kivij, 2016).

Thus, good project management approaches cannot guarantee project success but may ultimately lead to project success assuming other factors are fulfilled. On the flip side, poor project management usually results in project failure (Ika, 2009) (Nasir et al, 2015) even other factors are fulfilled. Thus, in conclusion, to achieve project success, it is not just project management success or management at business and environment level success, but both. In other words, it is not one or the other but one and the other. Even in projects that only provide technical enhancement such as server and security upgrades (Flynn, 2007), will require

project management efficiency (most crucial in this case) and business and environmental level factors, in order to be successfully implemented.

2.3 Project Management Body of Knowledge (PMBOK)

2.3.1 Overview of PMBOK

As mentioned, to achieve project success, it is not just project management success or management at business and environmental level success, but both. PMBOK focuses on project management success with its project management standards, but at the same time, describe the interrelationships of the standards with other management disciplines such as program and portfolio management (PMBOK®, 2013). Program and portfolio management disciplines are management at business level. The purpose of project is to help organisations achieve their goals through strategic business initiatives by developing and implementing them through projects (2013). Thus, it is important that project's goals are aligned with the organization's strategy, and this is where program and portfolio management comes into picture, where they ensure right projects are selected, prioritizing the work, and dependencies, costs, timelines, benefits, resources, and risks and allows organizations to have an overall view of the status of the strategic goals, ensuring internal business values are realised following project investment. Program and portfolio management details will not be discussed further in this study as the scope of this study is at project management level.

Apart from describing interrelationships of project management standards with management at business level, PMBOK also describes the influence at environmental level. Project exists in an environment that is broader than the project itself, and understanding this environment and its influence on project, promote smooth management experience that eventually lead to desire result, which is project success. Organisation's characteristics such as culture and structure influence how projects are performed. Cultural norms, which develop over time established approaches to project management and means that are considered acceptable for getting the work done (2013). Also, through organisation structure, authorities who

make or influence decisions can affect the availability of resources and influence how projects are conducted (2013). Thus, a project manager will need to interact with

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work	4.4 Monitor and Control Project Work 4.5 Perform Integrated Change Control	4.6 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Time Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Resources 6.5 Estimate Activity Durations 6.6 Develop Schedule		6.7 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Perform Quality Assurance	8.3 Control Quality	
9. Project Human Resource Management		9.1 Plan Human Resource Management	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Control Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses		11.6 Control Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	12.4 Close Procurements
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Management	13.3 Manage Stakeholder Engagement	13.4 Control Stakeholder Engagement	

Table 1: Project Management Process Group and Knowledge Areas Mapping (PMBOK®, 2013)

relevant authorities accordingly based on organisation structure, culture or internal & external environmental event. These factors are not under the control of project team but will enhance or constraint project, for example, government or industry

standards, political climate, marketplace conditions, stakeholders risk tolerances and etc (2013). Unlike management at business level where it is only managed through program and portfolio management, environmental level will also need to be managed at project level (through project management processes).

In order to have an overview of the processes a project will undertake, explanation for project lifecycle, phase and project management processes from PMBOK perspective, are elaborated. A project life cycle is the series of phases that a project passes through from its initiation to its closure. A phase is a collection of logically related project activities that culminates in the completion of one or more deliverables. When a project is divided into phases, the project management processes are used in each phase, as appropriately, to effectively drive the project to completion in a controlled manner until the criteria for phase completion have been satisfied. Project management processes are grouped into 5 categories known as Project Management Process Groups (or Process Groups): Initiating, Planning, Executing, Monitoring & Controlling and Closing. Within each process group, different knowledge areas that represent different aspects of project management are taken into consideration in driving the project to completion in a controlled manner. PMBOK knowledge areas consist of integration, scope, time, cost, quality, human resource, communications, risk, procurement and stakeholder management (refer to Table 1), and these constitute project management standards of PMBOK.

2.3.2 Importance of PMBOK

Importance of PMBOK can be observed from case study by PMI where different PMBOK knowledge areas are used for project to run smoothly. In PMI's PM Network 2012 edition, PMI published case study on Procter & Gamble (P&G) enhancement project of its 20 years old ordering, shipping and billing software (2012b). P&G adopted integration, risk, human resource management from PMBOK on this project to lead the project to success. In terms of integration (referring to Integration Management in Initiating process in Table 1), P&G's global business services group created a project charter that included a business case, project assets, enterprise

environmental factors, and a summary milestone schedule and budget to ensure the revamp would align with business goals (2012b). The project was one of the largest in the P&G's history, and carried great risks such as loss of business due to inability to process orders in a timely way, loss of credibility due to lack of quality in the shipping process and loss of sales as competitors took advantage of the transitions. Using risk management, P&G introduced a board to mitigate and manage those risks and the move proved vital. Using human resource management, P&G identified potential human resourcing issues that could have thrown off the project amidst one major acquisition deal and to minimize disruptions to the schedule, P&G reallocated staff from other areas of the company. In another PMI case study, Indra who is a global technology solutions provider, deployed high profile automated-vote counting system in Norway, displayed the importance of stakeholder management. Introducing new electronic voting system in large number of vigilant stakeholder groups such as Oslo city council, 15 district boards, an array of government agencies, political parties and media, will require understanding of every stakeholder needs and expectation to gain their acceptance and avoid resistance (2012a).

2.4 System Development Life Cycle (SDLC)

In managing project, there are 2 processes performed: project management processes & product-oriented processes (PMBOK®, 2013). Project management processes ensure the effective flow of the project throughout project life cycle, on the other hand, product-oriented processes define processes pertaining to product, that are required in order to create the product (2013). For IT project, product-oriented processes are specified in SDLC. Both project management and product-oriented processes are equally necessary for successful IT project and must be coordinated properly (Hewagamage & Hewagamage, 2011).

2.4.1 Overview of SDLC

SDLC defines processes/phases required in order to produce/enhance IT product/service. There are several models of SDLC and each has its own

characteristics, limitations and working environments, thus, different model is used to develop different software (Kumar et al, 2013). A model describes how the processes flow from the beginning of development towards the end. The models can describe the processes to be performed sequentially, in parallel, overlap with each other or V-shape model (Balaji & Murugaiyan, 2012) (Anand & Dinakaran, 2015). Regardless the model, the processes are the items to be discussed in this section as they are the processes require for producing IT product/service. Kumar et al (2013) and Balaji & Murugaiyan (2012) define the processes to be Requirement Analysis, Design, Coding, Testing and Maintenance.

Requirement Analysis and Design processes' goals are to understand product/service requirements, identify system requirements and transform requirements into specifications (2013). Chakraborty et al (2012) represent the two processes as Requirement Engineering (RE) and noted that RE as the most important in SDLC. The implications of poor RE is enormous as poor requirement specifications lead to errors at later processes and eventually lead to costly coding rework and maintenance. As shown in Figure 2, RE requires further subdivision of processes to ensure production of high quality requirement specifications/documents. Details of each subdivision processes are out of the context of this study thus will not be elaborated. In a nutshell, requirement specifications describe desired features and operations as collection of modules or subsystems, in detail including screen layouts, business rules, process diagrams, pseudo code and etc.

Coding is the process of writing requirement specifications using programming codes (Kumar et al, 2013). Testing is the process that will contribute to the delivery of high quality product/service, more satisfied users and lower maintenance costs by getting codes tested. There are several levels and types of testing (Yadav & Kumar, 2016): Black box testing, White box testing, Unit testing, Integration testing, Functional testing, Security testing, Compatibility testing, Alpha testing and Beta testing.

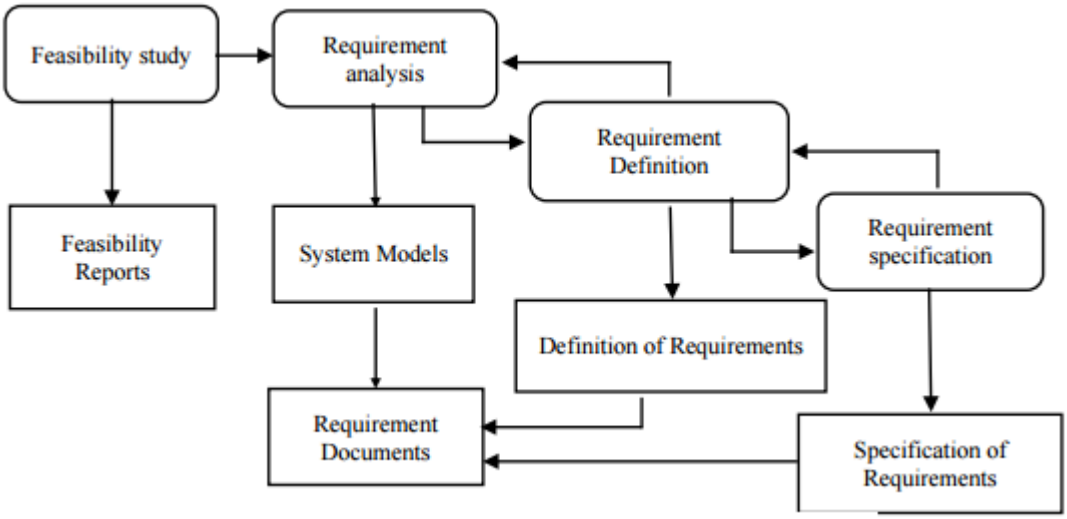

Figure 2: Requirement Engineering Framework (Chakraborty et al, 2012)

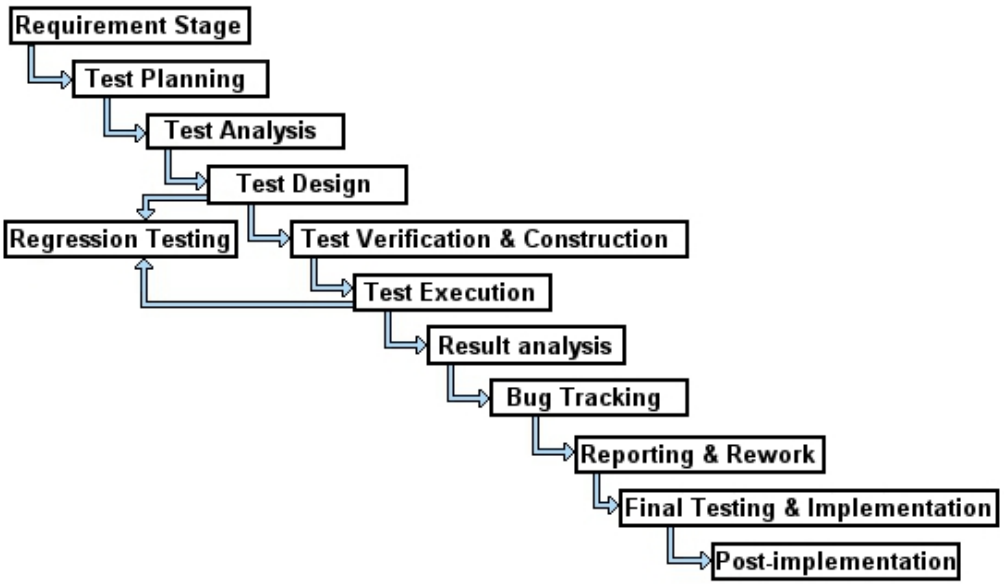

Figure 3: Phases of Testing Process (Kekare, 2013)

The types of test to be implemented depend on the complexity and requirement of the product/service. Testing process has its own lifecycle and possibly as shown, but not limited to Figure 3, where test plan is created after requirement specifications produced. After test execution (for any type of test), results for the test are analysed and bugs are tracked and fixed before User Acceptabilitance Test (UAT) and finally, product/service delivery. Maintenance started after delivery of the product/service (Kumar et al, 2013).

2.4.2 PMBOK & SDLC

A IT product life cycle includes development life cycle plus other processes that provide for deployment, maintenance, support, evolution, retirement, and all other inception-to-retirement processes for a product, including configuration management and quality assurance processes that are applied throughout a IT product life cycle (SWEBOK®, 2014). In general, product life cycle could be larger compared that of project life cycle, where there could be several projects within the single product life cycle (Hewagamage & Hewagamage, 2011). As an example, development and maintenance of a particular software product could be considered as two separate projects (2011). As mentioned in Section 2.3.1, there could be single or several phases for a single project and within each phase, project management processes (as codified by PMBOK) are used to effectively drive the project to completion in a controlled manner by taking multi-facets areas such as human resource, communications, risk, procurement and stakeholder management into account to ensure the effective flow of the project.

This study focuses on project within the development cycle of IT product lifecycle. As mentioned in previous paragraph, development cycle of IT product lifecycle could be a project on its own, but within the same cycle, there could be more than one project, separated by the different IT modules / sub-products that constitute a bigger IT product. Within each project, there could be single or several phases, separated by module's deliverables and within each phase, project management processes are applied while incorporating product-oriented processes. As mentioned in Section 2.3.1, project management processes involve Initiating, Planning, Executing, Monitoring & Controlling and Closing, and since SDLC is product-oriented processes, SDLC's processes are incorporated into project management processes according to where the processes fit best.

Both project management and product-oriented processes are equally necessary for successful IT project and must be coordinated properly (Hewagamage & Hewagamage, 2011). The coordination can be performed by integration, as per

proposed by Hewagamage & Hewagamage (2011). It is the integration of project management processes with product-oriented processes (SDLC in this case), as per shown in Figure 4. This integration serves as generic framework; in real project implementation, new processes may be introduced or removed depending on project complexity, SDLC model (refer to Section 2.4.1) and organisations practices. The proposed integration integrates processes from both project management and product-oriented processes using relevancy and their fitting into each process. For example, activities in RE (refer to Section 2.4.1) can be carried out within Initiating process of project management processes, while at the same time, develop Project Charter (Integration Management) and identify Stakeholder (Stakeholder Management).

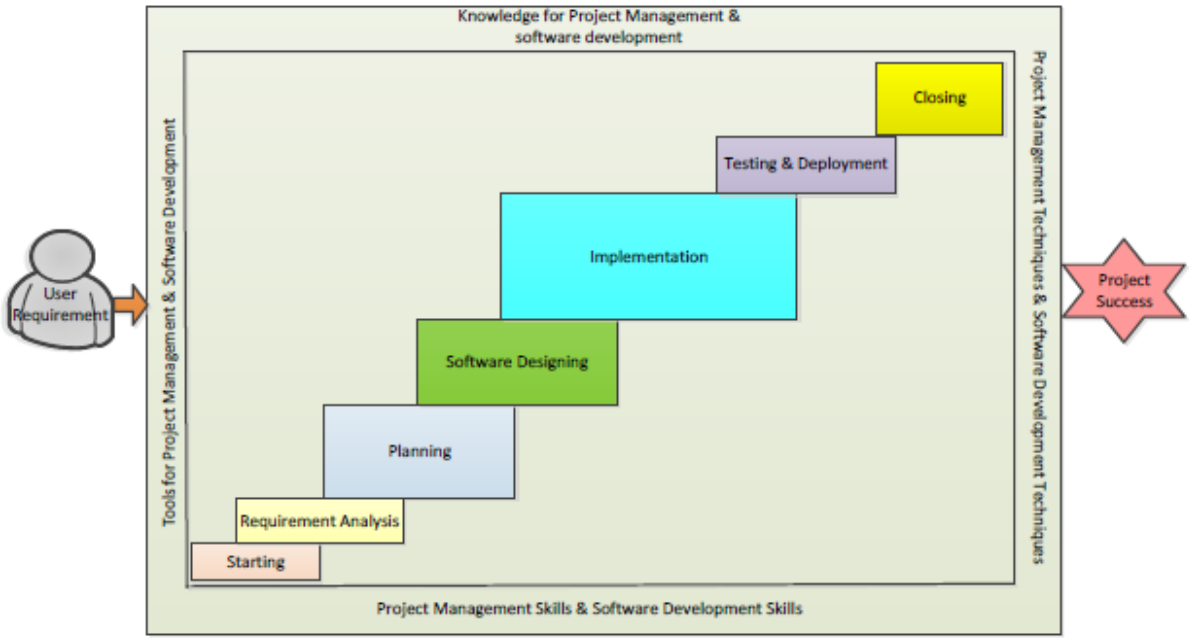

Figure 4: Integration of Project Management Processes & System Development Life Cycle (SDLC) (Hewagamage & Hewagamage, 2011)

2.5 Scrum Methodology

2.5.1 Overview of Scrum

As mentioned in section 2.4.1, there are several models of SDLC where each model describes how the processes flow from the beginning of development towards the

end, either sequentially, in parallel, overlap with each other or V-shape model. Scrum is one of SDLC's models (Balaji & Murugaiyan, 2012). As mentioned in section 1.1, Scrum is the most widely accepted Agile framework and perfect for IT project that is uncertain and unpredictable, where the requirements are frequently changing due to constant new discovery and technology, to be completed in limited time and thus making it complex. Scrum was introduced to overcome issues raised from sequential processes flow (Mahalakshmi & Sundararajan, 2013) particularly in complex IT project. Scrum employs an iterative, incremental approach to optimize predictability and control risk by maximizing opportunities for feedback. Project deliverables are divided into smaller chunks and each chunk is delivered through iteration called Sprint. At the end each iteration, deliverables are delivered to project sponsor for evaluations and validations and any changes / new features will be implemented in future Sprints, thus reduces the risk of undesired feature or obsolete technology.

