UTS UNIVERSITY OF TECHNOLOGY SYDNEY

# Enterprise IT Governance for Innovative Software Development Projects

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# CERTIFICATE OF AUTHORSHIP/ORIGINALITY

I, Muhammad Awais Azmat Bajwa declare that this thesis, is submitted in fulfilment of the requirements for the award of PhD Degree, in the School of Computer Science, FEIT at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise reference or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

This research is supported by the Australian Government Research Training Program.

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*Dedication of this work goes to*

*My Mother and My Family*

*Maria*

*Zuhair*

*Yousuf*

*&*

*Mustafa*

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The journey of Ph.D. is different, difficult, tiring, challenging, creative, amazing and at the end satisfying. This can’t be completed alone. I read an African saying long ago; 'if you want to go fast, go alone, if you want to go far, go together'. I realized it in my Ph.D. journey and experienced it really well. Several people helped, supported and contributed to my quest from the start to the end. Few were for a short time with me, most were there throughout the journey. This research took a lot of my family’s time and it was not possible without the support of my family. I believe this is an achievement for all of those who were part of my struggle, all the way. I am thankful to Allah subahan hu wa talla, who give me strength and courage, put barakah in my work and helped to achieve it. It is only Allah's mercy that made it possible. I feel humble, grateful and honored. I pray to Allah that he helped me and the work is produced in this research to benefit others.

# ABSTRACT

This research aims to understand Enterprise Information Technology (EIT) governance in Agile Software Development (ASD) projects by answering the following questions: what is EIT Governance, how does EIT governance lead ASD projects, and what impacts does EIT Governance have on ASD project outcomes? This research is vital for business enterprises seeking innovative approaches to improve the software delivery cycle. Agile as a modern software methodology supports innovation, shorter delivery cycles and implements through ASD projects. However, these projects are carried out under the EIT Governance structure, which was designed for legacy systems. ASD projects executed under the existing set of governance rules are not well-studied. This research is focused on covering this gap for academia and industry.

A working definition of EIT Governance is formulated in this research. Decision-making is recognized as the core of EIT Governance. Initial findings indicated that decision-making implementation clarity and decision-making distribution impact ASD projects, while decision-making tailoring had no impact. The research was further expanded to explore if any factor(s) were overlooked. A significant factor 'Team' was found concerning decision-making in ASD projects. Finally, the research concluded that team composition changes impact the team's decision-making ability, which impacts ASD project outcomes. A systematic literature review, survey methodology, and thematic analysis are used to conduct this research. The findings of this research are significant for academia and industry where team changes are not considered as a governance factor impacting ASD projects outcome.

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# 1 INTRODUCTION

## 1.1 Research Driver

IT Governance is recognized as one of the top issues for CIOs due to a lack of alignment with business and being behind in implementation compared to rapid changes in software development (Pereira & da Silva, 2012). The software development methodology transitioned from waterfall to agile to meet business demands. This transition has changed the way how software is developed and how a software development project is managed (VanderLeest & Buter, 2009). IT Governance is often a rigid set of rules and processes, preventing information systems from evolving and changing along with the company and its strategies (Ramlaoui et al., 2015). At the same time, the Software governance ecosystem can help achieve the company goals, yet organizations struggle to effectively use it (Baars & Jansen, 2012). Gaps are found in the Governance theory and its implementation (Ko & Fink, 2010). Ko and Fink further explored and described the significant gaps in the theory and implementation of IT Governance in its integration mechanism. From the above, the author derived that the applied governance processes or model is different than what is desired to achieve business results. If the governance processes or model is tailored to manage agile projects, results may have been different for agile software development projects.

Governance works under a rigid structure to manage and achieve organizational goals (Ramlaoui et al., 2015). From top to bottom, four layers are depicted in the ISO model, Corporate Governance, IT Governance, IT Management, and IT Operations (Juiz et al., 2014). Business needs and strategies are born from the top layer, plans are made, administered, and executed by the middle layers, while the last layer ensures the smooth running of day-to-day business. Projects are planned and performed in the middle layers, where agile methodology introduced the concept of decision power at the tactical layer under IT Governance. In this case, project decisions are made within an agile project without interference from the above layers.

The argument can be that agile is only for software development and project-oriented work. It is not to apply to the entire organization. This argument is not entirely valid. Agile is implemented at the project level and considered specific to software development. However, when software is developed, it is for multiuse, multipurpose, and

for multiple stakeholders. Several functional, non-functional, financial, and technical decisions are required to be made. These decisions are leading the development and outcomes. Current software development is not the computerization of an existing manual system anymore. It is now optimizing the entire process, in some cases shaping the business itself. Business is not the sole leader or single-direction source, IT is now directing too. IT works in the technical space, provides the user experience, and leads users to a better experience. Furthermore, IT is developing processes that have not existed before. These processes guide the business about how the software should be developed and implemented. Software development significantly contributes to the overall IT delivery to the business.

Frequent changes in business and consequent failure to meet deadlines require a transformation in how software is developed. Agile is often adopted as an answer to the various problems and limitations of the existing methodologies and have changed the software developed at all level of organizations (Dingsøyr et al., 2010). In Agile Software Development (ASD) projects, different methods are used for managing and resolving problems. However, layers above the ASD projects still intervene and dictate the solution or execution of the project tasks. That top-down approach still exists, and Agile Software Development has placed itself within the legacy governance structure and legacy processes. This understanding and experience lead the researcher to believe that a difference may exist in the governance process or the governance model. If the governance model for the ASD project is improved, will it improve ASD project results?

## 1.2 Research Aim

This research aims to understand and investigate the impact of Enterprise IT Governance (EIT Governance) on software development methodologies that support innovation. In particular, to investigate the effect of EIT Governance on Agile Software Development Projects (ASD Projects).

An enterprise is a business organization considered significant in size, typically over 100 people in Australia and over 1000 people in the US. An enterprise is expected to carry out numerous functions on a large scale (Rice, 2013). Departments are set up to manage these functions. Enterprise Governance provides a framework, structure, process,

procedures, and instructions to these departments for day-to-day business operations. Enterprise IT Governance is a subset of Enterprise Governance (Peterson, 2004). EIT Governance is responsible for all IT aspects in the organization. It is further divided into IT Governance at a strategic level and Governance of IT at the middle and tactical (or operational) levels. Project management governance at the operation level is to manage projects. Agile software development (ASD) projects are a particular type of project to manage agile software development. Agile is one of the modern software development methodologies which supports innovation (Morris et al., 2014). EIT governance impact on ASD projects is the focus of this research.

The Agile Manifesto was developed to provide principles for software development, notably rapid development in a changing environment (Alliance, 2001). Several implementation methods, approaches, or flavors are available to implement agile in the IT industry, which shares the same principles and values (Stoica et al., 2013). Corporate-level organizations employ agile to deliver quickly and keep delivering even when requirements are changing. For this research, all types and flavors of agile are considered under Agile Software Development (ASD); when ASD is mentioned, it is an overarching concept of 'Agile' and is not limited to any particular agile approach or flavor.

Another reason to consider ASD projects for this research is that the author has worked in Agile Software Development projects and is familiar and experienced with the Agile way of working.

## 1.3 Research Questions

This research aims to understand EIT Governance and to investigate its impact on the ASD projects, factor(s) which impact these ASD projects, and to recommend changes to improve ASD project results. Research questions to achieve these objectives are:

1. What is EIT Governance?
2. What impact does EIT Governance have on ASD projects?
3. What are the EIT Governance factor(s) that impact on an ASD project's outcome?

## 1.4 Significance

This thesis is significant at three levels.

1. It clarifies a very muddled set of definitions of EIT Governance and provides a clear, unified framework to address EIT Governance.
2. It demonstrates an important factor, team composition change, which impacts ASD projects in decision-making under EIT Governance.
3. It contributes recommendations for project management in academia and the professional field.

This thesis covers multiple overlapping functional areas in an enterprise. To understand EIT Governance, one needs to know these cross-functional areas. First is the Governance itself, which has its own parameters. Governance implementation and dynamics in large organizations cannot be the same as for small and entrepreneur-level setups. EIT Governance is well known and discussed but defined in many ways. A significant portion of this research covers the topic of EIT Governance definition. The second is Project Management implementation in enterprise-level organizations. Project management is to manage and deliver projects. Though, the structure and procedures of project management are well-defined. Still, there is overlapping with Governance. Several project management frameworks are used in enterprise-level organizations, along with governance frameworks where they may overlap. The third is the software development environment, where development methodologies evolved over time, and innovative ideas were adopted for business needs. These methodologies have phases, approaches, or procedures to follow for software development. Hence it overlaps with project management procedures as well as governance procedures. EIT Governance at the top is overarching these functional areas where the software development environment is at the bottom of the chain under project management. This thesis clarifies EIT Governance, helps to understand ASD projects decision-making under EIT Governance and provides improvement recommendations.