Scrum Teams are self-organizing and cross-functional. Self-organizing teams choose how best to accomplish their work, rather than being directed by others. Cross-functional teams have all competencies needed to accomplish the work without depending on others who are not part of the team. The team model in Scrum is designed to optimize flexibility, creativity, and productivity. As mentioned in Section 1.1, the team consists of a Product Owner (PO), the Development Team (DT), and a Scrum Master (SM). The PO is responsible for maximizing the value of the product and the work of the DT. Figure 5 provides an overview of Scrum processes and the role and responsibilities for each team member. PO serves as the person of interaction between the team and other stakeholders, getting requirements from executives, shareholders, customers, users and etc. All the requirements are listed into an ordered list, prioritised by PO, known as Product Backlog (Sutherland & Schwaber, 2013) and is the single source of requirement for any changes to be made to the product. PO is sole person responsible for managing the Product Backlog and deciding what should be done and when the software should be shipped through understanding of the customer needs and a basic knowledge of how software is developed and deployed. PO is also required to closely collaborate

with the team to guide and direct the team regarding requirements and answering questions when they arise, providing feedback, and signing off work results. No one else is allowed to tell the team to work from a different set of requirements, and the team isn't allowed to act on what anyone else says. SM is responsible for ensuring Scrum is understood and enacted (2013) by helping PO in finding techniques for effective Product Backlog Management (i.e: during change of requirement), ensuring prioritisation of Product Backlog maximise value, facilitating Scrum event (i.e: Sprint Planning, Daily Standup Meeting etc) and coaching DT in self-organization and cross-functionality. DT consists of professionals who are self organising and cross-functional, who do the work of delivering a potentially releasable increment of product at the end of each Sprint (2013).

The items within Product Backlog are selected to be implemented in a Sprint through Sprint Planning Meeting, creating Sprint Backlog which contains list of requirements to be implemented within a Sprint (refer to Figure 5). During Sprint, there is Daily Scrum Meeting which is a 15-minute time-boxed event for the Development Team to synchronize activities and create a plan for the next 24 hours by inspecting the work since the last Daily Scrum and forecasting the work that could be done before the next one (2013). "Daily Scrums improve communications, eliminate other meetings, identify impediments to development for removal, highlight and promote quick decision-making, and improve the Development Team's level of knowledge" (2013). At the end of Sprint, a Sprint Review is held to inspect the deliverables and adjust the Product Backlog if needed by eliciting feedback and foster collaboration between Scrum Team and stakeholders on the next things that could be done to optimise value (2013). Finally, Sprint Retrospective occurs after the Sprint Review and prior to the next Sprint Planning where it is an opportunity for the Scrum Team to inspect itself and create a plan for improvements to be enacted during the next Sprint in terms of people, relationships, process and tools etc (2013).

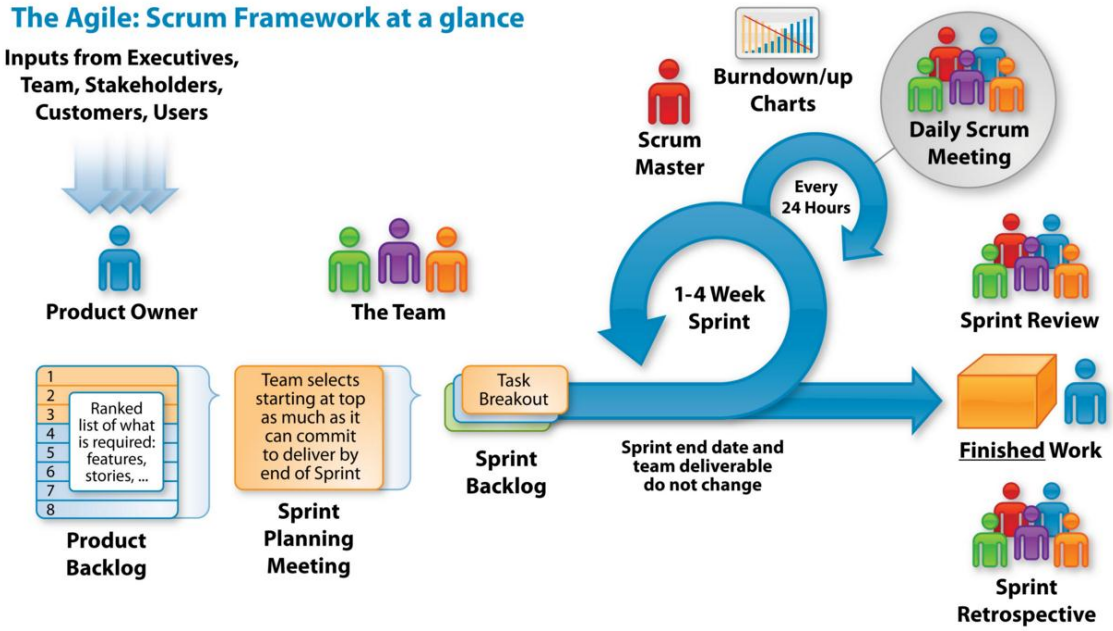

Figure 5: Overview of Scrum Processes (Poladia, 2015)

2.5.2 PMBOK & Scrum

Williams (2005) criticizes the use of PMBOK, where he finds them inappropriate for complex, uncertain, and time-limited projects such as IT projects. However, most scholars believe that implementing PMBOK knowledge increases the chance of project success (Zwikael, 2009). Based on PMBOK Overview (Section 2.4.1) and Scrum Overview (Section 2.5.1), PM oversees the project whereas the PO and SM are more concerned with managing the work packages. This is consistent with the statement that PMBOK provides guideline for project management processes while Scrum (which is SDLC's model) is product-oriented processes, thus, they should be incorporated accordingly.

As mentioned in Section 2.3.1, project management processes are grouped into five groups known as Project Management Process Groups (or Process Groups): Initiating, Planning, Executing, Monitoring & Controlling and Closing where within each process group, different knowledge areas that represent different aspects of project management are taken into consideration (i.e: integration, scope, time, cost, quality, human resource, communications, risk, procurement and stakeholder management). As shown in Figure 5, the start of Scrum processes are described as

the processes after high-level project requirement or scope have been identified or analysed (Initiating process) and delivered to PO to manage (Planning, Executing, Monitoring & Controlling and Closing process). However, enterprise projects require a series of initiation activities before Scrum processes can be started. Apart from providing shared vision of high level scope, initiation activities manage decisions around architecture and technology choice, stakeholders identification, resources allocation, risks analysis and etc. Those activities are not described in Scrum.

As per codified by PMBOK, initiation activities refers to initiation of either a new project or new phase of an existing project. It is aim to obtain authorization to start the project or phase. For new project, within project initiation, project's initial scope is defined, initial financial resources are committed, project manager is selected & assigned, and internal & external stakeholders who will interact and potentially influence the overall outcome of the project are identified. For new phase of an existing project, purpose of initiation is to validate the decisions made in prior phase and helps to keep the project focused on the business need that the project was undertaken to address. Based on the success criteria, a decision is then made as to whether the project should be continued, delayed, or discontinued (PMBOK®, 2013).

However, project initiation which is performed at the organisational or program and portfolio level would be outside of the project's level of control. Processes such as project's initial scope definition, financial resources commitment and project manager selection are outside of project's level control. At project level, a project manager will initiate by developing more detail descriptions of the project (i.e: architecture, technology, risk), apply organisational resources for project activities, identify all stakeholders (also, analyse relevant information regarding their interests, involvement, interdependencies, influence and potential impact on project success) (PMBOK®, 2013) and etc. Sometimes, Initiating is known as "iteration zero" in Scrum as it happens prior to the start of Scrum, but on enterprise projects it's more a project's phase than iteration because, it is significant enough to require a high degree of planning and organisation.

Even though Scrum does not describe Initiating process, Scrum does describe other project management processes (Planning, Executing, Monitoring & Controlling and Closing). For example, there is Planning process involve when requirements are listed into an ordered list, prioritised by PO. There is also Executing, Monitoring & Controlling processes when DT decides the amount of work they can take on in a Sprint and the method of carrying out the work, while SM ensuring prioritisation of Product Backlog maximise value, facilitating Scrum event (i.e: Sprint Planning, Daily Standup Meeting etc) and coaching DT in self-organization and cross-functionality. However, within each of the project management processes, there are some knowledge areas (integration, scope, time, cost, quality, human resource, communications, risk, procurement and stakeholder management) that Scrum does not described. For example, in Planning process, PO's responsibility to prioritise Product Backlog only focuses on scope and time planning, there is no description on cost, quality, human resource, communications, risk, procurement and stakeholder planning.

2.6 Adoption of Agile in IT Project

Due to the lack of description and consideration of aspects of project management as discussed in Section 2.5.2, the reality of Agile adoption is not complete adaptation of the methodology but rather a hybrid form with areas that remain within other methodological philosophies (Burman, 2015). Furthermore, the hindrances for project to be completely Agile indicating certain aspects of project managements that are not within Scrum methodology are essential for project to be implemented smoothly.

2.6.1 Hybrid Adoption

In 2012, Schwalbe & College managed to map Scrum framework into PMBOK's process groups of Planning, Executing, Monitoring & Controlling and Closing. Creating the Product Backlog, developing the Sprint Backlog, and discussing plans during the Daily Scrum would fall under Planning. Performing the daily work and Sprint, and creating the potentially shippable product increment would fit under

Executing. Holding the Sprint Review and discussing challenges as part of the Daily Scrum can be viewed as Monitoring and Controlling. Reflecting during the Sprint Retrospective would fit under Closing. This mapping shows that Scrum methodology focuses only scope and time management of deliverables, leaving other aspects of project management. As per mentioned in Section 2.5.2, PMBOK Planning process group encompasses more than planning scope and time of deliverables but also planning of cost, quality, human resource, communication, risk, procurement and stakeholder (refer to Table 1). Furthermore, there is no mapping for PMBOK's Initiating process group because it is a phase that falls outside the Scrum (Schwalbe & College, 2012).

Most hybrid (combination of Waterfal and Scrum) models proposed Waterfall methodology at the beginning of a project, filling the gap of Initiating process lack in Scrum methodology. Burman stated that hybrid methodology is a way to compensate for external factors that influence the project from being completely Agile (2015). In Burman study, project managers admitting customer interaction on the right level is an issue and sales department who is not educated in Scrum give a distorted idea of the project process during initial presentation of the project to the client, resulting in distorted expectation from client about the project scope, timeline and etc. Furthermore, new contracts should be created following Agile methodology, where costs are on iterative basis rather than a predetermined cost.

Rahmanian proposes hybrid model where Waterfall and Scrum methodology are used together. A Waterfall-Up-Front and Waterfall-At-End model (refer to Figure 6) was proposed, where Waterfall methodology is used only at the beginning and at the end of project (2014). Studies by West et al (2011) and Lozo & Jovanović (2012) also proposed traditional project management (Waterfall) at the beginning of the project. Waterfall-Up-Front is to specify the requirements, and link them together as one contract to reduce risk of confusion in terms of project objectives and deliverables. A study has emphasized the importance of Initiating process. Objectives and deliverables confusion is one of the challenges in adopting Scrum (Kanane, 2014). The development team members face a number of challenges that

adversely affect their ability to execute properly the tasks assigned to them and one of the challenges is the access to a full view of the product. Therefore, the team members usually have to spend time enquiring different stakeholders and performing crosschecks to gauge an understanding what the product is supposed to do or how the product is supposed to work. Because of this, the team members do not only spend a lot time to build this full view of the project but also, as they are doing it separately and using different sources, exposing to many misunderstandings and leaving a large margin for personal interpretations. All this of course, has a considerable impact on performance of the development team (2014).

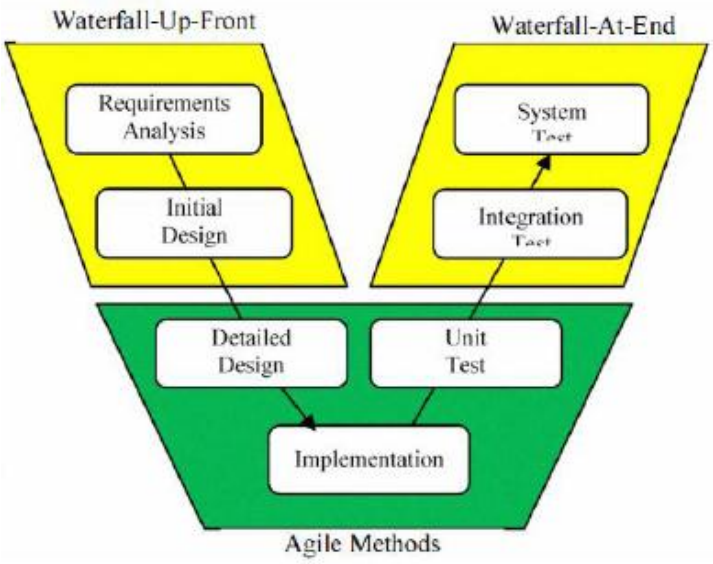

Figure 6: A Hybrid Model for Software Development and Project Management (Rahmanian, 2014)

2.6.2 Integrated Adoption

As mentioned in Section 1.2, Sliger & Broderick integrate PMBOK knowledge areas into Scrum but the study only covered integration, scope, risk and quality management (2008). As mentioned in Section 2.6.1, Schwalbe & College Scrum can be mapped to PMBOK's process groups of Planning, Executing, Monitoring & Controlling and Closing. For Integration Management, within Planning process, Sliger & Broderick integrate Release & Iteration Planning, within Execution process, integrate iteration work, within Monitoring & Controlling, integrate facilitation &

collaboration and within Closing process, integrate feedback & Product Backlog prioritisation. For Scope Management, which constitute only at Planning & Monitoring & Controlling processes, within Planning process, Sliger & Broderick integrate Product Backlog Meeting and Planning, Release & Iteration Planning, Feature Acceptance Criteria and within Monitoring & Controlling process, integrate change into Product Backlog.

Quality management, which is not covered in Schwalbe & College's study, is defined in Sliger & Broderick's study (refer to Figure 7). The framework in Figure 7 focuses on quality in terms of fulfilling feature requirements and customer acceptance. Another aspect of quality management is sustaining and improving the quality of development process, which has the benefit of better appearance to potential clients (Popović, 2015). The main goal is to achieve high customer satisfaction through products with consistent quality. Popović's study integrated quality management system ISO 9001 into Scrum. There are several documents requirements for ISO 9001 certification and Popović (2015) study mapped documentation artefacts of a Scrum process into the ISO 9001 requirements. The proposed mapping enabled organisations to maintain the standard quality following ISO 9001 standards in Scrum and resulted in better visibility and acceptance by future clients or project bidding that requires quality management system certifications.

Risk management is a key project success factor (Nyfjord, 2008). Scrum makes some explicit statements about risk management during the development process, where risk management is described as a part of the planning phase, where it is stated that risk should be identified, assessed and actions for controlling the identified risk defined, as per mapping by Sliger & Broderick, as shown in Figure 8. The risks should be listed and planned for when defining the project. However, it is not explained how these risk management tasks can be carried out, and there are no precise guidelines for how to identify, classify, assess or manage risks (Nyfjord, 2008). Hence, Nyfjord proposed integration as a solution to address the lack of risk management in the agile model (refer to Figure 9).