## 1.5 My Journey and Professional Experience

When this research commenced, author's understanding of the IT world was based on experience in the industry and knowledge gained from experts in the field. I have over 18 years of experience in the IT industry. I started as a programmer and worked in various industries, multinational companies, and countries. I was involved in software development projects throughout my career and learned and executed several methodologies over the years, from pure waterfall to complete agile development. During this period, I experienced many governance styles in various enterprise-level companies and countries. I also experienced the transformation from Waterfall to Agile software development and was part of such large-scale organizational changes. My project/program manager role was to lead and manage the projects from inception to delivery. My responsibilities include business discussions, solution proposal/estimation, acquiring a project team, planning, management, and execution of the project, stakeholder management, including client, vendors, executive management, and overall Governance of the entire life cycle of a project.

I have delivered many high-profile software development projects in various organizations. I experienced and observed operational problems in Governance for software development projects. Such issues became visible when software development approaches that support innovation, like Agile, was introduced. Agile implementation requires more control at the project level. Any problem in the agile project triggers questions about the role of Governance in the project and how it impacts project outcome. At times, it becomes unclear if these issues are due to the Governance or the distribution of the Governance. If Governance is distributed at the project level, what is the impact of Governance on the agile project success? Being a project manager in the center of such situations, I realized there was a need to study and understand the impacts of Governance in these projects.

I had the urge to work in the research field. These problems allowed me to explore governance impacts on projects and how I can contribute to helping the industry and the community. Being a project manager and dealing with such issues daily, this topic and research are significant for my profession. Moreover, this research as a whole is a

contribution to knowledge for project managers, academia, and professionals in innovative software development projects.

## 1.6 Structure of the Thesis

Chapter 2 provides a literature review of this research in three parts. Part one covers the definition of EIT Governance. Part two developed hypotheses for the first stage of empirical research and discussed Governance in the enterprise for agile software development projects. And part three covers team formation and composition which was triggered by the Stage-2 data analysis. In Ch.3, the research methods discussed three stages of research work and the methods and methodologies used in each stage. Quantitative research is used for stage 1 to confirm the hypotheses (Ch-4). In Ch.4, the results of the hypotheses tests indicated two out of the three hypotheses were accepted. However, one hypothesis was rejected. This result triggered a decision to take a deeper look. The research approach was changed from positivist to interpretivist. Qualitative research is used to find factors that can impact ASD projects in stage 2 (Ch-5). In Ch.5, stage 2 results provide an analysis of qualitative data collected through open-ended interviews. It emerged that ‘team’ is a significant factor in Governance. Though 'people' was a significant concept in the definitions in the existing literature, 'team' is a different structure and is considered a different entity. It required a further literature review which is covered as part 3 in Ch-2. The literature review of the team found that team formation and structure/composition may impact the decision-making in ASD projects and may change ASD project’s outcomes. In Ch.6, stage 3 results provide to validate team findings and how these factors have changed the ASD project outcomes. Ch.7 discusses the results, providing answers to the research questions, recommendations, and next steps. The appendix and references are provided in Ch.8 and Ch.9, respectively.

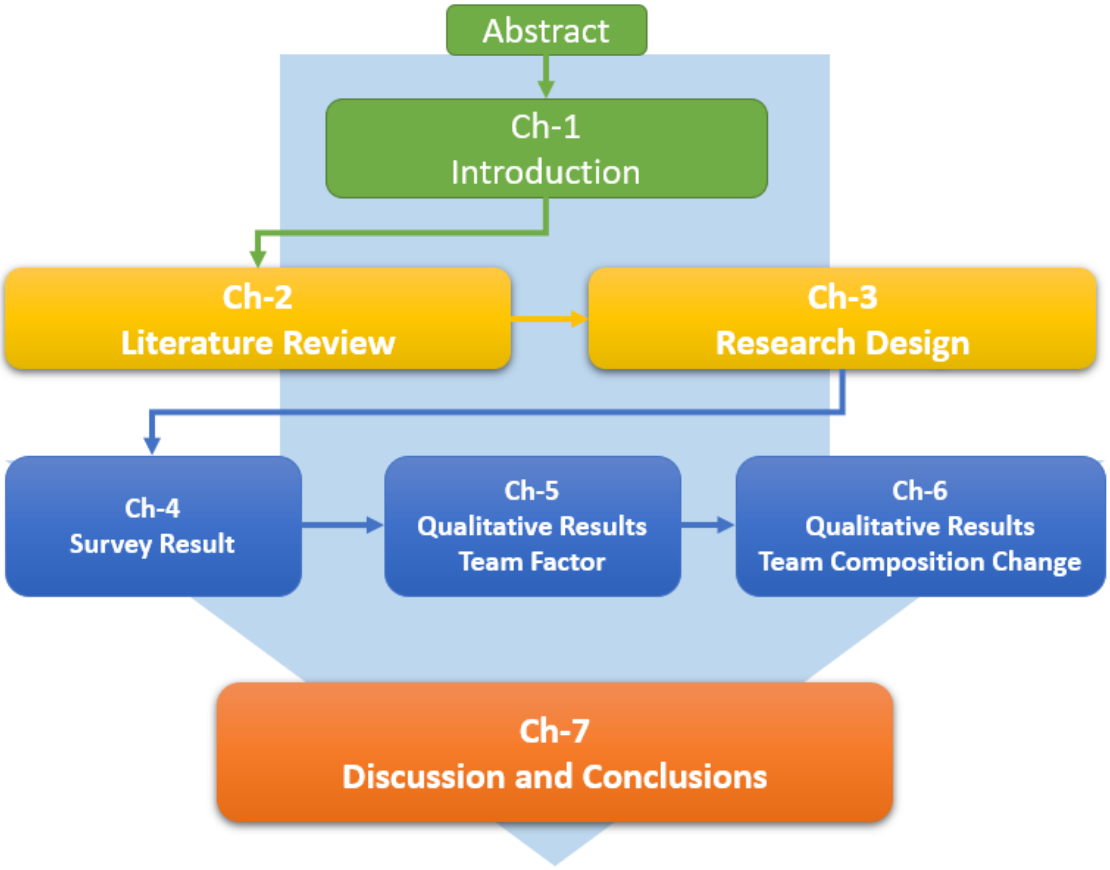



**Figure 1-1 Thesis Chapters Reading Guide**

# 2 LITERATURE REVIEW

The governance is considered as a structure to manage an organisation from top to bottom, where the top layer gives strategic direction and the middle layer implements through the tactical layer. Plans are made and administered by the middle layer while the tactical layer just executes those plans. The agile methodology on the other hand provides decision power to the project team, where the team discusses and decides what to implement and how to implement it.

A considerable number of research papers related to Governance are reviewed and discovered that Governance in EIT is a relatively new area and not often published. The literature review conducted firstly, for the broad concept of EIT Governance using a 'systematic literature review' (Kitchenham et al., 2009) method. The purpose was to understand EIT Governance, establish a definition of EIT Governance and work towards the first research questions, 'what is EIT governance?'. It will set the working definition and boundary for this research. Secondly, a targeted literature review is conducted based on the key concepts from the aim and working definition of EIT Governance to form the hypotheses. The literature review is to find previous work in this field, form relationships of key concepts to develop hypotheses and to explore any new concepts linked to aim of this project.

## 2.1 EIT Governance Definition

In the first part of the literature review, a 'systematic literature review' method (Kitchenham et al., 2009) was adopted and performed through a four-step approach to finalize the results. (see table 2.1 below) This section of the literature review is to find a definition aimed to answer first research question, i.e. What is EIT governance. Also, this section will set a working definition for this research. After reviewing the available databases, I found that AIS eLibrary, Scopus, IEEE and Google Scholar have coverage of both range (categories and time) and depth (specific areas and topics) in the IT field specifically for EIT Governance, Innovative Technologies, Software Development and Project Management. These databases cover papers from journals and conferences around the world, with a variety of in-depth topics and provide results with abstracts. These databases were selected for the EIT Governance Definition literature review. Each database is searched for articles in two steps, the first step using a single filter and single field, while in step two, multiple filters are used on multiple fields.

List of selected databases:

- AIS eLibrary
- Scopus
- IEEE
- Google Scholar

In step-1 and step-2, systematic literature review was performed to search the selected databases and steps were repeated for various keywords. In step-1 a single key phrase was used, while in step-2 the logical AND was used for two key phrases as the search filter (table 2.1). In the third step, papers from these databases were reviewed for the main concepts. Step-1 and step-2 were repeated for the key concepts found through the review process. Step-3 is repeated to refine the resultant papers. In fourth and last step, a final set of retrieved papers were reviewed in detail for relevance and final selection for the analysis.

**Database Search - Iteration 1**

The database searches were performed using an iterative approach. The first word that came into mind was “Governance” to commence the literature review. The word “Governance” is too wide for a search and needs to be more specific. Hence, “IT Governance” was preferred as the first phrase to commence the iterative search. The single key phrase search in step-1 returned a large number of papers. Each database resulted in over a thousand papers, and review of each paper was not possible. A quick review of titles and abstracts, from a set of papers from each database, suggested changing “IT Governance” to “Enterprise IT Governance” and adding “Definition” as the second key phrase. Step-2 was performed with two filters and produced much better results. The total number of papers found was 30 from all three databases. Table 2.1 provides details of the step-1 and step-2 searches and the resultant paper of the first iteration.

**Table 2-1 Filtered Search – IT Governance Definition**

| Search DB | Step 1 | | | Step 2 | | |
|---|---|---|---|---|---|---|
| | 1 Filter | | Results | 2 Filters with AND | | Results |
| | Search Word | Field | | Search Word | Field | |
| AIS eLib | "IT Governance" | All Fields | 1,286 | "Enterprise IT Governance" "Definition" | All Fields Abstract | 13 |
| Scopus | "IT Governance" | All Fields | 1,152 | "Enterprise IT Governance" "Definition" | All Fields Abstract | 11 |
| IEEE | "IT Governance | All Fields | 3,091 | "Enterprise IT Governance" "Definition" | All Fields Abstract | 5 |
| *Google Scholar | "IT Governance" | All Fields | 37,200 | "Enterprise IT Governance Definition" | All Fields | 1 |
| * Google Scholar does not allow AND filter | | | | | | 30 |

The resultant papers (30 papers as results of step-2) were reviewed as part of step-3. Each paper was reviewed for EIT Governance and concepts related to innovative software development projects. The consideration of review at this stage was to find related concepts for EIT Governance, innovative software development, project success, and project management in the enterprise-level organization. Innovative projects were where itratirve approaches were used. Word ‘agile’ was not used for innovative project widly in the early stages. Project success can be in many forms. From these papers, a concept/ keyword “Business Value” describes project success. These papers revealed that in the enterprise, projects are executed to deliver business value under EIT Governance. For this research, project success is business value achievement. 'Business value' keyword indicates that research papers use it as a parameter of EIT Governance. This finding is aligned with this research focus, where EIT impact of governance on ASD project is to deliver results to the business.

**Database Search Iteration 2**

Based on the review results from step-3, a second iteration for the database search commenced. In iteration-2, step-1 and step-2 were performed for new key-word "Business Value". In this iteration, the search was performed on specific fields. A single filter search in step-1 used "Business Value" on the 'Title' field and returned a large number of papers. Each database returned over a hundred papers while Google scholar returned over two thousand papers. A detailed review of each paper was not possible. A quick review of the abstracts, from a set of papers from each database suggested to add "Definition" as the second filter. The dual filter search in step-2 used "Business Value" on the 'Title' field and "Definition" on the 'Abstract' field. The search from Step-2 returned 70 papers from all databases. The resultant papers may or may not have EIT Governance and Innovative Software Development Projects together, hence step-3 review of each paper was required to find the relevant papers or new concepts which may further elaborate relation among EIT Governance, Innovative Software Development and Project Management in the enterprise level organizations. Table 2.2 provides details of step-1 and step-2 searches and resultant paper of second iteration.

**Table 2-2 Filtered Search – Business Value Definition**

| Search DB | Step 1 | | | Step 2 | | |
|---|---|---|---|---|---|---|
| | 1 Filter | | Results | 2 Filters with AND | | Results |
| | Search Word | Field | | Search Word | Field | |
| AIS eLib | "Business Value" | Title | 139 | "Business Value" | Title | 2 |
| | | | | "Definition" | Abstract | |
| Scopus | "Business Value" | Title | 565 | "Business Value" | Title | 12 |
| | | | | "Definition" | Abstract | |
| IEEE | "Business Value" | Title | 288 | "Business Value" | Title | 21 |
| | | | | "Definition" | Abstract | |
| *Google Scholar | "Business Value" | Title | 2,810 | "Business Value Definition" | All Fields | 35 |
| * Google Scholar does not allow AND filter | | | | | | 70 |

The resultant papers from the second iteration were reviewed, combined with the papers of the first iteration in step-3. Another concept was discovered when "IT Governance" and "Business Value" definitions were applied for innovative software development projects in the enterprise level organizations. The concept/keyword was "Decision Making". Decision making indicates significance in EIT governance and business value

as a result. It is important to find where decision making is used as part of the definition and how it relates to this research scope.

### Database Search Iteration 3

A third iteration commenced with a single filter search using the new key-word “Decision Making” on the title field. Step-1 returned a large number of papers, again in thousands. A quick review of the abstracts, from a set of papers from each database, again suggested adding “Definition” as the second filter. This dual filter search in step-2 used “Business Value” on the ‘Title’ field and “Definition” on the ‘Abstract’ filed. The total number of papers found was 33 from all three databases. Table 2.3 provides details of step-1 and step-2 searches and resultant paper of third iteration.

**Table 2-3 Filtered Search – Decision Making Definition**

| Search DB | Step 1 | | | Step 2 | | |
|---|---|---|---|---|---|---|
| | 1 Filter | | Results | 2 Filters with AND | | Results |
| | Search Word | Field | | Search Word | Field | |
| AIS eLib | "Decision Making" | Title | 3,347 | "Decision Making" | Title | 29 |
| | | | | "Definition" | Abstract | |
| **Scopus | "Decision Making" | Title | 48,033 | "Decision Making" | Title | 2 |
| | | | | "Definition" | Abstract | |
| IEEE | "Decision Making" | Title | 251 | "Decision Making" | Title | 1 |
| | | | | "Definition" | Abstract | |
| *Google Scholar | "Decision Making" | Title | 690 | "Decision Making Definition" | **Abstract | 1 |
| * Google Scholar does not allow AND filter | | | | | | 33 |
| ** Large number of results forced to change the criteria for abstract field | | | | | | |

The resultant papers from iteration three were combined with the resultant papers of previous iterations and a review was conducted as step-3. These papers were reviewed for EIT Governance definition and innovative software development as critera of

selection. Finally, only those papers were seleteced which meat the critera and covered these aspects. These 18 papers for detailed analysis were recorded with reference numbers.

**Consolidating Search Findings**

Fourth and final step commenced for a detailed analysis, understanding, and to finalize a definition for EIT Governance and scope for this research. Section 2.1 to 2.6 covers the step-4 literature review analysis. During the detailed analysis in step-4 a further literature review was conducted for the background and completeness. However, definitions were taken only form the selected 18 papers and wherever these definitions are analysed or used, these papers are referenced with numbers. Table 2.4 provides document reference ids, researcher and the year published of the final 18 papers.

**Table 2-4 Filtered Search – Decision Making Definition**

| Document Reference | Researcher | Year Published |
|---|---|---|
| D01 | Brown and Magill | 1994 |
| D02 | Luftman | 1996 |
| D03 | Sambamurthy and Zmud | 1999 |
| D04 | Grembergen | 2000 |
| D05 | Weill and Vitale | 2002 |
| D06 | Schwartz and Hirschheim | 2003 |
| D07 | IT Governance Institute | 2004 |
| D08 | Weill and Ross | 2004 |
| D09 | Craig, Cecere, Young, and Lambert | 2005 |
| D10 | Webb, Pollard and Ridley | 2006 |
| D11 | Simonsson and Ekstedt | 2006 |
| D12 | Bowen et al. | 2007 |
| D13 | De Haes and Van Grembergen | 2009 |
| D14 | Gerrard | 2010 |
| D15 | Huang et al. | 2010 |
| D16 | Ali and Green | 2012 |
| D17 | Bradley et al. | 2012 |
| D18 | Chong and Tan | 2012 |

### 2.1.1 EIT Governance Definitions Review

The analysis started with exploring EIT Governance, its alignment, definition, components and differences across the corporate area. Existing principles of governance are abstracted from early experiences. It is possible that Governance was formally implemented in enterprises for the first time at the end of seventeenth century where the term ‘director’ was used to monitor where large sums of money were consumed in organizations (Farrar, 1999). IT Governance issues are first reported as Information System (IS) Functions in an enterprise. IS executives facing IS management as a critical issue to organize IS Functions was noted from the mid-80s (Brancheau & Wetherbe, 1987; Dixon & John, 1989). Further research based on the literature review and the case study which focussed on IS Function alignment with the business within an enterprise found the existence of a critical management issue for some time in IS management with little work done to establish guidelines (V.Brown & Magill, 1994). At the same time, a lack of clarity for organizations to use a solution model for IS Functions to align with business was observed. Management Information Systems (MIS) researchers (Allen & Boynton, 1991; Zmud et al., 1986) proposed some models to align IS Functions, but a

clear guideline was absent. Other researchers (Alter, 1990; Joseph & Mark, 1992; Von Simson, 1990) discussed Information Systems (IS) alignment problems with centralized, decentralized and "centrally decentralized" solutions. However, it is argued that these solutions are obscure, where some IS Functions are suggested to be centralized, some decentralized and other shared responsibility, making them contradictory (Alice, 1991; LaBelle & Nyce, 1987; Margolis, 1993). These researchers covered literature published over a decade with the focus on alignment. They could not provide a standard definition of IS Function or IS Governance.

**Definition difference in Academia and Industry**

The definition of EIT Governance is later explored concerning differences between academia and Industry. EIT Governance is a relatively a new concept, this newness requires a definition which is agreed and widely accepted by academia and industry (Van Grembergen, 2004). Web et. al. analysed 12 definitions from the literature in an attempt to define a sufficiently clear and acceptable IT Governance definition (Webb et al., 2006). This study was part of an on-going research program into theory and practice and found that IT Governance, as an emerging topic of academic study from the late 1990s, was a significant area of inquiry by scholars and practitioners alike. Academic and practitioner literature was considered for the study while widespread confusion was found in the scope of the IT Governance as well as alignment with corporate governance. At the same time, in the enterprise, IT Governance was considered as sub-set of Corporate Governance, which is defined by many researchers (Kingsford et al., 2003). Furthermore, a considerable overlap between Corporate Governance, Strategic Information System Planning and IT Governance was found during the review of these studies. It was concluded that the existing definitions in the literature could not represent the broad reach concept of IT Governance adequately.