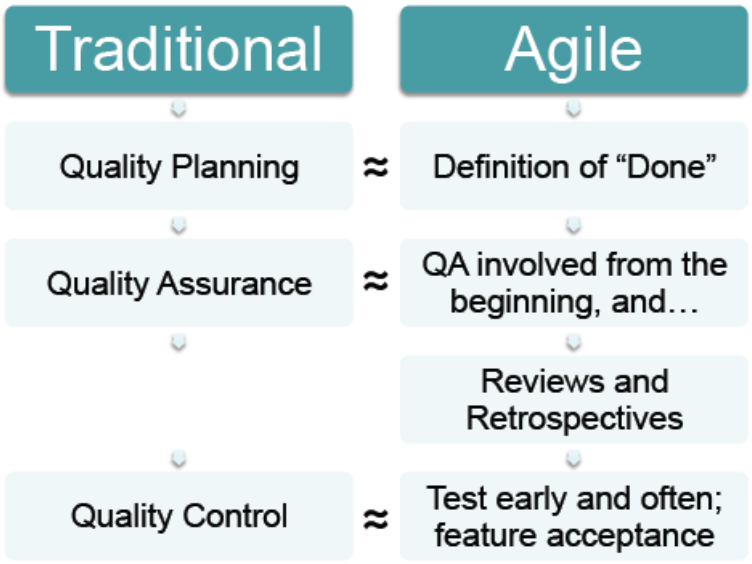

Figure 7: Mapping PMBOK Quality Management to Agile (Sliger & Broderick, 2008)

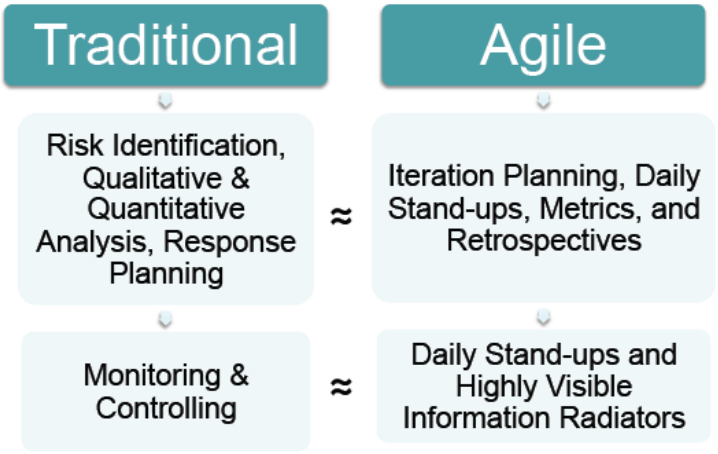

Figure 8: Mapping PMBOK Risk Management to Agile (Sliger & Broderick, 2008)

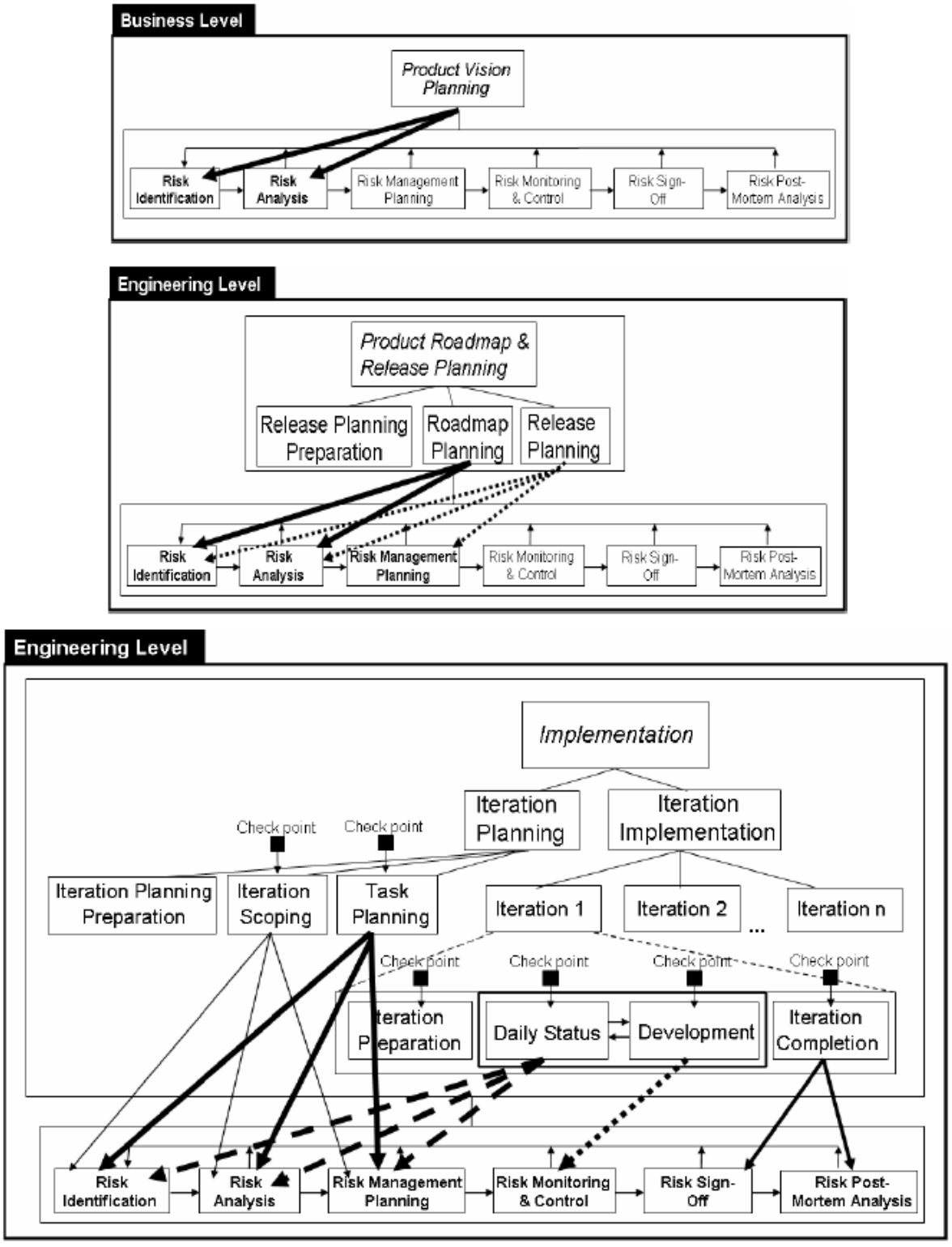

Figure 9: Mapping PMBOK Risk Management in the Product Vision Planning, Product Roadmap & Release Planning and Implementation Phase (Nyfjord, 2008)

2.7 Literature Conclusion

Literatures confirm the key to project success is both project management success and management at business and environment level success. PMBOK focuses on project management processes through its project management standards, that not only manages project at project level but also environmental level, guarding the project from external environment that is broader than the project itself, and understanding this environment and its influence on project, promote smooth management experience that eventually lead to desire result, which is project success. The purpose of project is to help organisations achieve their goals through strategic business initiatives by developing and implementing them through projects that produce products/services that assist organisations to achieve their goals. Thus, as per stated in PMBOK, within a project, there is project management processes and product oriented processes. From literatures, it is found that the relationship between PMBOK and Scrum is one is project management processes while another is product oriented processes. They are two separate processes but equally crucial in driving project success. Since both are two separate processes, Scrum definitely does not cover areas that PMBOK knowledge areas do. Thus, with the recognition the importance of PMBOK knowledge areas, the agility of Scrum and the hindrances for project to be completely Scrum, leads to attempts to fill these gaps with either hybrid project management or integration of PMBOK knowledge areas into Scrum.

3. Methodology

3.1 Methodology Introduction

This section is concerned with methodology used in figuring answers to research question (refer to Section 1.3) being undertaken. Using research methodology, research answers are found based on some assumptions, existing/available knowledge and the nature of realities in the area that are being researched, to make informed decision of the best way to move toward figuring accurate answers to research question, that closely represent the realities, without any bias. Using Research Onion by Saunders et al (2012) (refer to Figure 10), this section will go through each layer of the onion, starting from the outer layer inwards, stating the reason for each methodology used, based on the underlying assumptions, knowledge and realities of the area being researched. From Section 3.2.1 to 3.2.6, the Research Design is explained based on Research Philosophy, Approach, Strategy, Choice, Time Horizon and Sampling, then, from Section 3.3 to 3.6, Data Collection Instruments, Data Analysis Procedures, Research Ethics and Limitations of Methodology are explained.

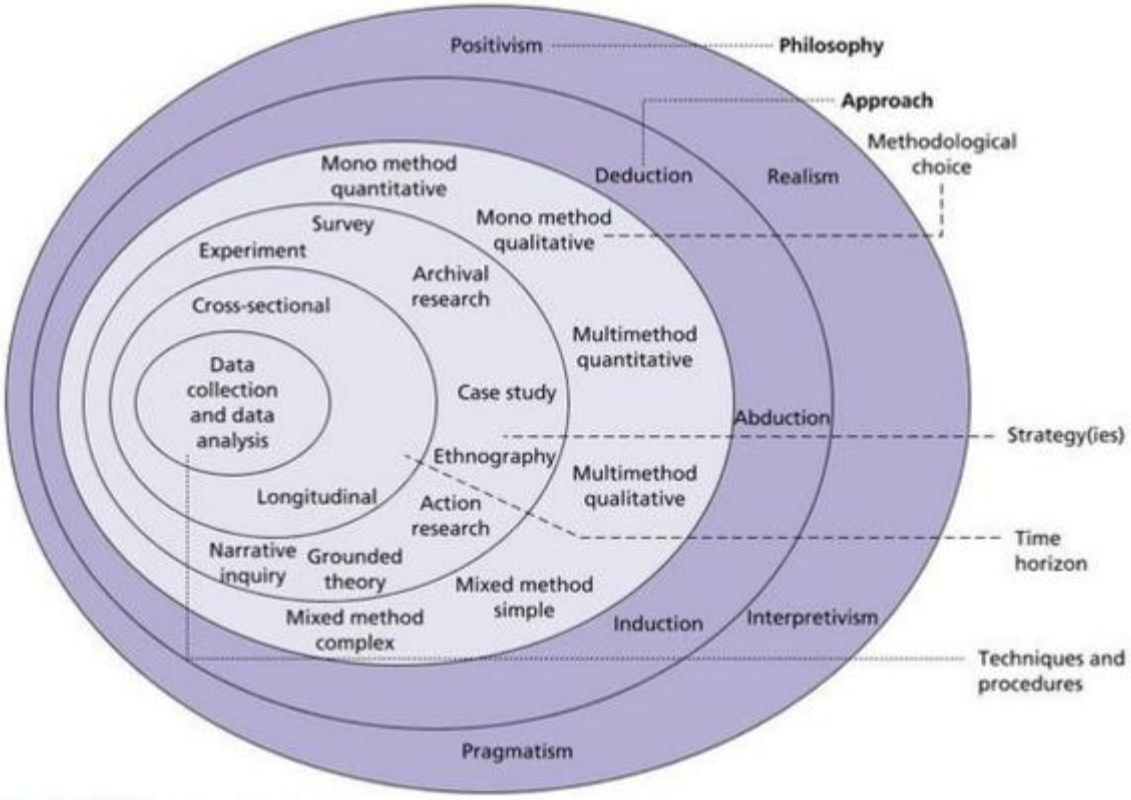

Figure 10: Research Onion (Saunders et al, 2012)

3.2 Research Design

3.2.1 Research Philosophy

According to Saunders et al (2012), Research Philosophy can be thought of as the assumptions made about the way the realities are in the area under research, influenced by practical considerations that examine & evaluate the appropriateness of the assumptions and adjusted accordingly. Depending on the research question, a best suited philosophical idea is chosen. Based on Figure 10, there are 4 philosophical types: Positivism, Realism, Pragmatism and Interpretivism. Positivism refers to collecting data about observable reality and searching for pattern and causal relationships between collected data to generate a generalisation 'law' (2012). Realism refers to collection of data that have real representation of the world, either directly or critically, where Direct Realism refer to the idea that what we experience through our senses depicts the world as it actually is, while, Critical Realism supports the notion that what we experience through our senses are only our senses' interpretation of what the world actually is (Bilczynska-Wojcik, 2014). Pragmatism refers to adoption of practical approach to problem solving by applying any method that seems right in the situation presented, thus may involves more than one philosophical position (Saunders et al, 2012).

Interpretivism philosophy was chosen to conduct this research. The basis of Interpretivism philosophy is that the nature of reality cannot be objectively identified but it is socially constructed (Natchayangkun, 2015). Social world of business and management are far too complex to be define by 'laws' where rich insights into this complex world will be lost if such complexity is reduced entirely to generalisations (Saunders et al, 2012). Interpretivism philosophy identifies the importance of interpretation in knowledge creation of complex social world (Leitch et al, 2010, p. 70). According to Blaxter et al (2010), the Interpretivism approach regards interpretations of the social world as 'culturally derived and historically situated'. This philosophy maintains that the social sciences should be concerned with understanding rather than explaining (which is the basis for the Positivism). The information obtained from the participants was socially interpreted rather than

objectively evaluated. Interpretation by placing people in social contexts provides greater opportunities to understand their perceptions (Hussey & Hussey, 1997). Kaplan & Maxwell, (1994) stated that the Interpretivism philosophy increases the value of qualitative data by providing contextual depth to the results.

Thus, Interpretivism philosophy was considered the most suitable for the exploratory of project management in participant's Scrum project. The thoughts, ideas and perceptions of participants can vary and a critical understanding can be only obtained through subjective interpretations. This subjective interpretation was suitable for this research because depending on several factors, project management in participant's Scrum project may vary. The factors were depending on, but not limited to participant's experience in managing project, depth of knowledge on the importance & impact of PMBOK knowledge areas on project's success and the project's needs. The research aim was not exploring method of implementation but the context of implementation. Understanding the reasons or situations or influences or implications behind the implementation was the research aim. By understanding implementation context, PMBOK knowledge areas could be incorporated into Scrum appropriately. Thus, the views of the participants were analysed based on the context and situation.

3.2.2 Research Approach

Based on Figure 10, there are 3 research approaches: Deduction, Abduction and Induction. Deduction refers to reasoning that occurs based on a set of premises, where a positive conclusion is made if all the premises' are positive and vice versa (Saunders et al, 2012). Abduction refers to reasoning that produces conclusion based on a set of possible premises that are considered sufficient enough to support the conclusion (2012). Induction refers to reasoning based on observing all premises' and made an interpretation based on the observation (2012). The interpretation is true as far as all the premises presented but situation may shift away or other factors may enter that resulted in occurrence of different situation than interpreted. As mentioned in Section 3.2.1, Interpretivism philosophy was

chosen and this philosophy underpins Induction approach to research. This was because, Induction uses interpretation to drive conclusion under research. Induction is more exploratory and open-ended, whereas a Deduction approach is more focussed and is primarily concerned with proving a theory or hypothesis. Induction approach is to generate new theories, likely through qualitative research, while Deduction approach is likely through quantitative research. An Induction approach is used by the researcher when chosen area of research allows theory to emerge from the data (Thomas, 2006). Research using an Induction approach is likely to be particularly concerned with the context, thus developing an understanding of the actual situation is the strength of Induction approach (Saunders et al, 2012). Induction research is proven useful for exploring and describing users' perceptions in various situational contexts which yielded extremely rich data that could be examined for contextual implications (Schamber, 2000, p. 740).

As per Literature Review chapter, PMBOK defined project management processes while Scrum define product oriented processes and this research aim at looking into how project management processes were incorporated into Scrum. The research aim was not exploring method of implementation but the context of implementation. For example, some researchers propose hybrid and integrated implementations. There was reasoning to why hybrid and integrated implementation were implemented. Each implementation might be applicable to only the context described by the researchers in their researches, and might not be applicable to another context. Exploring the reasoning of different implementations in different contexts from participants was this research's aim. Primary data gathered from participants will facilitate the contextualisation of implementations. With the understanding, this research attempts to provide interpretation of how project management processes are incorporated into Scrum oriented process. The interpretation was the theoretical output using inductive approach that emerges from data obtained from participants. The nature of this research, contextualisation of primary data and production of theoretical output implied inductive research approach is the most suitable for this research.

3.2.3 Research Strategy

Based on Figure 10, there are 2 types of Research Strategy: Quantitative and Qualitative. Quantitative research is often used for data collection techniques or data analysis procedures that generate or use numerical data (Saunders et al, 2012). Quantitative research usually starts with a theory or concept known as hypothesis and using standardised data collection techniques, data are analysed with emphasis on numbers and figures to drive conclusion that either agree or disagree with hypothesis (Reddan, 2015). On the other hand, Qualitative research is often used for data collection techniques or data analysis procedures that generates or uses non-numerical data (Saunders et al, 2012). Qualitative research is more focused on people's thoughts, beliefs, choices and reasons for certain behaviours at certain point and due to this subjectivity to opinion, qualitative research does not include measurements or numbers (Reddan, 2015). In summary, the difference between Qualitative and Quantitative is that the former starts with a theory, uses standardised data collection techniques and statistical data analysis, whereas the latter develops a theory, open data collection techniques and interpretative data analysis (Flick, 2015).

Due to Interpretivism philosophy and Induction approach of this research, Qualitative is the most suitable Research Strategy. Qualitative is interpretive because researchers need to make sense of the subjective and socially constructed meanings expressed about the area under research (Saunders et al, 2012). Data collected qualitatively are useful for discovering and this is because non-numerical data can provide in-depth information on known characteristics as well as hidden characteristics, which initially is unknown to researcher (Hair et al, 2003, p.76). Due to potentially hidden and unknown characteristics, qualitative data collection use unstructured collection techniques to develop a richer theoretical perspective than already exists in the literature.

As mentioned, this research aim was to explore how project management processes were incorporated into Scrum. The implementations might be different due to

different project's context. Certain contexts such as project's size, type, organisation's governance and environmental factors, participant's experience in managing project, depth of knowledge on the importance & impact of PMBOK knowledge areas on project's success and the project's needs, not all PMBOK knowledge areas might taken into consideration in project, thus, participant's answer was subjective to the project which participant involved in. These subjective characteristics would not able to be uncovered if quantitative method was chosen. This was because quantitative data is useful for testing or clarifying existing known characteristics. By using unstructured data collection technique of qualitative method, participants were given the opportunity to provide their perceptions or understanding of a given area freely to researcher without being limited by boundary structured by researcher. Consequently, context of PMBOK knowledge areas implementation were viewed from unlimited perspectives and thus, provided better understanding of the context. However, researcher required to be highly skilled in contextualising in order to achieve accurate interpretation.

3.2.4 Research Choice

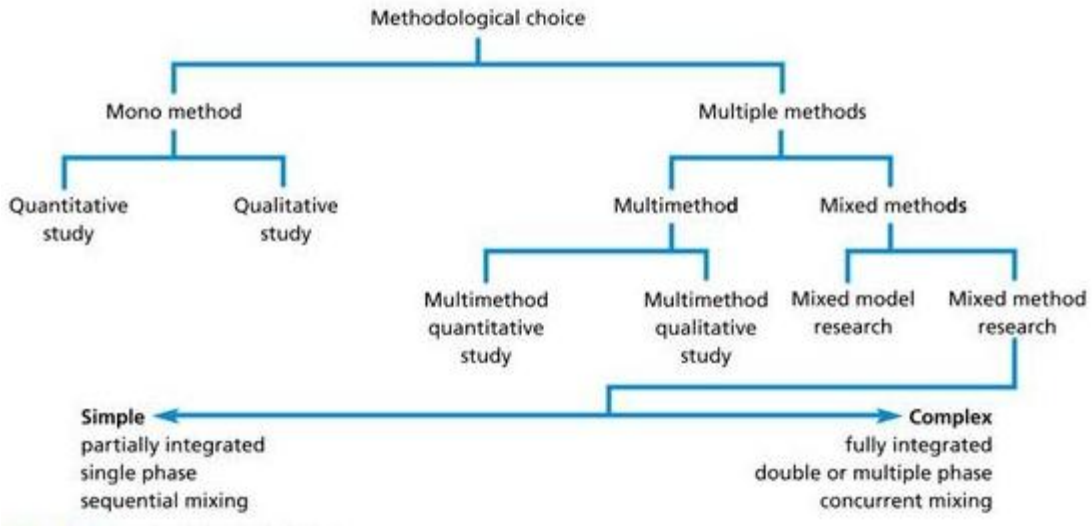

Figure 11: Methodological Choice (Saunders et al, 2012)

As shown in Figure 10, there can be mono-method, multi method and mixed methods for either Qualitative or Quantitative strategy. Mono-method indicates the

use of single data collection technique of either Qualitative or Quantitative strategy. Multi method indicates the use of more than one data collection techniques of either Qualitative or Quantitative strategy. Mixed method indicates the used of data collection technique of not either, but both Qualitative and Quantitative strategy. Creswell (2013) believes that a mixed approach, integrating qualitative and quantitative data, is a very discerning approach. Fetters et al (2013) agree that "mixed methods research studies draw upon the strengths of both quantitative and qualitative approaches" as the researcher can use quantitative data to validate the qualitative.

The research choice for this research is mono-method. Even though multi method stated as discerning approach but due to time constraints in collecting and analysing data, multi method was not considered. Apart from time constraints, mixed-method was not considered because, PMBOK knowledge areas implementation was subjective to many factors, such per mentioned in Section 3.2.1, thus, it would be complicated to validate using quantitative data as the figures obtained through quantitative data analysis procedures would not be as polarised as true or false, yes or no.

3.2.5 Time Horizon

There were two considerations in determining the time element for this research: Cross-sectional or Longitudinal. Cross-sectional refers to research of study of a particular phenomenon (or phenomena) at a particular time while Longitudinal refers also to research or study of a particular phenomenon but for over a period of time, to study change and development (Saunders et al, 2012, p.190). Again, due to time constraints, this research could only accomplish a study that applied at a particular time, during the time when this research was undertaken. Thus, the chosen Time Horizon of this research was Cross-Sectional. The result of the research was a conclusion interpreted from primary data collected at single point of time.

3.2.6 Sampling - Selecting Respondents

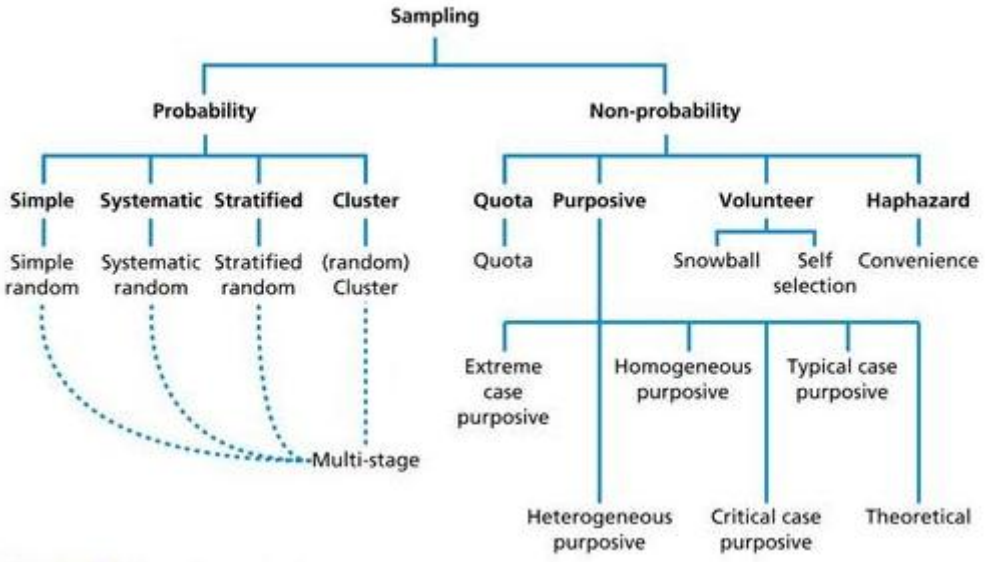

Figure 12: Sampling Techniques (Saunders et al, 2012)

An ideal case for providing accurate representation or interpretation would be collecting data from every possible case or group, however, this is impossible not only in terms of the effort needed to collect data but also to analyse all the potential data, with constraints in time, money and most importantly access to data (Saunders et al, 2012, p.258). Sampling techniques are used to reduce the amount of data by collecting only data from a subgroup rather than every possible cases or groups. There are several sampling techniques as shown in Figure 12, where the techniques are divided into two main categories: Probability and Non-probability. Probability sampling is used to achieve objectives that require statistical estimation of the characteristics of the population from the sample, where the probability of each case being selected from population is known, while for Non-probability the probability of each case being selected from population is unknown (2012, p.262).

The target population for this research were individuals who manage projects that run with Scrum. There were several positions that possibly have the responsibilities to manage project in Scrum such as Project Manager, Product Manager, Product Owner, Scrum Master or even team members depending on the project size, complexity, number of stakeholders and organisation's structure, culture and

governance. Thus, there was no definitive title/position the targeted population should hold. The criteria that were used to select target population were:

1. Participant's project is IT project.
2. Participant must be in the position of managing / leading project that use Scrum.
3. Participant must have project management or Scrum experience.

Criteria-1 is to ensure the industry the participants in is IT industry. There is no restriction to the type IT project as the main consideration of this research is the implementation of project management processes in Scrum, not product oriented processes. The type of IT project will only influence product-oriented processes, not project management processes. Criteria-2 is to ensure participant has ample knowledge of project management processes or Scrum processes. The larger the project, the more complex the project is and more PMBOK knowledge areas would be incorporated into Scrum.

This research chose to use Non-probability sampling technique. This was because it was not possible to identify all target population that fit the aforementioned criteria. For example, the role that is in the position of managing / leading Scrum project are but not limited to Project Manager, Product Manager, Product Owner and Scrum Master. Thus, this research aimed at exploration from available samples, as long as they fulfilled the 3 criteria mentioned in previous paragraph. Furthermore, due the nature of this research, statistical inferences were not required to be made from each sample. As mentioned, the research aim was not implementation method but implementation context which could not be represented or induced with statistical analysis. With these factors in mind and Figure 13 as reference, Convenience sampling method was used. Convenience sampling occurs when participants are selected based on their availability (2012).

Saunders et al (2012) stated there are no rules for sample size for non-probability sampling, but rather the logical relationship between sample selection technique and the purpose and focus of the research undertaken, thus, the validity, understanding and insights gain from data collected will be more to do with researcher data

collection and analysis skills rather than the sample size. However, Saunders et al provides guidelines on minimum sample size require for different nature of research and the suggested minimum sample size for semi-structured / in-depth interviews (will be explained in Section 3.3) is 5-25 samples. Due to time constraint, only 5 samples were taken for this research.

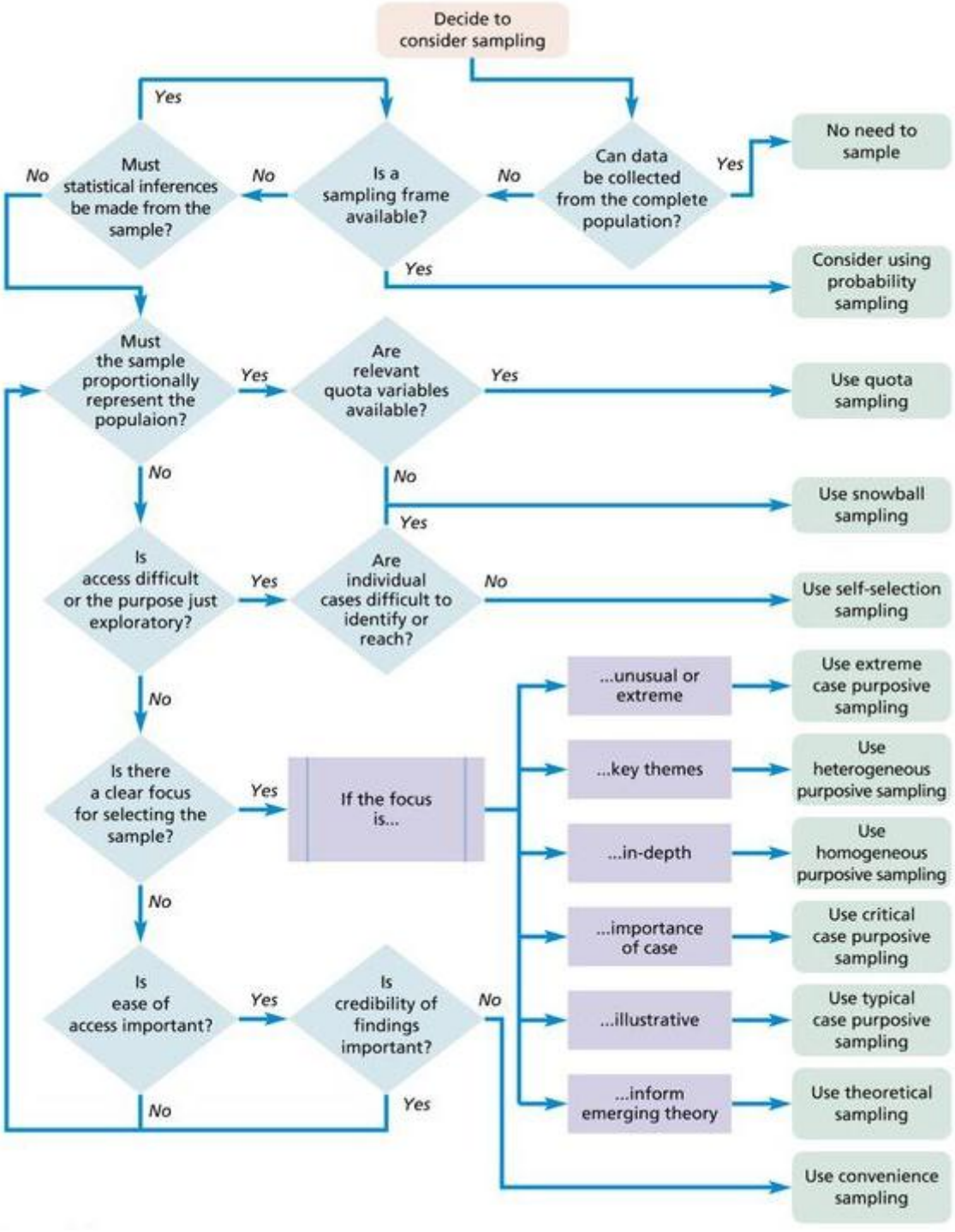

Figure 13: Selecting Non-Probability Sampling Technique (Saunders et al, 2012)

3.3 Data Collection Instruments

There are several data collection techniques available. Firstly, data can be collected through Observation. Observation involves recording, description, analysis and interpretation of people's behaviour. Researcher will participant in the environment of other people, responding to the ways in which participant carry out their activities by sharing researcher's experiences (Saunders et al, 2012, p.340). For this research, this type of data collection technique was not viable because this research was an exploratory study and researcher meant to interpret participant's project management implementation and present the interpretation as is, without influencing participant's point of view. Furthermore, apart from time and resource constraints, most projects contain or use private information, thus, there would be accessible issue if observation technique was applied.

Another form of data collection technique, there is Interview. Interview involves interviewer asking purposeful questions to interviewee and carefully listening and recording the answers for further exploration and analysis. There are several types of interviews, as shown in Figure 14. Standardised or structured interview use questionnaires, which were based on predetermined set of questions, usually with pre-coded answers and thus used to collect quantifiable data (Saunders et al, 2012, p.374). On the other hand, non-standardised or unstructured interview does not use predetermined list of questions but based on clear idea about the aspects of the area under research which interviewee then response freely based on their perspective on the area under research, thus providing in-depth general idea of the area (Saunders et al, 2012, p.375).

Interview was adopted as data collection technique for this research. The nature or method of the interview was selected in consistent with research question and objectives, purpose of the research and the research design that had been adopted. According to Natchayangkun (2015), the main characteristics of data collection method used in the data collection of Interpretivism philosophy are small samples, in-depth investigation and qualitative. Based on this, this research should apply

unstructured interview, however, due time constraints, semi-structured interview was applied as using unstructured interviews required significant amount of data collection and analysis time. Data collected through semi-structured interviews allows researcher to enter into informal conversation with the participants to explore the maximum information about their experience, and at the same time, cover all the areas necessary for the research. The semi-structured questions were used to guide the research through the areas that need to be answered (by listing potential themes) and to prevent discussion from getting into irrelevant topics. It incorporates general approach and participant often requires follow up questions in order to clarify aspects of the participant's answer. According to Burman (2015), this approach uses pre-written questions in order to maintain equivalence between interviews, but does not follow it with the same rigidity as structured interviews. Instead semi-structured interviews are more open and iterative in its nature. This allows an increased flexibility in the interview while still focusing on themes predetermined by the researcher. With the research question established early in the research, semi-structured interviews combine the rigidity and flexibility of structured and unstructured interview in order to attain equivalence and generality. Interview questions used in this research can be found in Appendix 3. Interviews were conducted using one-to-one method, with face-to-face or internet and intranet mediated interviews (refer to Figure 14).

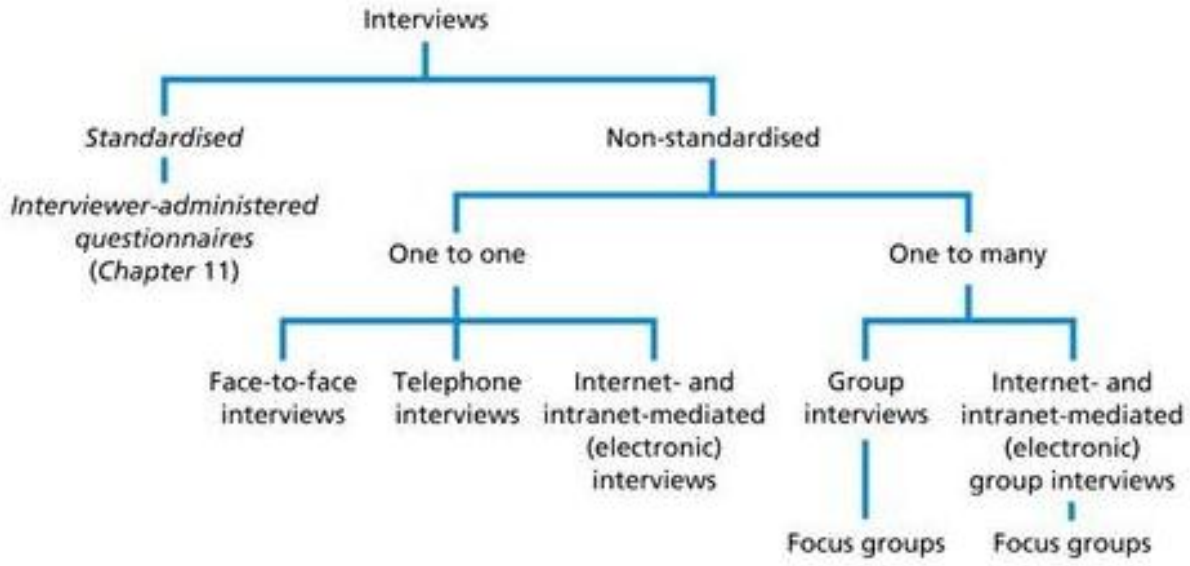

Figure 14: Interview Types (Saunders et al, 2012)

3.4 Data Analysis Procedures

Data analysis proceeded subsequently after data collection. Qualitative data is subjective and socially constructed meanings are expressed, which are based upon interpretation of events that occur around participants participated in research (Saunders et al, 2012, p.546). Due to derivation of data's meanings from words, there are ambiguous meanings as words may have multiple meanings. Processes such as summarisation, categorisation according to themes and linkage between the categories will transform the unstructured and ambiguous meanings to structured meanings for answering research question.