A common definition of EIT Governance does not exist between researchers and practitioners (Simonsson & Ekstedt, 2006). Simonsson & Ekstedt found a gap between practice and the available literature and noted that consultants and CIOs are not running IT Governance 'by the book' (Cumps et al., 2006; Dahlberg & Kivijarvi, 2006). It is argued that a lack of uniform definition as discussed by (Webb et al., 2006) is based on a small number of articles (Simonsson & Ekstedt, 2006). To cover this gap, Simonsson and Ekstedt widened their research to build a model. The aim of their research and model was

to develop a common definition that could cover the gap between literature and practice. Efforts were made to find priorities in the literature based on words used and views of IT experts. Their proposed definition covered all available words. However, the proposed definition does not cater for ongoing development. Even the authors of this definition concluded that differences are still found in the priorities from literature and practitioners.

**No Common Definition**

Growing complexities, arguments on organizational context (Lunardi et al., 2009), IT Governance framework scientific deficiencies (Goeken & Alter, 2009) and IT Governance are being recognized as a (Chief Information Officer) CIO's top-10 issue led to further research on finding determining factors for IT Governance (Pereira & Silva, 2012). Research conducted on available IT Governance definitions found a lack of shared understanding and no single definition was used. Common themes from these definitions are suggested as determining factors. These themes range across culture, structure, size, industry, region, maturity, strategy, ethics and trust and are considered contingency factors to implement IT Governance (Pereira & Silva, 2012). These factors can be used to determine implementation steps and priorities but do not provide a definition for IT Governance. Such factors can change over time while a good definition should not be impacted by implementation factors.

EIT Governance within organizations in the software development domain in particular is discussed and it is noted that EIT Governance is an emerging area and that little research has been done on software development governance (Bannerman, 2009b). Betterman suggests a meta-management perspective describing governance as a multi-dimensional concept where it is varied at different levels because of its function and shape. Research in corporate governance originated in political science and institutional economics and at a corporate level, the governance key role is to satisfy stakeholders and regulators (Bannerman, 2009a). However, at a specific domain level, the focus is on an appropriate form of governance with alignment to the corporate governance. It is counter-argued that the governance model, amount, shape, size, function, strategic and technical role at different levels is a choice of the organization (Pound, 1995; Peter Weill & Jeanne W. Ross, 2004; Peter Weill & Jeane W Ross, 2004). As several frameworks exist for IT Governance, organizations prefer to design their customized model (Broussard & Tero, 2007). IT Governance factors for the software development domain can be configured for

optimal performance. Bannerman also stated that there is still no consensus for an IT Governance definition and software development governance is even less mature, and yet to be defined.

EIT Governance alignment and organizational performance are discussed along with EIT Governance definitions and contingency factors (Wu et al., 2015b). It is found that there is no single widely accepted definition for IT Governance. Although researchers tried to define a unique definition, it is evident that different factors had an impact on the shape and selection of IT Governance. To pursue work in this research, an EIT Governance definition is required to define scope of work and its relationship with other factors. As it is evident that there is no single IT Governance definition available which is widely accepted that can be used for the research for this thesis, the focus was shifted to analyse existing definitions, analyse impacts on the definitions, select one of them, or, form a definition which can be used for this research as a base. In the next subsection, there is an analysis of existing definitions, the impact of time and events on the definition, and key concept relationships, followed by a final definition for this research.

### 2.1.2 EIT Governance Definitions Core Concepts

Several studies have been conducted and literature published for IT Governance and its role, definition and alignment in the enterprise. IT Governance is considered as a subset of Corporate Governance (Kingsford et al., 2003). Numerous IT Governance definitions are discussed, not all definitions are widely used or common among academia or industry. This review is focused on common definitions used in the research articles to understand IT Governance definitions common and emerging concepts and links between these concepts.

**Decision-making in the Definition**

Ryan Peterson (2004) used a business case study and showed how different stakeholders viewed IT Governance differently in one company. He discusses different needs, characteristics, qualities, values and type of IT Governance and how organization culture is influencing it. The definition used for his research is:

"The distribution of IT decision-making rights and responsibilities among enterprise stakeholders, and the procedures and mechanisms for making and monitoring strategic decisions regarding IT"

**Strategic Alignment in the Definition**

Wilson and Pollard (2009) used an Information Systems Audit And Control Association (ISACA) framework, an ISACA survey and case studies to find IT Governance theory and what it is in practice. They found IT is closely linked with stakeholders, investment and control by corporates, at the same time the management layer is not able to understand IT Governance. The definition used for their research was from Webb,

"IT Governance is the strategic alignment of IT with the business such that maximum business value is achieved through the development and maintenance of effective IT control and accountability, performance management and risk management"

**Lack of Determinig Factor in the Definition**

Pereira and da Silva (2012) conducted a study to collect IT Governance definitions to find determining factors (culture, structure, size, industry, regional differences, maturity, strategy, ethical and trust) for implementation. They found clarity in corporate governance and enterprise governance as compared to EIT Governance. At the same time, they mentioned that none of the existing EIT Governance definitions reflects all the determining factors and a lack of understanding by professionals was observed. An important aspect to be considered here is that the above research was conducted to find factors for implementation. These factors may be considered when EIT Governance Definition is examined for completeness.

Teo, Manaf and Choong (2013) noted that many definitions exist with varied clarity. They found that the literature covers IT Governance aspects like structure, processes, strategy,

decision-making, accountability, value delivery and alignment. All are a top management view of governance, yet miss the people aspect, a critical part of the organization (Teo et al., 2013).

## Standards for EIT Governance

Juiz and Toomey (2015) noted that private organizations are subject to many regulations by the government or regulatory bodies, at the same time, no regulation requires an IT Governance framework to be in place. Regardless, the corporate sector realizes the importance of IT Governance. Hence standards have been developed by international and local bodies to guide companies to understand what is IT Governance and how to implement it. Australian Standard AS 8015 was the first formal standard for IT Governance. ISO 38500 is an international standard for IT Governance and driven from the Australian Standard. This standard defined IT Governance in three-parts consisting of 'Agenda', 'Investment' and 'Operations'.

Juiz and Toomey (2015) further discuss why IT Governance is required, what it does for the corporation and its overlap with other disciplines. They found business needs and organizational maturity had a direct link with IT Governance to deliver value, enable business and create opportunities. They subscribe to the definition:

"Governance of IT is the system to direct and control use of IT (Juiz & Toomey, 2015)

## Project Management and EIT Goverannce

Project management methodologies are used to plan and execute projects. Sharma, Stone and Ekinci (2009) performed a study into IT Governance and Project Management and found that IT Governance and Projects have a very close link. IT projects in a very complex technological environment are linked with business objectives. A small change from the project can impact business, IT Governance is providing an umbrella and a connection between business and IT projects. The IT Governance definition used for their research is:

"IT Governance is the process and structure that ensure that organizations deploy their IT investments appropriately to ensure that the resulting activities - whether programmes,

projects or operations that they fund - are carried out properly and achieve the desired results. (Sharma et al., 2009)"

**Software Development and IT Governance**

Software development methodologies are used to create better code. Goh, Pan and Zuo (2013) discussed agile development practices of large-scale projects. They did not cover IT Governance specifically, but the focus of their article was on development practices and control. IT governance was not named or discussed in the article, but the concept of measurements and control was such as to relate to governance. They linked project success to a set of agile practices and how they are used. Such definition of control is similar to Governance practices. Their definition of sensing-based agile development practices is noted here to examine the broad definition of IT Governance:

"A set of agile IS development practices that are sensing centric, in which the focus is to develop capabilities to accurately sense the project uncertainties stated above in order to meet the urgency of project completion and to develop capabilities that allow for proactive response to these uncertainties. (Goh et al., 2013)"

The above definition provides evidence that in the agile development project, monitoring and control practices are used to attain value. Agile projects are self-managed, thus there is a very fine line between governance and the management layer.

Software is not only developed in controlled, centralised environments, but is also developed by the community in open space called 'Open Source' where everyone contributes. Di Tullio and Staples (2013) discussed governance and control for open source software development. They noted that governance is necessary and required for software development projects. Open source development projects are complex and growing in numbers. Though these projects are different than traditional development projects, measurement, control and implementation of governance is still required for such community-based work. The definition of governance used for open source projects is taken from Markus M.L. (2007) stated as:

"The means of achieving the direction, control and coordination of wholly or partially autonomous individuals and organizations on behalf of an OSS development project to which they jointly contribute (Di Tullio & Staples, 2013)"

**Projects and EIT Governance**

The above studies established a strong connection between IT Governance and software development projects. They demonstrate that, regardless of size, environment, coding methodology and project management methodology, IT Governance is closely linked to projects.

Based on the literature review, Table 2.5 describes common (largely used for a long time) and evolving (used in recent times) themes in an IT Governance definition.