Data from the semi-structured interviews with participants were audio recorded and transcribed for the qualitative analysis. The recording allows the actual voices of the participants without imposing personal preconceptions to be presented. A thematic analysis was conducted to evaluate the data collected from the qualitative analysis. Ideas, concepts, terminology or phrases can be used as themes. In this research, PMBOK knowledge areas were the themes. Once the transcribed data from the interviews divided into different themes, they were organised into categories that summarised and brought meaning to intended context. The categorisation was based on existence of PMBOK knowledge areas' implementation, reason and impact of existence. In thematic analysis both implicit and explicit ideas within the data were analysed through developing codes for each theme (Braun, 2006). The code frequencies, code co-occurrences and the relationship between the codes all have formed the basis of analysis.

3.5 Research Ethics

The ethical issue of validity versus avoiding harm (Miles, et al., 2014) is always present while performing a qualitative study, thus ethical consideration for the research started from research's beginning stage until reporting stage. As part of negotiating access, anonymity and confidentiality was ensured to participants. Their participation was completely voluntary and the participants were informed prior to the interview that their identity and details will remain confidential (refer to

Appendix 2), no personal information was collected other than number of years of experience in their current title/position, project's type and size (based on number of stakeholders), their certification (if any) and their contributions to be used within the context of DBS MBA requirements and would not be disclosed to any third party. They also at any point could refuse to answer any question presented. Thus, interview questions were designed to a certain degree explored participants' experience without diving into confidential information. During the interviews, researchers would not participate or influence participants' perceptions on the subject matter, so as to ensure data collected were purely participants' own perceptions. Finally, researchers would present data collected from participants "as is" without tweaking participants' contributions to match researchers desire results.

3.6 Limitations of Methodology

One of the limitations of this research was small sample size. Even though small sample size is suggested for Interpretivism, Induction and Qualitative research, the contextualisation from small samples do not support strong reliability and validity. Also, through convenience sampling, participant's maturity (in terms of experience & knowledge) were not assessed, thus maturity levels were different for each participant, thus primary data might provide wide range of contexts as implementation of PMBOK knowledge areas in Scrum project depend highly on to participants maturity. There was also no scope on the type and geographical location of the IT projects participants were involved in. Implementation of PMBOK knowledge areas might be influenced organisation policy, resource constraint, project type and convenience, rather than necessity. In order to simplify the research due to time constraint, these variables were not taken into account when collecting primary data.

4. Data Analysis/Findings

4.1 Project Initiating

As per discussed in Literature Review chapter, there is no clear description of how a project is initiated in Scrum and due to its importance, participants were enquired on whether they implement any project initiation process, method of implementation and whether the implementation is part of or separate from Scrum processes. There were mix responses from participants. Some participants stated that their project initiation is part of their Scrum process while others stated otherwise. Out of the 5 participants, 1 stated that their project doesn't require project initiation, 1 stated that their project initiation is part of Scrum process while the rest stated their project initiation is external of Scrum process. Participant 1, a certified Scrum Master, holding Product Manager position stated that project initiation is separated from Scrum and is when high level requirements or conceptual ideas are discussed. Those high level requirements are then further elaborated, discussed and reviewed during Backlog Grooming and Sprint Planning (both are Scrum processes) and changed as necessary:

> *"Separate process - High level requirement discussion where conceptual ideas are discussed. Agile Process - collaboration and constantly review and make changes during grooming and planning."*

Participant 2 provided more comprehensive view of project initiation which involves communication with client to get clear picture of the requirements, feasibility study, detail tasks list, calculation of effort require to complete the tasks, cost estimation, client negotiation, team member selection based on skills required by the project and finally, official project initiation to kick off the development of the project. Also, Participant 2 mentioned one key point that aligned with the idea demonstrated by literatures, and that is project initiation is not part of Scrum process and Scrum process only starts during SDLC, during project execution:

> *"Agile processes were not part of these steps. We followed Agile during the actual SDLC cycle."*

Participant 4 described 2 project initiations. They are similar to Participant 1's project initiation. The first initiation involves high level requirements or conceptual ideas discussion and consolidation of all the components / modules that constitute a product to perform risk and dependency analysis for deliverable iteration planning. The second initiation involves breaking down tasks list into smaller chunks:

> *"Breaking requirements into EPIC (main story), then, breaking EPIC into PBI (Product Backlog Item) or user stories. Prior to that, we have a top-level PI (Program Increment) planning where we get all components of software together to gauge the risks of each program/product."*

Due to the project nature of Participant 3, project initiation is not necessary. As described by Participant 1, 2 and 4, their project initiation involves high level requirements and deliverable iteration planning. For Participant 3 whose project involves enhancing / editing existing system, deliverables are per request basis and thus no high level requirements and deliverable iteration planning require. However, as per mentioned by Participant 2, there may be certain tasks such as feasibility study, detail tasks list, effort calculation, cost estimation necessary to be performed at project initiation, but for Participant 3, all the aforementioned tasks may have been fix and thus do not require to be performed. Finally, Participant 5 adopted integrated Initiating process into Scrum process where at the beginning of each iteration, an Initiating process is performed.

4.2 Project Cost Management

In PMBOK® (2013), apart from Planning process, Cost Management is also managed at Monitoring & Controlling process (refer to Table 1). In Planning process, as per discussed in literatures review, PO's responsibility to prioritise Product Backlog only focuses on scope and time planning, there is no description on cost. In Monitoring & Controlling process, SM's responsibility of ensuring prioritisation of Product Backlog maximise value, facilitating Scrum event (i.e: Sprint Planning, Daily Standup Meeting etc) to discuss challenges and coaching DT in self-organization and cross-functionality, are all monitoring & controlling of tasks, but no monitoring &

controlling of cost. Thus, participants were enquired on whether they implement any Cost Management, method of implementation and whether the implementation is part of or separate from Scrum processes. Out of the 5 participants, 1 participant is not involved in Cost Management and thus unable to provide information, 3 participants stated Cost Management is done iteratively according to amount of deliverables and 1 participant stated Cost Management is done at project kick-off stage.

Participant 2, 3 and 4 all have cost estimation done iteratively according to amount of deliverables at each iteration. In terms of monitoring and controlling cost, participants manage through minimising client change request during iteration implementation.

Participant 2:

> *"In case, client asks for change/enhancement during existing project, efforts to accommodate those changes have to be calculated in terms of man-hours. If those efforts are significant then it has to be communicated to the client immediately since it affects project costing as well as planned delivery schedule."*

Participant 3:

> *"We are editor so cost is measured by time spent on a functionality we want to do…Taking all the tasks done we have a numbers of S,M,L translated into times which gives us a rough idea about the time required (linear time) It's first a sort of budget estimation. Then come up the question of parallelising tasks and if we can shorten the development time."*

For Participant 5 Cost Management is done at kick-off stage:

> *"When project is in the kick off stage, the proposal of the model is being draft including the time planning, required equipment, traveling and resources budget."*

4.3 Project Quality Management

Based on Literature Review Section 2.6.2, Quality Management is integrated into Scrum, but the focus is on quality in terms of fulfilling feature requirements and customer acceptance. Another aspect of quality management is sustaining and improving the quality of development process, which has the benefit of better appearance to potential clients. Thus, participants were enquired on whether they implement any Quality Management, method of implementation and whether the implementation is part of or separate from Scrum processes. Out of the 5 participants, 1 is not involved in Quality Management while the other 4 participants adopted Quality Management approach as product conformance to requirements and fitness for use. All 4 participants stated that their Quality Management is integrated into Scrum process. This is consistent with what is stated in Section 2.6.2. However, none of the participant's Quality Management involve in improving quality of management of project. PMBOK provides basic approach of quality management based on International Organisation for Standardisation (ISO). There are several considerations of quality management based on ISO and they are:

1. Product conformance to requirements and its fitness for use.
2. Quality should be integrated and not inspected into project management or project deliverables as the cost of prevention is less than correcting mistakes found during inspection.
3. Continuous improvement on implementation of quality management.
4. Requires participation of all members of the project team.
5. Understand the cost of quality to produce work that is conformance to requirement and cost for rework for non-conformance work.

As per ISO, Quality Management approach should be preventive and not inspective as the cost of prevention is less than correcting mistakes found during inspection (PMBOK®, 2013). Participant 1, 3 and 5 adopt preventive approach while Participant 2 adopts inspection approach to Quality Management. Participant 1 lays out acceptance criteria and done definition before features are developed to increase the likeliness of features to be developed to be conformance with requirements and

fitness for use. Participant 3 further emphasis on quality by performing code review for coded features to ensure codes are following programming best practices, thus ensuring good quality codes, which will prevent bugs issues related to bad quality codes (memory leaks, unhandled exception, etc):

> *"We have a development process that force any developers to go through the following steps: - To do : The task is ready for development. - In progress : the task is being worked on by a developer. - In Review : The task is finished and the code needs to be reviewed by someone else. - To Test : The task passed the technical review and is in the queue for QA - In testing : The QA is functionally testing the task. - To Release : The functionally test have passed and that item will be a part of a battery of regression tests before being merged. - Closed : The task is merged and ready to be shipped in the next release."*

As mentioned, Participant 2 adopts inspection approach, where quality depends on QA team effort to ensure product is conformance to requirements and its fitness for use:

> *"I was involved in quality management process in terms of utilising dedicated (sometimes shared) tester for individual project. It was part of controlling phase of SDLC since clients refuse end-product with defects & bugs. So number of bugs were directly affecting project timeline."*

4.4 Project Communication Management

Project Communication Management involves communicating with team members and other project stakeholders either internal (at all organizational levels) or external to the organization to create a bridge between diverse stakeholders who may have different cultural and organizational backgrounds, different levels of expertise, and different perspectives and interests, which impact or have an influence upon the project execution or outcome (PMBOK®, 2013). Thus, communication and collaboration are the keys for success and is what Scrum emphasises on: individuals and interactions over processes, customer collaboration over contracts and formal

negotiations, and responsiveness over rigid planning. Due to Scrum emphasises, it can be assume that Communication Management is integrated into Scrum process, however participants were still enquired on whether they implement any Quality Management, method of implementation and whether the implementation is part of or separate from Scrum processes, because the level of communication may differ than PMBOK. Out of the 5 participants, 2 participants have some forms of communication outside of project team while the other 3 participants only manage/involve in communication within the project team.

Participant 2 and 5 have some forms of communications outside of project team. Participant 2 involves managing customer and external companies at each iteration that requires communication with customer and external companies:

> *"As a manager, I was responsible to manage communication with client from deliverable point of view.e.g. code, test plans, release documents, sign-off etc. It was also part of Agile from project deployment perspective since web-based projects had to be hosted on remote servers like Amazon which involved discussions with hosting company technicians."*

Participant 5 stated that project manager is the sole communication channel for all stakeholders:

> *"Yes, the project manager or leader will be the sole communication between all the stakeholders. Deliveries communication will be followed up as per the agreed schedules."*

For Participant 1, 3 and 4, there is only Communication Management within project team that exist as daily stand-up meeting that is self manage by team to communicate with other team members on issues, dependencies and impediments. However, there is another communication between all Scrum Masters of different Scrum teams, within the same organisation to ensure the dependencies of features from different teams are managed accordingly.

Participant 1:

"Daily standup and ad-hoc small discussion within team members. Weekly meetings for Scrums of Scrums to communicate with other team members that has dependencies."

Participant 4:

"Standup daily (15mins). Retrospective for every end of sprint. Scrum of scrum meetin between all of the scrum masters bi-weekly to align and leverage information."

4.5 Project Risk Management

Project Risk Management iincrease the likelihood and impact of positive events and decrease the likelihood and impact of negative events in project and the processes involve are (PMBOK®, 2013). Scrum employs an iterative, incremental approach to optimize predictability and control risk by maximizing opportunities for feedback at the end of each iteration, thus reduces the risk of undesired feature or obsolete technology. However, this 'requirements' risk is only one type of risk that exist and more sources of risks need to be managed (as mentioned in Section 1.2). Furthermore, based on literature review, there are no precise guidelines for how to identify, classify, assess or manage risks in Scrum. Thus, participants were enquired on whether they implement any Risk Management, method of implementation and whether the implementation is part of or separate from Scrum processes.

Out of 5 participants, 1 participant is not involved in Risk Management. The rest of 4 participants have some form of Risk Management handled by them. Participant 1 stated that Risk Management is a separate process from Scrum. Participant 2 stated that the risks are uncertain and harder to identify and thus any unpredictable circumstances will result in communication and negotiation with customers:

"Even though risk management is essential during project initiation to identify & mitigate risks, projects utilising Agile framework like XP are always prone to unknown technical, commercial & business risks during every phase of SDLC. Usually risks were handled through formal communication / negotiation with clients & company management."

For Participant 3, the risks are managed at different level and as both separate and part of Scrum processes:

> *"The risk is continuously monitored at different level, during the dev time by developers, the architect, infrastructure lead and before releasing anything… we have meetings to discuss risks before starting the work, were we are mitigating the risks by taking actions, and if the development is smooth we don't meet again until we have a formal release meeting where we can talk about some risks and iterate."*

For Participant 4, risk are analyse iteratively at each stage of development:

> *"Risk management including deliveries schedules, security, and deliveries outcome. Each stage of development its expected deliveries, this will calculate the whole deliveries manner. All stakeholders will be in communication when risk analysis is done."*

4.6 Project Stakeholder Management

Stakeholder Management includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution (PMBOK®, 2013). As mentioned in Section 1.2, there are also risks from stakeholders as important projects often have to deal with a complex organisational/political environment where stakeholders may have competing priorities for the project. There are no literature on how stakeholders are managed in Scrum thus, participants were enquired on whether they implement any Stakeholder Management, method of implementation and whether the implementation is part of or separate from Scrum processes.

For Participant 1, there is no Stakeholder Management as they are fix and due to Minimum Viable Product (MVP) approach use by Participant 1's organisation. MVP promotes minimum feature delivery and thus there is no other competing priority for

the project. For Participant 2 & 3, there is some form of stakeholder management either by Project Manager or Product Owner.

Participant 2:

> *"I was involved in stakeholder management in terms of organisation management (directors) and managers at client end since flow of the deliverable would be from organisation to client.."*

Participant 3:

> *"It's good practices to give the right level of information to the right person. For most of the stakeholders, knowing that everything is on track and having and ETA date is the most important thing. Also if we have any change of scope that needs to be discussed, that will be the Product Manager who's doing that."*

For Participant 4, there is stakeholder management at Initiating and Executing process. At project kick-off (Initiating process), stakeholders are identified and at Executing process, stakeholders are engaged with any changes before decisions are made:

> *"During project kick off, the stakeholders will be identified. In between schedules, if there's changes it shall be communicated to all. If changes creates too much impact on project deliveries, risk analysis must be communicating to all stakeholder for decision."*

4.7 Project Human Resource Management

Human Resource Management includes the processes that organize and manage project team members who may have varied skill sets, may be assigned full or part-time, and may be added or removed from the team as the project progresses (PMBOK®, 2013). There no literature found in managing human resource in Scrum thus, thus, participants were enquired on whether they implement any Human Resource Management, method of implementation and whether the implementation is part of or separate from Scrum processes. Out of the 5 participants, only 1 participant involve in Human Resource Management while for the rest, there seem to be fix human resource throughout projects. For Participant 4, human resource is managed based on team load:

"Yes, manage efforts in the team. Create burn down charts to gauge the team load. Usually, when anyone is free-up, we either allocate them to new PBIs or help to burn down other existing PBIs."

4.8 Project Procurement Management

Procurement Management includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team who can be either the buyer or seller of the products, services, or results of a project, including the contract management and change control processes required to develop and administer contracts or purchase orders issued by authorized project team members (PMBOK®, 2013). Out of 5 participants, 2 were not involved in procurement, while the rest mentioned Procurement Management is separate from Scrum and no details of the implementation method were given.

5. Discussions

5.1 Project Initiating

As mentioned in Section 2.5.2, according to PMBOK, Initiating process involve at different level, one at program or portfolio level and one at project level. Project initiation at project level consists of development of details descriptions of the project in terms of architecture, technology, risk and etc, application of organisation resources activities and identification of stakeholders. Those are project management processes, in terms of product oriented processes, based on SDLC (refer to Section 2.4.1), prior to Coding, there are Requirement Analysis and Design stage. However, Scrum processes only defined Coding processes or in other words, processes after high-level project requirement or scope have been identified or analysed and after Product Backlog has been created. Thus, in order to perform Requirement Analysis and Design stage of SDLC as well as other project management processes, Initiating process is either implemented as separate from Scrum process or incorporated into Scrum process.

From Data Findings in Section 4.1, out of the 5 participants, 3 participants stated their project initiation is external of Scrum process while 1 participant stated that their project initiation is part of Scrum process. As per literature review, the implication of running a project without Initiation process results in confusion of objectives and deliverables. As there is no full view of the product, team members have to spend time enquiring different stakeholders and performing crosschecks to gauge an understanding what the product is supposed to do or how the product is supposed to work, exposing to many misunderstandings caused by personal interpretations (Kanane, 2014). Due to the importance of Initiating process, most participants incorporated project initiation prior to performing Scrum process. This is consistent with the proposal by Rahmanian (2014) (refer to Section 2.6.1) where Requirement Analysis and Initial Design, both are Initating processes, are done prior Scrum processes. Requirement Analysis is important as stated in Kanane (2014) study: Many team members have troubles to understand what is expected from them and is usually because the requirements are not clear, or not exhaustive."

Study by Cho (2008), further emphasise this point "Agile allow you to go much quicker as long as whoever is specifying has a very good idea of what clients want, else Agile methods are just as slow as anything else." Thus, having Requirement Analysis prior starting development, result in more details requirements and provide clearer objectives.

Apart from defining clear objectives and system architecture, Participant 2 demonstrated Initiating process is also for defining task list, amount of effort to complete task which is important for cost estimation, client negotiation (i.e: scope, cost, architectural design negotiation) and skills-based team selection. However, project initiation may hinder the agility of Agile by preventing change for task list defined. Participant in Gholami & Heinzl (2013) study mentioned:

> *"We cannot change these small chunks. It all depends on the first plan and just like the traditional way, if the initial plan is not good enough the process is not successful enough… The initial plan completely de-pends on managers."*

Thus, even though requirements / task list provide clear requirements, good idea of what clients want, task list should be flexible enough to accommodate change.

5.2 Project Integration, Scope & Time Management

Participants were not enquired on whether they implement any Integration, Scope & Time Management. According to PMBOK, Integration Management includes making choices about resource allocation, making trade-offs among competing objectives and alternatives, and managing the interdependencies among the project management knowledge areas. Thus, essentially, Integration Management focuses on integration of different knowledge areas. Participants were not enquired about Integration Management because integration depends heavily on the type of knowledge areas implemented and thus would become 2nd level analysis if Integration Management data were collected, where 1st level analysis would be identifying implemented knowledge areas. Furthermore, the integration can be indirectly be understood through method of implementation of each knowledge areas specified by participants. On the other hand, Scope & Time Management was

not enquired from participants because scope and time are properly managed in Scrum through its Product Backlog and time-box Sprint.

5.3 Project Cost Management

Based on PMBOK® (2013), Cost Management includes the processes involved in planning, estimating, budgeting, financing, funding and monitoring & controlling costs so that project can be completed within the approved budget. All the aforementioned activities of Cost Management are taken care of at Planning and Monitoring & Controlling processes (refer to Table 1). As Scrum defined only product-oriented processes, Cost Management, as one of project management processes is not defined in Scrum. Scrum reduces the risk of undesired feature or obsolete technology by having flexibility to accommodate change, however, this flexibility is not helpful in estimation cost (Larson & Gray, 2011). In order to prevent over-spending and managing financial concerns, many organisations established a maximum budget that should not be exceeded (2011).

From Data Findings in Section 4.2, out of the 5 participants, 3 participants stated Cost Management is done iteratively according to amount of deliverables and 1 participant stated Cost Management is done at project kick-off stage. Most participants integrated Cost Management into Scrum process where both Planning and Monitoring & Controlling of Cost Management processes are done at the same time, iteratively according to the amount of deliverables at each iteration. By estimating the amount of cost based on deliverables is part of Planning while managing change / enhancement request during iteration is part of Monitoring and Controlling process of Cost Management, as huge change request may result in over spending from initial estimated cost of that specific iteration. However, huge change request may still be considered implementation, as it is part of Scrum manifesto of flexibility. Thus, any change that may result in over spending from initial estimated cost may need further discussion, negotiation and budgeting in order to prevent exceeding maximum budget allocated to the whole project. As per stated by Participant 2 (refer to Section 4.2), if change efforts are significant then it has to be

communicated to the client immediately since it affects project costing as well as planned delivery schedule.

5.4 Project Quality Management

Based on PMBOK® (2013), Quality Management addresses the quality of management of the project and deliverables of the project. There can be serious and negative consequences if quality requirements are not met. Common understanding of quality is fulfilling customer requirements but quality of management of project is also an important aspect of a project, as meeting customer requirements by overworking project team may steer a project into deep failures due to risks such as employee attrition, error and rework (2013).

From Data Findings in Section 4.3, out of the 5 participants, 4 participants stated that their Quality Management is integrated into Scrum process. This is consistent with what is stated in literature in Section 2.6.2. Participants' Quality Management focus is on quality in terms of fulfilling feature requirements and customer acceptance and none on improving quality of management. The lack of quality of management can lead to negative consequences. Based on study by Ashraf & Ali (2013), about 40% developer reported that SM and PO interrupt their working during a Sprint. SM try to pressurized developer like project manager in traditional project management by asking question about developer's job, while PO introduce a new requirement during a Sprint, which consequently, more work pressure is felt by developers which result in coding errors or extra work hours to be spent.

Due to flexibility of Scrum, change may be requested during Sprint. Thus, instead of fulfilling every client's request during Sprint (normally, with a fix duration), there should be negotiation process to find the balance between the client's change requirements within a Sprint with already implemented features, time and cost within a Sprint, in order to prevent adding new features with the remaining limited time and cost left or removing already implemented features, within a Sprint which very often will cost team members to struggle with overloaded work (Kanane, 2014).

Apart from change request, the tense sequencing of Sprints also cost team members with overloaded work (2014):

> *"I want to become better on this to find a way of having a recreation between the sprints because we are not good at that. We are usually running one sprint and when it's ended, we start the requirements for the next sprint and we will continue, so it's a constant movement of effectiveness so if you run really hard you have the chance to burn out people."*

In Gholami & Heinzl (2013) study, there is a time slot called slack time, which was assigned by some managers to some teams so that employees are free to do whatever they like during working hours. In one example, it is called Monday schools where there are meetings in which team members share their knowledge and do very short workshops of about half an hour to half a day.

5.5 Project Communication Management

Communication Management is integrated into Scrum process however the level of communication may differ than that of PMBOK. In PMBOK® (2013), Communication Management involves in Planning, Executing and Monitoring & Controlling processes (refer to Table 1). In Planning process, a communication plan/approach is developed to communicate with team members and other project stakeholders either internal (at all organizational levels) or external to the organization to create a bridge between diverse stakeholders, based on stakeholders needs and available organisation assets. The plan is then executed to ensure proper communication is implemented by creating, collecting, distributing, storing or retrieving information, and while at the same time monitor the effectiveness of the communication plan and adjust or restructure the plan to enhance effectiveness. Even though Scrum emphasises on communication, there is no specific process that defined Communication Management in Scrum but Scrum processes such as Sprint Planning Meeting, Daily Scrum Meeting, Sprint Review and Sprint Retrospective promote communication.

From Data Findings in Section 4.4, out of the 5 participants, 2 participants have some forms of communication outside of project team while the other 3 participants only manage/involve in communication within the project team. The 2 participants that have some forms of communication outside of project team mentioned that external communication is handled by project manager or leader (as mentioned in 1.5, project manager may undertake PO or SM role in Scrum, thus they may still exist in Scrum). This indicates that the communication outside of project team is handled by a role outside of Scrum's role and hence outside of Scrum processes. However, in project where there are dependencies with other project, there is Scrum process within Scrum process, known as Scrums of Scrums, where all SMs from different project will meet and discuss dependencies of their projects with each other, as per stated by Participant 1. This is consistent with a study by Cho (2008), which stated that there is little or no communication between separate teams and could cause problems such as duplicated work and thus, suggested Scrums of Scrums Meeting to ensure no duplication of work. Furthermore, for a bigger project, having a bigger Scrum team is not the solution as Daily Scrum Meeting, which intended to be short, will lengthen and thus, cost precious time to be wasted. The solution will normally be dividing the team into smaller teams and perform Scrums of Scrums Meeting to ensure decisions in one Scrum team is distributed to other Scrum teams (Kanane, 2014).

Essentially, Scrum processes promote communication between team members within a project. However, there are other stakeholders involve that require to be communicated as well, i..e customer. In order to ensure customer requirements are being fulfilled, continuous communication with customer is essential as per implemented by Participant 2. Customer engagement is crucial however, according to Ashraf & Ali (2013), communication with customer is a tough task, as customer may not be encouraged to continuously communicate with project team members due to their own job routines and responsibilities. The same challenge resonates in Cho (2008) study, where several developers mentioned that "the biggest area of communication issues that we have is with the customer more than anything else because they tend to not give us a lot of feedback" due to other daily jobs that need

to be taken care of in addition to work with developers. Thus, to manage this communication challenge, a communication plan or approach needs to be developed, implemented, monitored and adjusted in order to enhance communication effectiveness between customer and team members. Even though participants have not provide comprehensive feedback on how customer communication can be managed, however logically, customer communication approach should be developed prior to Scrum processes, as one time process, provided it is the same set of customers throughout the project and the communication approach shall be adjusted accordingly at each Scrum iteration based on its effectiveness.

5.6 Project Risk Management

Even though Risk Management is a crucial process, flexibility of Scrum increases unpredictability and thus increases difficulty to identify potential risks. Thus, as per stated by Participant 2, there is Risk Management but at minimum and any negative circumstances will result in communication and negotiation with customers. From Data Findings in Section 4.5, out of 5 participants, 4 participants have some form of Risk Management handled by them. Participant 1 stated that Risk Management is a separate process from Scrum while the other 3 have Risk Management integrated into Scrum processes. This is consistent with Sliger & Broderick (2008) and Nyfjord (2008). Nyfjord further integrate Risk Management at different level of a project, at business, product and engineering levels to gauge risks from different sources (refer to Section 2.6.2). Even though integrated Risk Management is the way to manage risk in Scrum, Participant 3 adopts both separate and integrated Risk Management in Scrum. For Participant 3, there is Risk Management prior to the start of Scrum processes and another Risk Management at each iteration.

Based on PMBOK® (2013), Risk Management involves (PMBOK®, 2013):

1. Develop plans to conduct risk management activities.
2. Identify risks that may affect the project.
3. Prioritise risks by assessing their probability of occurrence and size of impact.

4. Quantitatively analysing the effect of the risks on overall project.
5. Develop risk response's plans and actions to enhance opportunities and reduce threats to project.
6. Monitor response plan, evaluate plan's effectiveness and monitor occurrence of new risks.

Risk Management involves in Planning and Monitoring & Controlling processes (refer to Table 1). Either separate or integrated Risk Management, as per PMBOK, risks are required to be identified, prioritised, analysed, developed response plan and finally, monitored response plan for effectiveness and adjust accordingly. Scrum itself pose several risks. Even though participants do not provide insights on how Scrum risks are managed, it is important to recognise the risks in order to move toward developing response plan.

Apart from several risks mentioned in Section 1.2, Scrum poses risks of knowledge lost. Scrum emphasizes in reduction of documentation, which pose problems for new programmer or even experience person. Ashraf & Ali (2013) study mentioned that 34% respondent agrees to it, particularly the developers who perform a task on a part of a project or new to a Sprint. This resonates with another study by Cho (2008) which mentioned that due to the lack of documentation, it would be one gigantic point of failure if the main guy of the project no longer part of the project (due to any reasons, i.e: resignation, assign to another project, relocate etc..). It would take several months for the company to recover the knowledge that one main developer has. According to Cho, the main idea behind reducing documents is to promote every team members to gain equal skills and knowledge on the systems, thus, if one person leaves, there is still a lot of shared knowledge that has gone around among other team members. However, in reality, this is not feasible. In terms of work space, Scrum considers open work space as better as compared to private, personal and separate spaces for developers because it supposedly provides better communication and access to other developers. However, about 28% developers consider it as distraction as they do not like somebody talking to them or taking personal calls on phone as the noise make them uncomfortable and less productive (Ashraf & Ali, 2013) (Cho, 2008). Thus, work space risk should also

be taken care of. As mentioned in Section 5.3 and 5.4, customer may request change after the start of Sprint, which may result in company faces difficulties from time to time by freezing the Sprint Backlogs, as customer expect them to carry out changes whenever they seems appropriate. Apart from the risk of increase in cost (refer to Section 5.3) and pressure feels by team member (refer to Section 5.4), but the risk of making quick decisions which will not be properly documented and may have potential damage to other parts of the product previously delivered (Kanane, 2014).

All the aforementioned Scrum risks should be handled either separate or integrated into Scrum processes based on the nature of the risks. For example, risk such as the one involves work space should be identified, prioritised, analysed, developed response plan prior to start Scrum processes. Thus, essentially, Risk Management should be managed at different level as proposed by Nyjford as there are wide range of risks to be taken care of apart from 'requirements' risk, which already been taken care of by Scrum.

5.7 Project Stakeholder Management

In PMBOK® (2013), Stakeholder Management involves in Initiating, Planning, Executing and Monitoring & Controlling processes (refer to Table 1). At Initiating, stakeholders are identified, at Planning, appropriate management strategies to effectively engage stakeholders are developed, at Execution, management strategies are implemented and at Monitoring & Controlling, management strategies effectiveness are measure based on stakeholders engagements and are adjust accordingly based on the effectiveness. Based on Data Findings in Section 4.6, all participants' stakeholder management involves in providing a certain degree of information / clarification to the right stakeholders and focuses on providing stakeholders with status and updates. Apart from fulfilling customer needs and expectations, managing stakeholders also involves fulfilling team members' needs.

As per study by Cho (2008), due to the flexible work schedule among developers, it is difficult to get together all developers at one time for Daily Scrum Meeting, as

some developers will get in at 7:30 am and some of at 9:30 am or leave at 3:30 pm and at 6:30 pm. The solution is to hold Daily Scrum Meeting as soon as everyone gets in but the problem is that those who get in early are interrupted from their work as they've been working for two or three hours, which cause frustration. Furthermore, Scrum which emphasizes on communication may not be something that is comfortable for some developers. These developers should be managed accordingly. Some go to the extent of letting top engineers go as they have lone-wolf personalities and not compatible with collaboration (Larson & Gray, 2011). However, a better strategic approach should be devise in order to manage this type of stakeholders instead of letting the best "asset" an organisation can have go, and should let engineers do what they do best.

Essentially, there should be identification, development, implementation and adjustment of strategic Stakeholder Management for every project as there are variants of stakeholders' needs and expectations. As per PMBOK, in Scrum project, at Initiating, stakeholders should be identified and appropriate management strategies to effectively engage stakeholders should be developed. At the start of Scrum process, management strategies should be implemented and management strategies effectiveness should be measure based on stakeholders engagements and are adjust accordingly based on the effectiveness.

5.8 Project Human Resource Management

In PMBOK® (2013), Human Resource Management involves in Planning and Executing processes (refer to Table 1). At Planning, it is a process of identifying roles, required skills and roles relationships, and devising a staffing plan, while at Executing, it is a process of acquiring staff, improving team competencies and tracking team performance. Based on Data Findings in Section 4.7, out of the 5 participants, only 1 participant involve in Human Resource Management while for the rest, there seem to be fix human resource throughout projects. Participant 4's human resource is managed based on team load by monitoring them during Sprint and adjust / spread the load to team member with lighter load. Thus, this is a

continuous monitoring and is at Executing process. However based on literature, there is need to identify required skills while identifying required roles, in order to devise a good staffing plan that will prevent staffing issues. As in study by Ashraf & Ali (2013), most developers are not trained on Scrum which results in lack of knowledge on how Scrum works, the tools that are needed and concept to adhere to. Without identifying the skills developers needed, the management will not provide training facilities to the developers, which results in the dependency of experienced developers to guide the junior. This will cost valuable experienced developers' time, which instead of developing codes, time is spent on coaching other developers about Scrum. SM can play a part in this scenario, however, the role responsibility is to ensure team members adhere to Scrum concepts and thus, it is not possible to ensure concept adherence when they do not know what the concept is in the first place. Furthermore, in the same study, apart from interrupting experienced developer in terms of Scrum, inexperienced developers will also interrupt experienced developer in terms of technical knowledge:

> *"During project task non-experience programmer interrupt the other experience member frequently .However scrum says that scrum team must be self organized and co-operative .But there will be a time limitation for an experienced person beyond which he cannot help others in real team environment."*

Thus, apart from managing team load during execution, identifying of team members skills are as important, in order to devise training for inexperienced staff or allocate inexperienced staff to a Scrum team where there are more experienced than inexperienced members, in order to prevent frequent interruption for experienced developers.