**Table 2-5 Concept words from Governance Definition**

| Word | Defined by | Appearance |
|---|---|---|
| authority | Luftman (1996), Sambamurthy and Smud (1999), Schwartz and Hirsheim (2003) | Common |
| control | Grembergen (2000), Webb, Pollard and Ridley (2006), Juiz and Toomey (2015) | Common |
| decision | Brown and Magill (1994), Luftman (1996), Weill and Vitale (2002), Will and Ross (2004), Craig, Cecere, Young and Lambert (2005), Simonsson and Ekstedt (2006), Andriole (2015) | Common<br>Evolving |
| maturity | Juiz and Toomey (2015) | Evolving |
| people | Simonsson and Ekstedt (2006), Andriole (2015), Teo, Manaf and Choong (2013) | Evolving |
| strategy | Grembergen (2000) | Common |
| value | Webb, Pollard and Ridley (2006), Gerrard (2010) | Common |

Another interesting observation on these definitions was that concept words are not static and over time a few concept words were repeated and new concepts emerged. These definition were examined for impacts by time and event. The next subsections provides the details of these impacts and links the key concepts.

### 2.1.3 Evolved and Diverged in Time

IT Governance is an emerging field which has evolved along with the definition of IT Governance. In the past 20 years, a number of scholars have performed considerable research to define IT Governance. Over the time, many different definitions emerged as well as themes in these definitions. In this research, various definitions expounded over time are examined for key concepts used in their creation. To analyse changing concepts over time, the relationship of these concepts with IT needs to be understood. The analysis shows that 'IT' is a common word used in the IT Governance definitions, and that it was compounded with other words like IT functions, IT activity, IT decisions, IT strategy, IT investment, IT control, IT structure and so on. To analyse key concepts, each concept in the IT Governance definition is considered, and how it is related to IT, regardless of whether or not the word 'IT' is mentioned.

**Governance Historical Background**

Governance can be traced back in ancient times. (Tamyko et al., 2014) mentioned the Greek word 'kybernan' means 'pilot a ship' and Latin word 'gubernare' which means 'direct' or 'guide'. Governance concepts of IT were first discussed as "IS Functions" from the mid-1980s. (V.Brown & Magill, 1994) discussed in their 1994 paper about IS Functions alignment with the enterprise and used a definition with concepts of 'decisions', 'responsibility' and 'functions'. (Luftman, 1996) used a definition in his book and enhanced it with multiple concept words. Though Luftman did not use 'functions' in his definition he included 'authority', 'management', 'process', 'business', 'priority' and 'resources'. (Sambamurthy & Zmud, 1999) used a simple definition with only two key concepts; they used 'authority' to cover decisions and responsibility while adding a new concept of 'activities' which these authorities are exercised.

**Shift in Governanc Concepts**

From the year 2000, there has been a noticeable change in the concepts used in the definition. It appears to be a shift towards enforcement from the top. (Wim Van Grembergen, 2000) discussed the top executives' involvement and direction-making for IT. He introduced 'capacity', 'board', 'control' and 'strategy' into the definition. (Weill

& Vitale, 2002) discussed the choices organizations made in transformation and added two new concepts. They mentioned ‘monitoring’ and ‘investment’ with a new dimension to ‘decision’ stated as a ‘shared decision right’. (Schwarz & Hirschheim, 2003) discussed the issues IT is facing to align the structure and processes with the rest of the organization. They linked strategy and executive management direction to the structure and process by adding ‘structure’ and ‘architect’ into the definition.

Only two unique concepts have been reported in the past decade for IT Governance definition. (Peter Weill & Jeane W Ross, 2004) used a definition specifying accountability and correct decisions. They introduced a unique aspect in the IT Governance and added ‘behaviour’ in the definition as a desirable outcome in using IT. (Simonsson & Ekstedt, 2006) discussed the differential views of IT Governance in academia and industry. They used a definition covering most of the previously discussed concepts; however they added another unique concept. This time, ‘people’ as a concept was used for first time in the definition of IT Governance.

From the systematic literature review, 18 papers are found with details of IT governance definition and discussion around the IT Governance definitions. From those papers, definitions were reviewed to find the concept words, which were taken into consideration for further analysis.

Table 2.6 shows the keywords and their time distribution when used in the definition. It is evident that hardly any new concepts are used during the last ten years. Researchers are using same concepts with variations of words in their definitions. A shift can be seen over the time period, and researchers are using more words in their definitions recently. A definition should be independent of time, if it keeps changing over time, it may not be stable, consistent and reliable, which means it cannot be used for evaluating results.

**Table 2-6 Concept words from Governance Definition**

| | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 | 2006 | 2008 | 2010 | 2012 |
|---|---|---|---|---|---|---|---|---|---|---|
| accountability | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| activity | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| architecture | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| authority | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| behaviour | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| board | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| business | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| capacity | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| control | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| decision making | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| environment | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| framework | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| function | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| goal (objective) | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| investment | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| leadership | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| management | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| measurement | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| monitoring | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| organization | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| people | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| performance | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| priority | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| process | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| resources | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| responsibility | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| strategy | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| structure | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 |
| value | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| **Counnt of key concepts** | **3** | **8** | **2** | **6** | **10** | **15** | **14** | **6** | **6** | **13** |

## 2.1.4 External Environment Impact

EIT Governance is impacted by its surroundings and this impact is severe enough to change even its definition. Literature from the early 1990s indicates that IT was influenced by the economy of scale and benefit consolidation. (V.Brown & Magill, 1994) documented that in the decade (from the mid-1980s), telecommunication management became the responsibility of IS due to these reasons. They further explored that

companies merged management of technology centrally and that the use of technology is delegated. Expansion and adoption to change merged functions in the corporate world over the time, which triggered EIT Governance transformation from centralized to de-centralized to federated models. (Bannerman, 2009b) discussed EIT Governance in particular for software development. He described structural and strategic roles of governance being used centrally while functional and tactical roles are decentralized. (Peterson, 2004) also mentioned centralized and decentralized approaches with limitations. He further discussed Federal IT Governance with a number of variations. Though these are implementation arrangements and changes, they impacted on alterations to the definition.

(Andriole, 2015) found a shift of approach from the 1970s till recent times in IT Governance. He described the events and their impacts on EIT Governance. He noted that technology governance is more explicit around operation then strategy. His research found that until the 1990s, infrastructure and development was in-house, that the dot-com bust of late 1990s had an impact on EIT Governance, and from the mid-2000s it shifted to a shared enterprise and the financial crises of 2008 triggered another control swing. These continuous changes do have implementation impacts due to various external factors; however these changes did force an adjustment to the definition and made it difficult for companies to adopt.

### 2.1.5 Business Value and Decision Making

Two distinct dimensions are identified in IT Governance from the literature review in the previous section. The first is what IT Governance wants to achieve, i.e. Business Value, and the second is what key function IT Governance plays for this goal, i.e. Decision Making. A further literature review was then conducted to understand the links between value and decision making.

Business needs are a driving force for a company's direction, but such information alone is not enough. A holistic view of the entire landscape is required to take the right course of action. (Işık et al., 2013) mentioned that the corporate realization about the importance of accurate, relevant and timely information for effective decision making has increased. To make a quality decision to achieve business value, a knowledge base system is required. Knowledge is defined by (Parry & Graves, 2008) as a "fluid mix of experience,

value, contextual information and expert insight offering a framework to evaluate and integrate new experiences and information". Knowledge can be gained by a system or program to compile multiple information elements of a particular area. (Mola et al., 2015) discuss links between knowledge-based systems and decision making. Their research produced a positive association between a knowledge base system and the quality of decision making. (Hawking & Sellitto, 2015) also indicated that the absence of an effective knowledge base system causes significant issues in the realization of benefits. These studies establish a link between business benefits and knowledge systems and between decision making and knowledge systems as shown below.

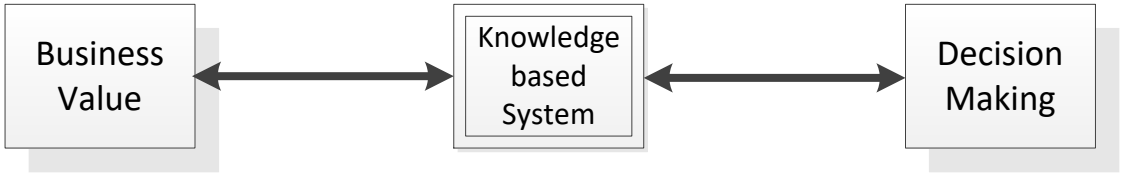



**Figure 2-1 Concept words link with Knowledge**

### 2.1.6 EIT Governance Definition Scope

Based on the literature review and analysis, there is no single agreed definition of IT Governance. IT Governance has evolved where the definition was changed or expanded. Many concept themes can be observed in those definitions at different times; however, they are all are linked and are significant for a definition. Definitions are suggested with just a few concepts in the beginning, and, as time passes, more concept words are used. Many words are common across most of the definitions and a few are emerging. The surrounding environment and global events also impact the definition. It is suspected that new trends in IT and other events may impact and change IT governance definition in the future.

It is author's view that a definition should not be impacted by time, surrounding environments, global events or implementation methods. In this section, the concepts used in IT Governance definitions are brought together for a better understanding and to conclude with a definition that can be used for rest of the research. The focus of this effort

was to establish a definition which is independent of time, events, implementation methods and upcoming trends.