5.9 Project Procurement Management

In PMBOK® (2013), Procurement Management involves in Planning, Executing, Monitoring & Controlling and Closing processes (refer to Table 1). Procurement Management involves processes necessary to acquire products, services, or results needed from outside the project team, thus, are not part of Scrum processes. Based

on Data Findings in Section 4.8, out of the 5 participants, 3 participants mentioned Procurement Management is implemented separate from Scrum. Due to project team's dependency on procurement products, services or results, procurement should be managed (externally to Scrum processes) by ensuring project team manage to access procurement items as necessarily without roadblocks.

6. Conclusions/Recommendations

6.1 Conclusion

In conclusion, not all aspects of project management that are considered in PMBOK, are covered in Scrum. As per literature suggest, the reason for this is that both PMBOK and Scrum codified different type of processes, with former being project management processes while the later being product oriented processes. To a certain degree, Scrum covered some aspects of project management such as Scope and Time Management; however as a project that exists in an environment that broader than the project itself, there are other aspects of project that are both crucial and require management. Thus, in order to promote project success, a project running Scrum highly require to consider the aspects of project management in PMBOK to be taken into account. Depending on several factors, implementation of project management aspects from PMBOK into Scrum project may vary. The factors are depending on, but not limited to project's size, type, organisation's governance and environmental factors, participant's experience in managing project, depth of knowledge on the importance & impact of PMBOK knowledge areas on project's success and the project's needs.

The purpose of this study was to understand the aspects of project management that are considered in PMBOK, specifically the knowledge areas, and Scrum, and analyse where each framework fit/stand among each other by recognising their differences, lack-off, interrelations, mutual exclusivities or complementary characteristics, to explore the right incorporation between the two, in order to drive a successful IT project. It is now understood that both PMBOK knowledge areas and Scrum stood as separate processes, interrelated & complemented each other through formality and agility of each processes and incorporated into each other through a combination of hybrid and integrated processes. For example, Quality Management codified in PMBOK complemented Scrum lack of quality in management (refer to Section 5,4). The same applied to Communication Management codified in PMBOK, where it complemented Scrum lack of communication management outside

of Scrum's team member (refer to Section 5.5). Finally, the incorporation method of PMBOK knowledge areas into Scrum is subjective to the project being undertaken.

This conclusion will help project manager that is transitioning to Scrum to recognise that Scrum does not covered all aspects of project management and he/she will still need to oversee the uncovered aspects while under-taking and performing a new role in Scrum, and provide a perspective for recognising there are more to managing a project than what's define in Scrum where Scrum only fit into the execution aspect of project management.

6.2 Future Recommendations

One of the limitations of this research is small sample size. Even though small sample size is suggested for Interpretivism, Inductivism and Qualitative research, the contextualisation from small samples do not support strong reliability and validity. Thus, for future research, it is recommended to improve the sample size. The samples also should be categorised based on project type, size, location, and other possible factors to further interpret the impacts these factors may have on data and directly on results. Participant's demographics should also be taken into consideration as different implementation may be applied depending on participant's maturity. An experienced participant may have different implementation than junior participant. Furthermore, the implementation of PMBOK knowledge areas may be influenced organisation policy, resource constraint and convenience, rather than necessity.

This research had provided an exploratory overview of PMBOK knowledge area implementation in Scrum. Details of implementation are not discussed, thus for future research, the details of how each aspects of project management managed in Scrum should be undertaken. Even though the implementation may differ from project to project and organisation to organisation, there can be common reasoning or logic to certain implementation that can benefit other type of projects / organisations. The details may encompass the details implementation of each PMBOK knowledge area or as a whole project.

Reflection

The dissertation title 'Exploratory Study: Project Management in Scrum IT Project' became the chosen study for my dissertation due to my interest in Scrum. I was working as a Business Analyst in projects that were implemented with Scrum. Throughout my experiences as Business Analyst, I found certain aspects of Scrum to be hard to work with. For example, the self organising and flat hierarchy tend to be difficult during decision making process. As a Business Analyst, I was constantly performing feasibility study, consolidating information and seeking clarification and decision during Requirement Analysis process to provide good quality requirements. However, any decisions that are not within my area of expertise were difficult to make, specifically technical and user interface design area. This is due to the fact that Scrum promotes collective decision making, and to make a decision, the team has to come together to discuss and come to a conclusion.

In most cases, team members do not have to enough time to perform discussion as they have to complete the tasks at hand, within the Sprint. Even if they do have time for discussion, any new technical/design implementation may require further research which is not possible to perform as the time allocated to team members are used for completing tasks. As a Business Analyst, I do not have the power to instruct team members to perform the necessary research so that I can provide accurate requirements thus, most of the time the requirements are based on preliminary knowledge or surface-level understandings provided by team members. Only during the start of another Sprint, team members will look at my requirements and perform the necessary research. At this point, time and resource may be wasted as there will be changes needed to be made after a deeper understanding had been obtained. Thus, there were more management needed to be made, instead of just managing deliverables, as per what Scrum has always focused on.

Due to the difficulties, I performed some research regarding Scrum and stumbled into discussions on the role of project manager in Scrum. The debates were on whether project manager role is obsolete in Scrum. There were also some

discussions on which Scrum role (Scrum Master / Product Owner) a project manager should undertake when their projects transitioned to Scrum. Based on these discussions, I dived further into the roles of project manager in traditional project management environment and found some interesting knowledge areas which could be used in managing certain difficulties in Scrum. As per my difficulties discussed in previous paragraph, proper time allocation, proper point of communication to team members and proper communication channel and allocation, can reduce my difficulties. Even though I thought that project management in traditional project management can ease some difficulties in Scrum, there are Scrum practitioners that believe project manager's role is obsolete in Scrum. Thus, these kick-off the idea to further dive into project management in Scrum, hence this dissertation.

During the course of collecting peer reviewed literatures, I found there were many contexts that I could dive into, from proposing a better integration of PMBOK knowledge areas into Scrum, to solving issues in Scrum using project management practices. However, due to lack of literature on stating the role where PMBOK knowledge areas and Scrum stand among each other in a project, I decided to provide an exploratory study to provide an overview on where each framework stand and their individual role and contribution in driving project success. Furthermore, 3 months is a short period of time to research and propose a better viable integration method of PMBOK knowledge areas into Scrum, as per done by Nyjford (2008) and Burman (2015).

Formulating research question was a confusing process. It had to be based on available literatures, research feasibilities and its contribution / purpose. I had to understand in depth on the ideas/concepts presented in literatures. Understanding in depth did not pose a problem for me but the vast amount of literatures to go in depth into was the challenge. This posed another skill set required in order to be able to decide or determine which literatures were the priorities and should be further studied. Sometimes, the decisions were wrong and time was wasted on dwelling on unrelated literatures. There were some time management, literatures tracking, notes taking, ideas/concepts tracking and information contextualisation in

order to form the research question. After research question was formulised, there was more information contextualisation performed in order to be able to structured interview questions that reflect the bigger research question.

During the course of primary data collection, there were few difficulties encountered. Due to the Interpretivism nature of this research, I would need to approach a number of individuals who involve in managing or leading Scrum project. Identifying the right individuals to collect primary data from was a challenge. An individual might hold a project manager position but ran project with other Agile framework (not Scrum), or an individual might involve in a project that was implemented using Scrum, but was not in managing or leading role. Thus, to obtain a small number of participants for this research required some effort in networking, background researching and filtering. Once enough suitable individuals were identified, approaching those individuals proved to be harder than it seemed, especially individuals that I had no prior relationships with, basically strangers. Most of the times, individuals were caught up in their own tasks, and unwilling to spare some times. On certain occasions, individuals were concerned with privacy even though they were informed about the confidentiality agreement. On other scenarios, individuals were not familiar with either project management processes or Scrum processes. Thus, the final approach was not only approaching strangers but also approach individuals within my contacts and their contacts. In terms of data analysis/findings, there were participants who did not provide elaborate insights or data that were enough for further analysis. Thus, these data were discarded and only data with enough insights were reported in Data Analysis/Findings Chapter.

Due to proper information contextualisation during interview questions generation, data analysis process was relatively easy. As the questions were structured according to themes, collected primary data was easy to be interpreted and presented. This dissertation research had provided very important insight into the role of PMBOK knowledge areas and Scrum in a project. Without this research, I would be still be 'standing on a fence' tipping towards both sides when seeming valid argument were made about the obsoleteness of a project manager in Scrum

project. Understanding that both PMBOK knowledge areas and Scrum are two different processes that cover different areas of a project is an important point for Scrum practitioners and project managers. Based on primary data collected, due to the rigidity implementation of PMBOK knowledge areas in traditional project management practices, there is different implementation of those knowledge areas in Scrum, adjusted in accordance Scrum's agility. Using this insight, I am able to better manage and contribute in ensuring smooth flow of delivering the deliverables during my future undertakings.

Reflection Conclusion

Finally, this dissertation had thought me very important skills, which are critical thinking and contextualisation skills. Reading through a huge number of peer reviewed literatures only provided me with vast number of information, and without proper context and interpretation, my understanding on the research area is muddled. However, through understanding of research methodology, proper correlation and interpretation of the ideas and contexts proposed by each peer reviewed literatures are understood. Thus, I am able to connect the bits and pieces of information to form another idea or opinion that is of my own. The idea is not solely based on own interpretation but supported by ideas of other researchers. This skill will serve me better in research and analysis related tasks, such as the ones within Business Analyst's role.

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Appendices

Appendix 1: Research Time Plan

ACTIVITY UNDERTAKEN	Research Methods 2														Exams					Dissertation										
Month	**Jan**		**February**					**March**				**April**				**May**					**June**				**July**				**August**		
Week Beginning	**18**	**25**	1	8	15	22	29	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15
Weeks	**1**	**2**	**3**	**4**	**5**	**6**	**6**	**7**	**8**	**9**	**10**	**12**	**13**								**1**	**2**	**3**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Research and finalise focus and research question (inc Hypotheses if relevant)																															
Conduct literature search																															
Write and finalise literature chapter																															
Research and decide on methodology strategy																															
Construct qualitative and/or quantitative instruments																															
Write / finalise method chapter																															

Ethical approval process																															
Contact suitable respondents for research investigation																															
Conduct primary data collection																															
Conduct data analysis phase																															
Write / finalise results chapter																															
Write / finalise discussion, conclusions & abstract																															
Compile first overall draft (inc. References, appendices, etc.)																															
Editing and editing and more editing																															
Final proofing																															

Appendix 2: Interview Invitation

Dublin Business School

13/14 Aungier Street, Dublin 2, Ireland
Tel: +353 (0) 1 4177500 E-mail: admissions@dbs.ie
Web site: www.dbs.ie

Date:

REQUEST TO CONDUCT RESEARCH

As part of the requirement to fulfil MBA in project management with Dublin Business School, I would like to request your participation in a research I will be conducting for my dissertation. The title of the research I wish to conduct is "Exploratory Study: Project Management in Scrum IT Project".

My data collection methods can either be audio recorded interview session or email interview. A brief detail of my research is as follow:

Academic literatures have stated Scrum methodology focuses on development processes, lacking other aspects of project management resulting Agile adoption that is not complete adaptation of the methodology but rather a hybrid form with some areas which remain within other methodological philosophies. The purpose of this research is to explore the different aspects of project management (i.e: risk and stakeholder management, etc) in Scrum and where each fit or stand among each other, recognising their differences, interrelations, mutual exclusivities and complementary characteristics. It is understood that depending on the size, type of project and other governance and environmental factors, not all aspects are taken into consideration in project, thus, participant's answer to interview is subjective to the project which participant involved in. The end goal of this research is to be able to explore the implementation of different project management aspects (if any) in Scrum IT project. Thus, either project managers or Scrum practitioners (i.e: Product Owner, Scrum Master, etc) will be fit to contribute to this interview.

Data collected are non-confidential, non-project specific data but project management and Scrum processes data. Participant and participant's organisation detail information are not recorded and therefore, participant is anonymous. Please feel free to let me know if you would like to read the transcripts, I will be happy to make them available for you.

Yours sincerely,
Melissa Lee
Master in Business Admiration (Project Management Stream)

Appendix 3: Interview Questions

General Questions

Q1 What is your title/position & how long have you been in the title/position?

Q2 Where is your organisation located and what is the type of project your organisation is involved in (i.e: SaaS, PaaS, IaaS, IoT, security, etc)?

Q3 Do you have any project management or Agile certification? If yes, please specify.

Q4 Which Agile framework is used in the project you are involved in (i.e: Scrum, Kanban, XP, etc)?

Q5 How many type and total number of stakeholders involved in the project? Please specify who they are (i.e: 2 programmers, 1 designer, 5 testers, 1 customer/client, government, 5 shareholders, etc).

Main Questions

How are different aspects of project management managed in Agile?

Sub Questions

Q1 Are you involved in project initiation process? If Yes, what are the processes involved in project initiation and is it part of or separate from Agile processes?

Q2 Are you involved in **Cost Management? If Yes, how is cost managed throughout the project and is it part of or separate from Agile processes?

***Cost Management is processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget.*

Q3 Is there **Quality Management? Are you involved in it? If Yes, how is quality managed throughout the project and is it part of or separate from Agile processes?

****Quality Management is processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken.*

Q4 Is there **Communication Management? Are you involved in it? If Yes, how is communication managed throughout the project and is it part of or separate from Agile processes?

****Communication Management is processes that are required to ensure timely and appropriate collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information.*

Q5 Is there **Risk Management? Are you involved in it? If Yes, how is risk managed throughout the project and is it part of or separate from Agile processes?

****Risk Management is processes of conducting risk management planning, identification, analysis, response planning, and controlling risk on a project.*

Q6 Is there **Stakeholder Management? Are you involved in it? If Yes, how is stakeholder managed throughout the project and is it part of or separate from Agile processes?

****Stakeholder Management is processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyse stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution.*

Q7 Is there **Human Resource Management? Are you involved in it? If Yes, how is HR managed throughout the project and is it part of or separate from Agile processes?

****Human Resource Management is processes that organize, manage, and lead the project team.*

Q8 Is there **Procurement Management? Are you involved in it? If Yes, how is procurement managed throughout the project and is it part of or separate from Agile processes?

***Procurement Management is processes necessary to purchase or acquire products, services, or results needed from outside the project team.*

Appendix 4: Interview Transcripts

Appendix 4.1: Participant 1

General Questions

Q1 What is your title/position & how long have you been in the title/position?

Product Manager - 4 months

Q2 Where is your organisation located and what is the type of project your organisation is involved in (i.e: SaaS, PaaS, IaaS, IoT, security, etc)?

Malaysia, SaaS

Q3 Do you have any project management or Agile certification? If yes, please specify.

Certified ScrumMaster

Q4 Which Agile framework is used in the project you are involved in (i.e: Scrum, Kanban, XP, etc)?

Scrum

Q5 How many type and total number of stakeholders involved in the project? Please specify who they are (i.e: 2 programmers, 1 designer, 5 testers, 1 customer/client, government, 5 shareholders, etc).

Varies from projects average 3 programmers, 1 Product Analyst, 1 UI/UX Designer, 1 QA, 1 ScrumMaster, 1 Product Owner, 3-5 Stakeholders

Sub Questions

Q1 Are you involved in project initiation process? If Yes, what are the processes involved in project initiation and is it part of or separate from Agile processes?

Separate process - High level requirement discussion where conceptual ideas are discussed. Agile Process - collaboration and constantly review and make changes during grooming and planning

Q2 Are you involved in **Cost Management? If Yes, how is cost managed throughout the project and is it part of or separate from Agile processes?

No

Q3 Is there **Quality Management? Are you involved in it? If Yes, how is quality managed throughout the project and is it part of or separate from Agile processes?

Yes. Acceptance criteria and definition of done is fulfilled.

Q4 Is there **Communication Management? Are you involved in it? If Yes, how is communication managed throughout the project and is it part of or separate from Agile processes?

Yes, Daily standup and ad-hoc small discussion within team members. Weekly meetings for Scrums of Scrums to communicate with other team members that has dependencies.

Q5 Is there **Risk Management? Are you involved in it? If Yes, how is risk managed throughout the project and is it part of or separate from Agile processes?

Yes. separate process

Q6 Is there **Stakeholder Management? Are you involved in it? If Yes, how is stakeholder managed throughout the project and is it part of or separate from Agile processes?

No. Stakeholders are fixed. We manage by product MVP (minimum viable product)

Q7 Is there **Human Resource Management? Are you involved in it? If Yes, how is HR managed throughout the project and is it part of or separate from Agile processes?

No

Q8 Is there **Procurement Management? Are you involved in it? If Yes, how is procurement managed throughout the project and is it part of or separate from Agile processes?

Yes. Separate from agile process.

Appendix 4.2: Participant 2

General Questions

Q1 What is your title/position & how long have you been in the title/position?

Program Manager - 5 Years

Q2 Where is your organisation located and what is the type of project your organisation is involved in (i.e: SaaS, PaaS, IaaS, IoT, security, etc)?