From the final selected 18 papers, key concepts were taken from the IT Governance definitions. These concept words are linked to IT governance. A diagram was developed to visualize the concepts used in the IT Governance definition. Figure 2.2 shows these key concepts used in various definitions and their possible links.

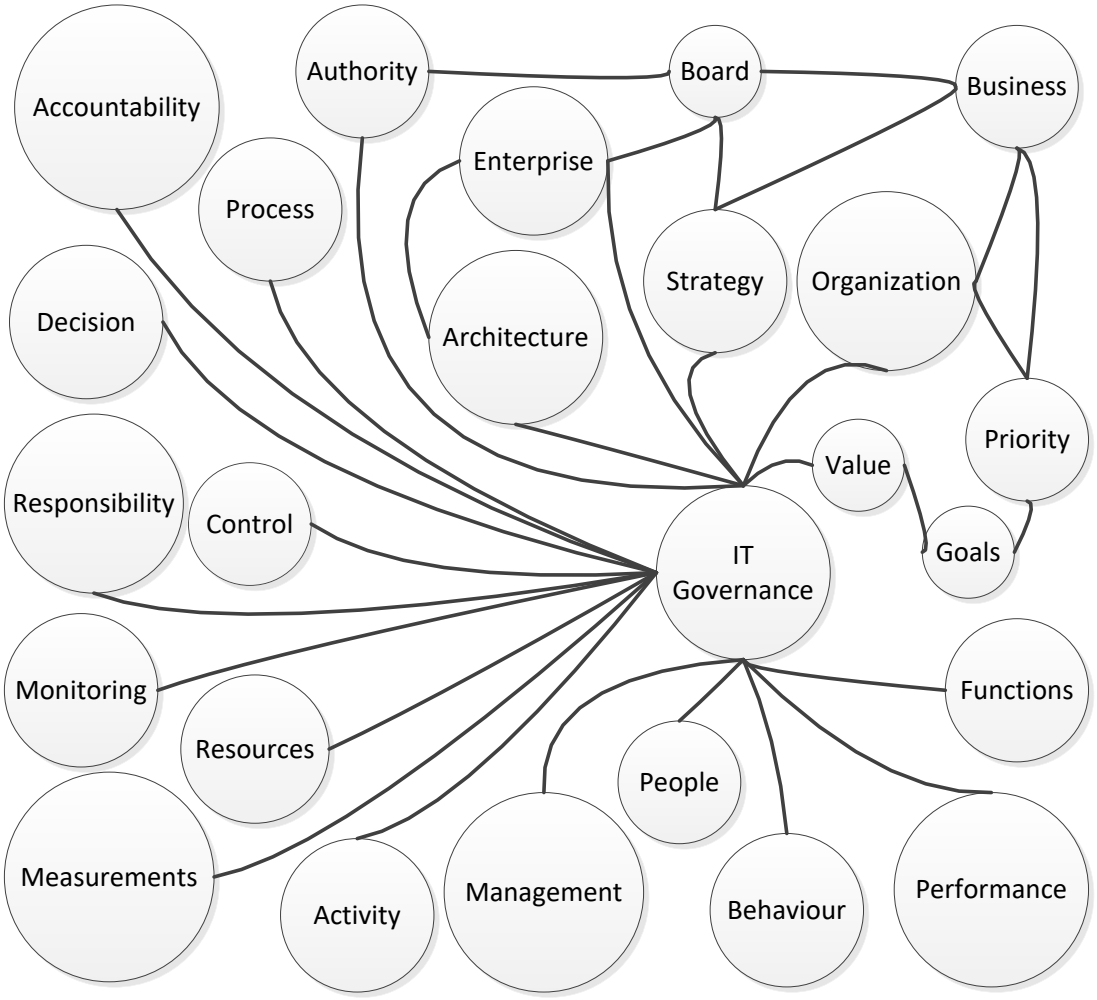



**Figure 2-2 Key Concept used in various definitions**

These concepts are taken from different definitions as described in the selected papers. A further detailed analysis was conducted to identify: where these key concepts occurred; their use in the definitions; their relationship, and their frequency of use was calculated. This analysis helped to understand which concepts are consistently used, how they are

linked, how they are used and placed in the definitions, how often they are used, what is their importance in the definition and the overall landscape of IT governance.

First, concepts taken from the definitions are counted per paper and per their frequency of use in different definitions. Table 2.7 below provides the key concepts, their use in each paper, their frequency of use and the count of key concepts in each paper. Four key concepts stands out from all the others. Decision making, goal (objective), organization and process. As previously discussed, each concept is important as it is used in the definition so I considered each key concept for this analysis and nothing was dropped.

**Table 2-7 Concept words from Governance Definition**

| | D01 | D02 | D03 | D04 | D05 | D06 | D07 | D08 | D09 | D10 | D11 | D12 | D13 | D14 | D15 | D16 | D17 | D18 | Freq |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| accountability | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| activity | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 4 |
| architecture | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| authority | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| behaviour | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 3 |
| board | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| business | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| capacity | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 |
| control | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 5 |
| decision making | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 9 |
| environment | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| framework | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| function | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| goal (objective) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |
| investment | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| leadership | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| management | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 4 |
| measurement | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| monitoring | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| organization | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 9 |
| people | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| performance | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| priority | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| process | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 9 |
| resources | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| responsibility | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 |
| strategy | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 7 |
| structure | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 6 |
| value | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| **Counnt** | **3** | **8** | **2** | **6** | **5** | **5** | **9** | **4** | **6** | **7** | **5** | **5** | **6** | **3** | **4** | **6** | **9** | **5** | |

Based on the diagram (Fig 2.2) which linked the concepts, table (table 2.7) which provides concepts with frequency of use, analysis of each concept link, placement in the definition and position in the overall enterprise IT Governance, grouping was formed. These concepts were sorted into five groups and Figure 2.3 presents these groups and linked

concepts in each cluster. The groups are formed based on related functions. Each group is defined and named by its core concept, i.e. Business, Organization, Management, People and IT Governance, as can be seen highlighted and bold in figure 2.3.

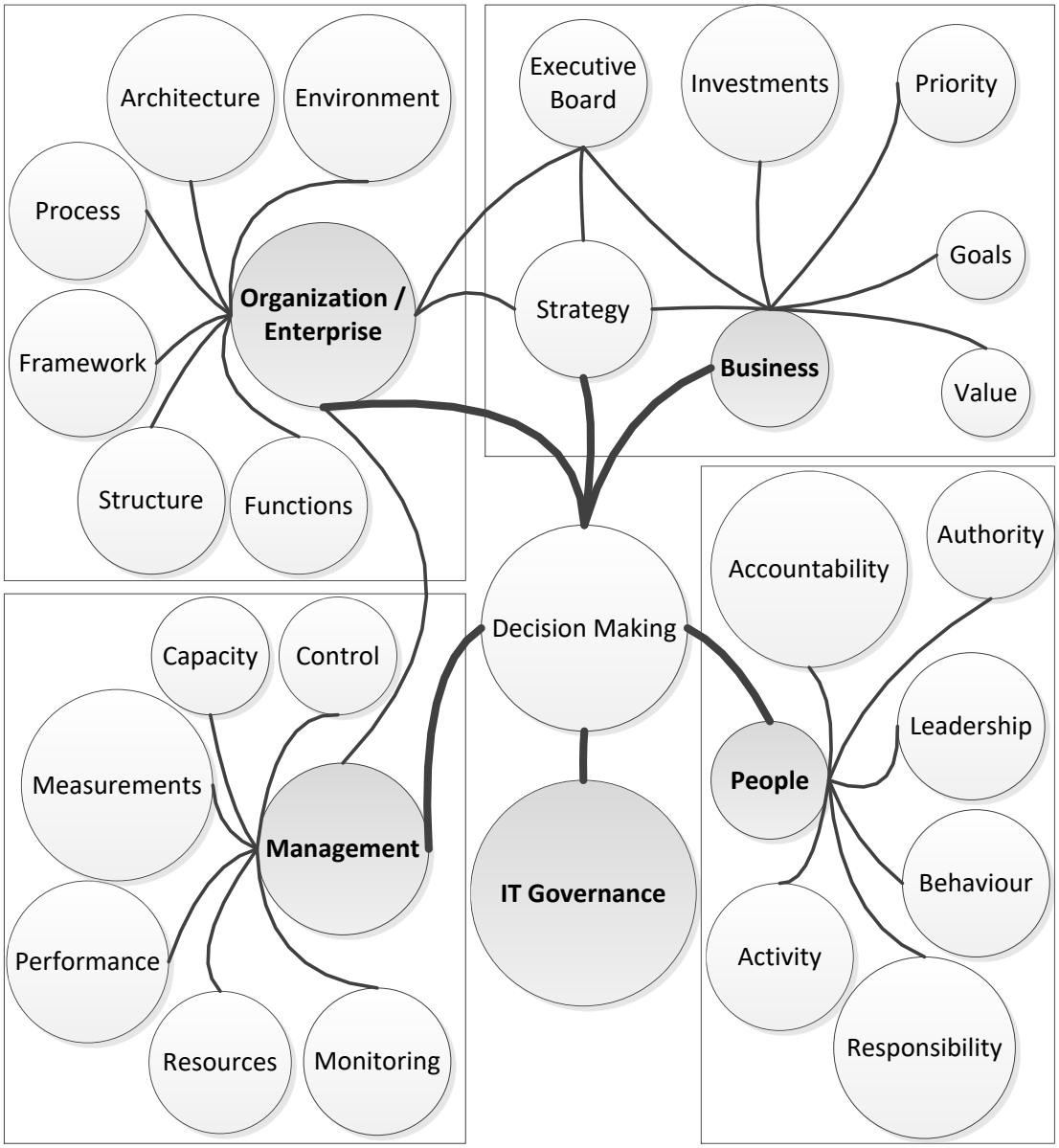



**Figure 2-3 Concept words in segments**

**Business**: IT Governance cannot make business priorities to set goals and values. Business brings investment to assign an executive board to deliver value as part of Corporate Governance. Board and Business functions jointly develop a strategy for delivering business value. IT Governance is taking direction from corporate governance and business through this strategy to deliver business value. IT Governance is not

developing any strategy outside of business strategy and compliments by adding IT related items into the overall corporate business strategy. Business goals, prioritization, value and strategy is covered under 'Business value'.