India, SaaS

Q3 Do you have any project management or Agile certification? If yes, please specify.

N/A

Q4 Which Agile framework is used in the project you are involved in (i.e: Scrum, Kanban, XP, etc)?

Scrum, XP

Q5 How many type and total number of stakeholders involved in the project? Please specify who they are (i.e: 2 programmers, 1 designer, 5 testers, 1 customer/client, government, 5 shareholders, etc).

1 Director, 1 Project Manager, 1 Marketing Exec, 1 Client, 1 Senior developer

Sub Questions

Q1 Are you involved in project initiation process? If Yes, what are the processes involved in project initiation and is it part of or separate from Agile processes?

- Receive prospective project enquiry from marketing team.
- Initiate Skype call or tele-conference with the client to get clear picture about the requirements
- Do feasibility study based on technical & business needs of client
- If feasibility outcome positive, then forward it to respective senior technical analyst to prepare detailed task list and efforts in terms of man-hours
- Communicate total efforts in terms of time & cost to client

- Negotiate with client if necessary
- Identify team members based technical & functional skills
- Establish first kick-off meeting with client & team

Agile processes were not part of these steps. We followed Agile during the actual SDLC cycle.

Q2 Are you involved in **Cost Management? If Yes, how is cost managed throughout the project and is it part of or separate from Agile processes?

I was involved cost management indirectly through development time tracking. In case, client asks for change/enhancement during existing project, efforts to accommodate those changes have to be calculated in terms of man-hours. If those efforts are significant then it has to be communicated to the client immediately since it affects project costing as well as planned delivery schedule.

It was part of Agile processes (XP) since it needed iterative development approach.

Q3 Is there **Quality Management? Are you involved in it? If Yes, how is quality managed throughout the project and is it part of or separate from Agile processes?

I was involved in quality management process in terms of utilising dedicated (sometimes shared) tester for individual project. It was part of controlling phase of SDLC since clients refuse end-product with defects & bugs. So number of bugs were directly affecting project timeline.

Q4 Is there **Communication Management? Are you involved in it? If Yes, how is communication managed throughout the project and is it part of or separate from Agile processes?

As a manager, I was responsible to manage communication with client from deliverable point of view.e.g. code, test plans, release documents, sign-off etc. It was also part of Agile from project deployment perspective since web-based projects had to be hosted on remote servers like Amazon which involved discussions with hosting company technicians.

Q5 Is there **Risk Management? Are you involved in it? If Yes, how is risk managed throughout the project and is it part of or separate from Agile processes?

Even though risk management is essential during project initiation to identify & mitigate risks, projects utilising Agile framework like XP are always prone to unknown technical, commercial & business risks during every phase of SDLC. Usually risks were handled through formal communication / negotiation with clients & company management.

Q6 Is there **Stakeholder Management? Are you involved in it? If Yes, how is stakeholder managed throughout the project and is it part of or separate from Agile processes?

I was involved in stakeholder management in terms of organisation management (directors) and managers at client end since flow of the deliverable would be from organisation to client while consulting & development cost would be paid by client to the organisation.

Q7 Is there **Human Resource Management? Are you involved in it? If Yes, how is HR managed throughout the project and is it part of or separate from Agile processes?

I was not directly involved in HR management but I did help HR department in candidate recruitment & selection process. This was not part of Agile.

Q8 Is there **Procurement Management? Are you involved in it? If Yes, how is procurement managed throughout the project and is it part of or separate from Agile processes?

I wasn't involved in procurement management since it was usually handled by hardware & networking department and it was separate from Agile processes.

Appendix 4.3: Participant 3

General Questions

Q1 What is your title/position & how long have you been in the title/position?

Product Manager - 3 years (8 years experience in different Project Lead role)

Q2 Where is your organisation located and what is the type of project your organisation is involved in (i.e: SaaS, PaaS, IaaS, IoT, security, etc)?

New Zealand, SaaS

Q3 Do you have any project management or Agile certification? If yes, please specify.

No, I've been doing scrum for 8 years, coaching team as well but just with experience.

Q4 Which Agile framework is used in the project you are involved in (i.e: Scrum, Kanban, XP, etc)?

Scrum

Q5 How many type and total number of stakeholders involved in the project? Please specify who they are (i.e: 2 programmers, 1 designer, 5 testers, 1 customer/client, government, 5 shareholders, etc).

A regular scrum team is composed of one QA, 3 to 4 devs, 1 Team Lead, one PO/PM who's acting the customer role.

Sub Questions

Q1 Are you involved in project initiation process? If Yes, what are the processes involved in project initiation and is it part of or separate from Agile processes?

We are editor of one solution so we don't have to initiate anything. However our agile process evolves over time by experimenting different approaches. If it works for one team then we spread the process to the others.

Q2 Are you involved in **Cost Management? If Yes, how is cost managed throughout the project and is it part of or separate from Agile processes?

Sort of, we are editor so cost is measured by time spent on a functionality we want to do. Any features requires time and efforts, these 2 information means money for the company and it does requires for the Product management team to come up with some ROI. (How many new customers will we have with that new feautres / did it generate lot of interest into our forum/vote sections / Was this requested by lot of customers in our sales funnels / Was this blocking customers to sign up, etc...) This is definitely a part of our project, in terms of cost we have to trim the functionality to a MVP (Minimum Viable Product) which then is decomposed into stories, tasks and finally Product Backlog Items (PBI). Each PBI is estimated in size (S, M, L) translated to times Small is a half day of work, Medium a day, Large is 2days and a half. More than that? The team needs to decompose the task into smaller items. Taking all the tasks done we have a numbers of S,M,L translated into times which gives us a rough idea about the time required (linear time) It's first a sort of budget estimation. Then come up the question of parallelising tasks and if we can shorten the development time. So far it doesn't impact a lot our allocation, but it helps us to prioritize our go to market strategy

Q3 Is there **Quality Management? Are you involved in it? If Yes, how is quality managed throughout the project and is it part of or separate from Agile processes?

We have a development process that force any developers to go through the following steps:

- To do : The task is ready for development.
- In progress : the task is being worked on by a developer.

- In Review : The task is finished and the code needs to be reviewed by someone else.
- To Test : The task passed the technical review and is in the queue for QA
- In testing : The QA is functionally testing the task.
- To Release : The functionall test have passed and that item will be a part of a battery of regression tests before being merged.
- Closed : The task is merged and ready to be shipped in the next release.

Q4 Is there **Communication Management? Are you involved in it? If Yes, how is communication managed throughout the project and is it part of or separate from Agile processes?

We are communicating the project status every weeks with different metrics :

- % accomplished
- ETA and if modified new ETA.
- number of hours worked on compare to the number of totals hours planned (S, M, L tasks)
- Short description about the status, and if some actions are taken to remedy to any problem.

Then within the teams we are collecting data at a more granularity level in terms of cumulated time spent on a feature, a task, some issues types, like customer facing bugs, or internal bugs or improvements or features.

Q5 Is there **Risk Management? Are you involved in it? If Yes, how is risk managed throughout the project and is it part of or separate from Agile processes?

The risk is continuously monitored at different level, during the dev time by developers, the architect, infrastructure lead. And before releasing anything we

have to make sure we are bulletproof for our customers and in that case the QA as well as the support team are verifying the product deeply. This is a part of our process, we have formal meetings to acknowledge the feature is ready to be shipped and all the testing required is done. So we have meetings to discuss risks before starting the work, were we are mitigating the risks by taking actions, and if the development is smooth we don't meet again until we have a formal release meeting where we can talk about some risks and iterate.

Q6 Is there **Stakeholder Management? Are you involved in it? If Yes, how is stakeholder managed throughout the project and is it part of or separate from Agile processes?

It's good practices to give the right level of information to the right person. For most of the stakeholders, knowing that everything is on track and having and ETA date is the most important thing. Also if we have any change of scope that needs to be discussed, that will be the Product Manager who's doing that.

The demos in our process are public to the whole company also, which makes what we are doing a bit more transparent, most of the times it's unfinished functionalities and we ask everyone to give us feedback, and usability feedback in order to quickly adapt and change during the development. This part is important because it keeps every stakeholders happy to be a part of the process and also see that things are moving forward.

Q7 Is there **Human Resource Management? Are you involved in it? If Yes, how is HR managed throughout the project and is it part of or separate from Agile processes?

I'm communicating the requirements, I'm translating them into Stories and during the development lifecycle I'm the key person to contact if there are questions on the functionalities. Otherwise during the sprints I'm just making sure the stories are prioritized in the right order.

Q8 Is there **Procurement Management? Are you involved in it? If Yes, how is procurement managed throughout the project and is it part of or separate from Agile processes?

As part of any functionality if we need a third party to do it or need to be a part of our eco system we are usually analyzing different solution, creating a gap-analysis and we are synthesising what's the best option for us. Definitely not in the agile process, it's just a prerequisite before even formalizing the requirements.

Appendix 4.4: Participant 4

General Questions

Q1 What is your title/position & how long have you been in the title/position?

Senior Software Engineer/Scrum Master

Q2 Where is your organisation located and what is the type of project your organisation is involved in (i.e: SaaS, PaaS, IaaS, IoT, security, etc)?

Malaysia, Embedded Software

Q3 Do you have any project management or Agile certification? If yes, please specify.

No

Q4 Which Agile framework is used in the project you are involved in (i.e: Scrum, Kanban, XP, etc)?

Scrum, SAFE Agile

Q5 How many type and total number of stakeholders involved in the project? Please specify who they are (i.e: 2 programmers, 1 designer, 5 testers, 1 customer/client, government, 5 shareholders, etc).

1 Development Team, 1 Testing Team, 1 Release Management Team

Sub Questions

Q1 Are you involved in project initiation process? If Yes, what are the processes involved in project initiation and is it part of or separate from Agile processes?

Yes, breakdown of tasks to smaller chunks. Example, breaking requirements into EPIC (main story). Then, breaking EPIC into PBI (Product Backlog Item) or user stories. Prior to that we have a top-level PI (Program Increment) planning where we get all components of software together to gauge the risks of each program/product.

Q2 Are you involved in **Cost Management? If Yes, how is cost managed throughout the project and is it part of or separate from Agile processes?

Yes, PI Planning (3 months) and sprint planning (2 weeks) is done.

Q3 Is there **Quality Management? Are you involved in it? If Yes, how is quality managed throughout the project and is it part of or separate from Agile processes?

No.

Q4 Is there **Communication Management? Are you involved in it? If Yes, how is communication managed throughout the project and is it part of or separate from Agile processes?

Yes, standup daily (15mins). Retrospective for every end of sprint. Scrum of scrum meetin between all of the scrum masters bi-weekly to align and leverage information.

Q5 Is there **Risk Management? Are you involved in it? If Yes, how is risk managed throughout the project and is it part of or separate from Agile processes?

No. only involve in PI Planning to vote for the confidence level for each program/product development. 1-least confident, 5-most confident.

Q6 Is there **Stakeholder Management? Are you involved in it? If Yes, how is stakeholder managed throughout the project and is it part of or separate from Agile processes?

No. Stakeholder is being divided by the layers in the software which is located in different country sites.

Q7 Is there **Human Resource Management? Are you involved in it? If Yes, how is HR managed throughout the project and is it part of or separate from Agile processes?

Yes, manage efforts in the team. Create burn down charts to gauge the team load. Usually, when anyone is free-up, we either allocate them to new PBIs or help to burn down other existing PBIs.

Q8 Is there **Procurement Management? Are you involved in it? If Yes, how is procurement managed throughout the project and is it part of or separate from Agile processes?

No.

Appendix 4.5: Participant 5

General Questions

Q1 What is your title/position & how long have you been in the title/position?

Development Manager - 5 years

Q2 Where is your organisation located and what is the type of project your organisation is involved in (i.e: SaaS, PaaS, IaaS, IoT, security, etc)?

SaaS

Q3 Do you have any project management or Agile certification? If yes, please specify.

No

Q4 Which Agile framework is used in the project you are involved in (i.e: Scrum, Kanban, XP, etc)?

Scrum

Q5 How many type and total number of stakeholders involved in the project? Please specify who they are (i.e: 2 programmers, 1 designer, 5 testers, 1 customer/client, government, 5 shareholders, etc).

5 programmers, 4 testers, End Users, Clients, Corperate team

Sub Questions

Q1 Are you involved in project initiation process? If Yes, what are the processes involved in project initiation and is it part of or separate from Agile processes?

Processes: project planning, architecture solution, resources. It is part of the Agile process.

Q2 Are you involved in **Cost Management? If Yes, how is cost managed throughout the project and is it part of or separate from Agile processes?

When project is in the kick off stage, the proposal of the model is being draft including the time planning, required equipment, traveling and resources budget.

Q3 Is there **Quality Management? Are you involved in it? If Yes, how is quality managed throughout the project and is it part of or separate from Agile processes?

Yes, throughout the development and policies. Once the architecture solution is selected and being developed the regular test and check are in order. Policies will be draft in accordance to the development. 3 stages of testing are involved.

Q4 Is there **Communication Management? Are you involved in it? If Yes, how is communication managed throughout the project and is it part of or separate from Agile processes?

Yes, the project manager or leader will be the sole communication between all the stakeholders. Deliveries communication will be followed up as per the agreed schedules.

Q5 Is there **Risk Management? Are you involved in it? If Yes, how is risk managed throughout the project and is it part of or separate from Agile processes?

Risk management including deliveries schedules, security, and deliveries outcome. Each stage of development its expected deliveries, this will calculate the whole deliveries manner. All stakeholders will be in communication when risk analysis is done.

Q6 Is there **Stakeholder Management? Are you involved in it? If Yes, how is stakeholder managed throughout the project and is it part of or separate from Agile processes?

Yes. During project kick off, the stakeholders will be identified. In between schedules, if there's changes it shall be communicated to all. If changes creates

too much impact on project deliveries, risk analysis must be communicating to all stakeholder for decision.

Q7 Is there **Human Resource Management? Are you involved in it? If Yes, how is HR managed throughout the project and is it part of or separate from Agile processes?

Project leader will act as HR manager (in communication with HR) to organise the project resource.

Q8 Is there **Procurement Management? Are you involved in it? If Yes, how is procurement managed throughout the project and is it part of or separate from Agile processes?

Yes only if it is required.

Appendix 5: Meeting Reports

Appendix B: Dissertation Meeting/Progress Monitoring Report

Name of Student: MELISSA LEE Student No.: 10290703

Name of Supervisor: PAUL TAAFFE Meeting No.: 1

Date of Meeting: 7th JUNE 2016 Location of Meeting: DBS WAITING AREA AUNGIER ST

Review/Comment on Progress Made (since last meeting):

N/A

Topics/Issues discussed/addressed at meeting: Action Agreed/Progress expected before next meeting:

(1) Questions regarding publishcation of PMI paper
(2) Questions regarding interview ~~of~~ questions (the structure, the concept & themes)
(3) ~~Discussing~~ Discussion on the research questions, the problems / issues ~~trying to be~~ under considerations
(4) Discussion on some of the concepts / practical applications of project management
(5) Question on typical timelines

Overall Summary/Conclusion of Meeting:

1. Practical applications of project management varies accordig to organisations & projects involved
2. Research qustions will require to be more specific in order to be able to answer it within a predefined scope
3. Justification for research qustion will repire to be Strong to have a solid thesis argument
4. Interview qustions should be structured in a way that answered research qustion but not limit participants point of view based on the project they are involved in

Date of next meeting: 7/6/16

Signed (supervisor):

Signed (student):

Note: Please complete and retain a copy report for each student meeting.
Please attach supporting documentation as appropriate.

Appendix B: Dissertation Meeting/Progress Monitoring Report

Name of Student: MELISSA LEE Student No.: 10290703

Name of Supervisor: PAUL TAAFFE Meeting No.: 2

Date of Meeting: 14th JULY 2016 Location of Meeting: DBS WAITING AREA CASTLE HOUSE

Review/Comment on Progress Made (since last meeting):

Primary data has been collected

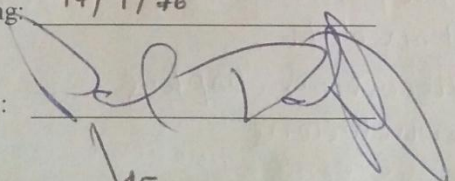
Topics/Issues discussed/addressed at meeting: Action Agreed/Progress expected before next meeting:

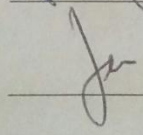
(1) Questions on ~~the~~ data analysis, on how data that had been obtained can be presented
(2) Questions on the potential conclusion that can be made based on data
(3) Questions on discussion chapters
(4) Question on conclusions

Overall Summary/Conclusion of Meeting:

(1) Construction doesn't have to be a framework, genere 'law', ideology / concept. It is based on primary data. If primary data doesn't provide a unified idea, then it should be concluded that there's no unified idea

Date of next meeting: 14/7/16

Signed (supervisor): 

Signed (student): 

Note: Please complete and retain a copy report for each student meeting.
Please attach supporting documentation as appropriate.