**Organization**: EIT Governance is a subset of Corporate Governance. Corporate Governance at the organization level is responsible for creating, developing and executing all governance function including hierarchies, roles, accountabilities and enterprise level environments. EIT Governance inherits these functions from corporate/enterprise governance and executes them within the limited scope of alteration. Various organizations are at different levels of maturity of their process development, implementation and adoption of methodologies/models for the governance functions. EIT Governance may have improved these functions in a few specific areas of implementation. In general, EIT Governance implementation of these functions is considered at the same level of maturity as the organization itself.

**Management**: Management is a delivery function for Corporate and IT Governance. Measurement, monitoring, control, performance, capacity and resource are management functions to deliver results for the business. These concepts are used in the IT Governance Definitions where the definitions seem to be functions of Governance rather than functions of Management. Figure 2.3 shows that management (including project management) is part of an organization to implement what governance is directing. In this case, IT Governance is implemented through the management functions of the organization.

**People**: The people part of figure 2.3 includes all 'people' working in the organization who are linked to IT governance at any levels. Activities and behaviours are linked with people. At the executive level, people need information to make strategies and directions while at the day to day work level, people need these directions. IT Governance is to 'facilitate' all people by delivering a mature system in which they can get the required knowledge to make right decisions.

**IT Governance**: Core function of IT Governance is directing through **decision making**.

### 2.1.7 EIT Governance Definition (for this Research)

Based on the literature review findings, key concepts from the various definitions, time and events impact, distinct dimensions of IT governance, analysis of the key concepts with time and frequency of use, their relationship in clusters and with each other helped to suggest the following definition which will be used for this research.

"EIT Governance facilitates **decision making** and provide direction to the organization, business, management and people to achieve business value."

This definition helps to undersatdn EIT Governance better and answers the first research question, i.e what is EIT Governance. It was distinctly identified through the literature review that decision-making is the core of EIT governance. Hence, decision-making will be used throughout the text in this research as alternative to governance and/or EIT Governance. The above definition will also be used as working definition for further research activities.

Above literature review has helped to understand the complexity and wide spread use of the various definitions. It also suggested that EIT Governance is complex and its implementation across the enterprise may be difficult. No single agreed definition and having various definitions raises a concern on clarity and implementation of decision-maing in the enterprise. It is imperative to further study the implementation of the EIT Governance. Effective implementation of EIT Goverance in the enterprise may have several aspects. How the decision-making distributed across layers and does organization change or tailor governance for implementation. This research focuses on the enterprise EIT Governance (decision making) for innovative (agile) software development projects.

From the above literature review, research questions, research focus and developed understanding, three EIT Governance aspects/areas require further attention: first, decision making clarity and implementation, second, the authority and distribution of the decision making and third, decision making tailoring for the ASD project.

A further literature review was conducted to understand the relationships and impact of these aspects on ASD projects. Hence the focus of main literature review became clear for the above three aspects of IT Governance implementation and impact on the ASD

projects. As mentioned earlier, decision making is the core concept of EIT governance, both will be used as interchangeable concepts throughout the project.

## 2.2 Decision-Making in Agile Software Development Projects

This section provides the main literature review on the decision-making impact on ASD projects. Three aspects selected in the previous section are: 1- decision making clarity and implementation, 2- the authority and distribution of the decision making and 3- decision making tailoring for the ASD project. Further literature review is ASD project centric and papers are discussed where these aspects can be studied for ASD projects.

### 2.2.1 Decision-Making Implementation Clarity

EIT Governance is defined in many ways by researchers and practitioners as explained in the previous section. EIT Governance is a relatively new concept. In (Van Grembergen, 2004), it suddenly become a very important issue for CIOs (De Haes & Van Grembergen, 2004). De Haes and van Grembergen indicated that Gartner's 'top 10 CIO management priorities' has added Governance related issues for the first time in 2003 where "Providing guidance for the Board/Executive" is ranked first and "Improving IT Governance" ranked third. This is because organizations want to implement IT Governance to achieve a fusion between business and IT to obtain the needed IT involvement of senior management. This newness inherently has a risk of being misunderstood. A wide spread confusion is revealed about scope and alignment of Enterprise Governance and EIT Governance (Webb et al., 2006). Interestingly, EIT Governance is a sub-set of Enterprise Governance, however, a study found overlaps among Enterprise Governance, Strategic Information System Planning and EIT Governance with a conclusion that existing definitions were unable to represent the broad reach concept of EIT Governance adequately (Kingsford et al., 2003). Furthermore, researchers and practitioners have differences in defining EIT Governance (Simonsson & Ekstedt, 2006). These differences are further confirmed with evidence that consultants and CIOs are not running EIT Governance 'by the book' (Cumps et al., 2006)  (Dahlberg & Kivijarvi, 2006). EIT Governance is not only

understood differently by scholar and practitioners but at the same time, by people in the field who apply it without considering research recommendations.

This oversight and understanding differences in EIT Governance, discussed in the previous paragraph, are probably caused by the variety of concepts used to define it. This lack of a shared understanding is developing complexities in organizations (Lunardi et al., 2009). This lead to further research on determining factors for EIT Governance. Common themes range from culture, structure, size, industry, region, maturity, strategy, ethics and trust which are considered contingency factors to implement EIT Governance (Pereira & da Silva, 2012). These factors had an impact on the shape and selection of EIT Governance (Wu et al., 2015a). Analysis is conducted on the existing EIT Governance definitions to reveal that number of concepts are used in these definitions in many ways. Table 2.8 provides key concept words used in different definitions, with frequency of use (one concept is used how many times by different definitions) and count per definition (how many key concepts are used in one definition). Figure 2.4 provides map of these key concepts linked with EIT Governance and demonstrate the wide spared confusion due to the number of concepts used in the definitions.

**Table 2-8 Key Concept frequency and count in EIT Governance Definition**

| | accountability | activity | architecture | authority | behaviour | board | business | capacity | control | decision making | environment | framework | function | goal (objective) | investment | leadership | management | measurement | monitoring | organization | people | performance | priority | process | resources | responsibility | strategy | structure | value | Count |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 3 |
| D02 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 8 |
| D03 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| D04 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 6 |
| D05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 |
| D06 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5 |
| D07 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 9 |
| D08 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 4 |
| D09 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 6 |
| D10 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 7 |
| D11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 5 |
| D12 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 5 |
| D13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 6 |
| D14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| D15 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| D16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 6 |
| D17 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 9 |
| D18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 5 |
| Frequency | 3 | 4 | 1 | 3 | 3 | 2 | 3 | 2 | 5 | 9 | 1 | 1 | 1 | 8 | 2 | 2 | 4 | 1 | 2 | 9 | 1 | 2 | 1 | 9 | 1 | 3 | 7 | 6 | 2 | |


**Figure 2-4 Key Concept in definition linked with EIT Governance**

The definition of EIT Governance changed over time in response to implementation constraints and a number of non-IT events. In the past 20 years, many concepts were added to the definition and others resurfaced from time to time. Due to the scale of economy and consolidation of benefits, management of technology is merged and the use of technology is delegated (V.Brown & Magill, 1994). The structural and strategic roles of governance are used centrally while the functional and tactical roles are decentralized (Bannerman, 2009c). These changes introduced centralized, de-centralized and federated models of EIT Governance implementation. With some limitation and variations, these models are only used to deploy EIT Governance (Peterson, 2004). Additionally, the dot-com bust of late 90s and the financial crises of 2008 triggered another control swing and impacted EIT Governance definition (Andriole, 2015). These are external factors which impacted EIT Governance. Table 2.9 provides key concepts used and changed over time

and clearly shows a spike after each major financial crises (year 2000 dot-com bust and year 2008 GFC).

**Table 2-9 Count of Key Concept in EIT Governance Definition over the time**

| | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 | 2006 | 2008 | 2010 | 2012 |
|---|---|---|---|---|---|---|---|---|---|---|
| strategy | | | | ● | ● | ● | ● | ● | ● | ● |
| resources | | ● | | | | | | | | |
| process/function | ● | ● | | | ● | ● | ● | ● | ● | ● |
| people | | | | | | | ● | | | ● |
| organization/environment/framework | | ● | | ● | ● | ● | | ● | ● | ● |
| monitoring/measurement | | | | | ● | ● | | | ● | |
| management/board/executive | | ● | | ● | | ● | ● | | ● | |
| IT | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| goal/priority/performance | | ● | | | ● | ● | ● | ● | ● | ● |
| decision | ● | ● | | | ● | ● | ● | ● | ● | ● |
| control | | | | ● | | | ● | ● | ● | ● |
| capacity | | | | ● | | | | | | ● |
| business/value/investment | | ● | | ● | ● | ● | ● | | ● | ● |
| behaviour | | | | | | ● | | | ● | ● |
| authority | | ● | ● | | ● | | | | | |
| architecture/structure | | | | | ● | ● | | ● | ● | ● |
| activity | | | ● | | ● | | | ● | | |
| accountability/responsibility | ● | | | | | ● | ● | | ● | ● |

Further analysis on the collected data in the literature review revealed that there are two distinct level of EIT Governance described in these definitions. First, EIT Governance at a strategic or enterprise level is called 'IT Governance', and the second at a tactical or resource level is called 'Governance of IT'. 'IT Governance' is designed to distribute decision-making rights and responsibilities among enterprise stakeholders (Peterson, 2004), linking the investment with goals (Willson & Pollard, 2009) and the control structure, processes, strategy, accountability, value delivery and alignment with business (Teo et al., 2013). Characteristics of 'IT Governance' described by Peterson (2014) are, flexibility, transparency, shared responsibility and accountability with corporate governance, alignment with business objectives and getting it right to achieve goals. 'IT Governance' at this level places an emphasis on strategies and places of decisions making (accountability, responsibility) rather control of IT. Strategic alignment, risk management, performance management, capability management, accountability and delivery of business value are the overlapping concepts among 'IT Governance', 'Corporate Governance', strategic information systems and strategic information system planning as described by Willson and Pollard (2009).

Figure 2.5 provides a map of key concepts linked to 'IT Governance' at the enterprise level. These concepts are designed to align business objectives, investment and strategy for IT with enterprise and business.

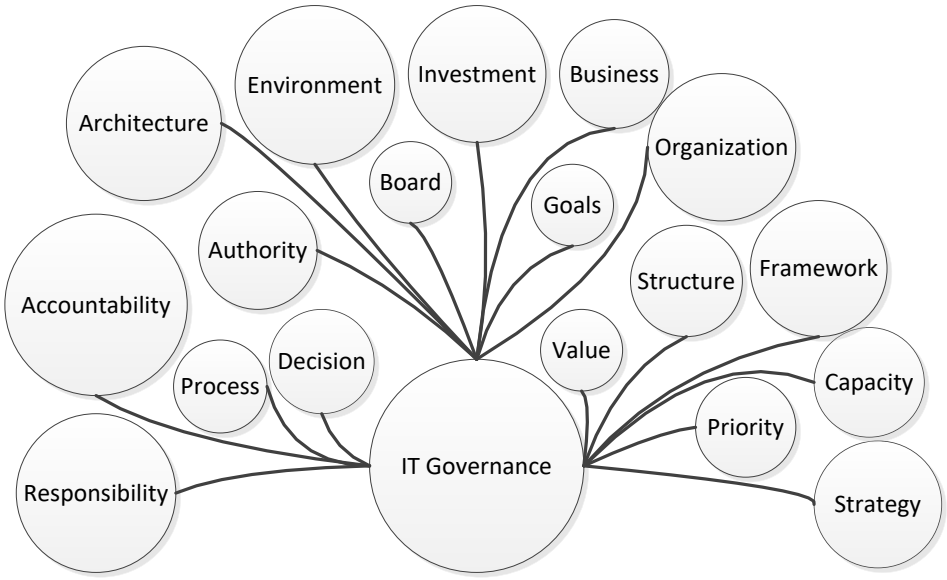



**Figure 2-5 Key Concept link to 'IT Governance'**

'Governance of IT' on the other hand is dealing with the IT resources. Juiz and Toomey (2015) described 'Governance of IT' as a system of control and direction to use IT resources, individual IT functions and activities. They further described that control must be performed from a business perspective (monitoring, management). It provides clear and consistent visibility how (measurement) IT (resources) is used (performance), supplied and acquired (control) for everyone in the stakeholder (people) list. Based on understanding of 'Governance of IT' as described in table 2.10, Figure 2.6 provides a map of key concepts linked to 'Governance of IT'.

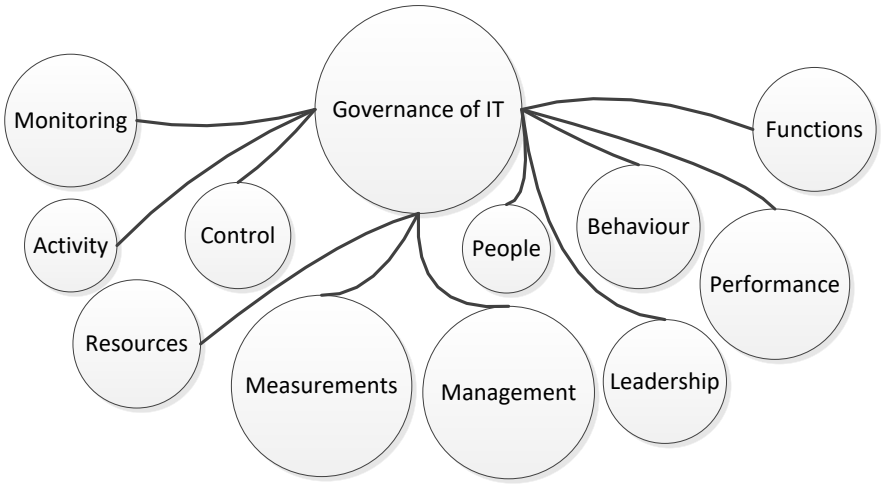



**Figure 2-6 Key Concept link to 'Governance of IT'**

Based on the literature review and an understanding of key concepts in governance, EIT definitions can be divided into two categories, 'IT Governance' (ITG) and 'Governance of IT' (GoIT). Many concepts used in the definitions can be seen at both categories (ITG and GoIT) also distinct concepts of two different levels may be used in a single definition. The dominant concepts used in each definition can help to determine the level of EIT Governance. Based on figure 2.5 and 2.6, it can be determined which concepts are used at what level. However, the overall impact, implementation scope, literature review and tone of the definition helps to determine if it applies at an enterprise level or a resource level. Table 2.10 provides details of definitions and the dominant level of EIT Governance.

These overlapping concepts at different levels are a source of confusion. The confusion is due to overlapping of these concepts at implementation. IT Governance and Governance of IT are part of EIT Governance and described at strategic and operation level respectively, however, these concepts are used interchangeable when people implement it for there day to day work. When strategy, distribution of authority, process and procedures are defined at the higher level, they still discuss who is implementing what and how. This also reflects when day to day procedures, steps and actions are taken, reference to the standard comes along. This is called implementation clarity which could be different in two organizations even when standards, processes and procedures are

same. This can be implemented with right documentation, trainings and contrarious improvement based on feedback from the people who are using it in the organization.

**Table 2-10 Count of Key Concept in EIT Governance Definition over the time**

| Researcher | Year | Governance Definition Reference | Ref | Level |
|---|---|---|---|---|
| Brown and Magill | 1994 | ITG decisions the locus of responsibility for IT functions | D01 | GoIT |
| Luftman | 1996 | ITG is the degree which the authority for making IT decisions is defined and shared among management, and the processes managers in both IT and business organizations apply in setting IT priorities and the *allocation of the IT resources*. | D02 | GoIT |
| Sambamurthy and Zmud | 1999 | ITG refers to the patterns of authority for key *IT activities*. | D03 | GoIT |
| Grembergen | 2000 | ITG is the organizational capacity by the board, executive management and ITM to control the formulation and implementation of IT strategy and in this way ensures the fusion of business and IT. | D04 | ITG |
| Weill and Vitale | 2002 | ITG describes a firm's overall process for sharing decision rights about IT and monitoring the performance of IT investments. | D05 | ITG |
| Schwartz and Hirschheim | 2003 | ITG consists of IT-related structures or architectures (and associated authority patterns), implemented to successfully accomplish (IT imperative) activities in response to an enterprise's environment and strategic imperatives. | D06 | ITG |
| IT Governance Institute | 2004 | ITG is the responsibility of the board of directors and executive management. It is an integral part of enterprise governance and consists of the leadership and organizational structures and processes that ensure that organization's IT sustains and extends the organization's strategies and objectives. | D07 | ITG |
| Weill and Ross | 2004 | ITG is specifying the decision rights and accountability standard to encourage desirable behavior in *using IT*. | D08 | GoIT |
| Craig, Cecere, Young, and Lambert | 2005 | ITG is the process by which decisions are made around IT investments. How decisions are made, who makes the decisions, who is held accountable and how the results of decisions measured and monitored are all parts of ITG. | D09 | ITG |
| Webb, Pollard and Ridley | 2006 | The strategic alignment of IT with business, such that maximum business value is achieved through the development and maintenance of effective IT control and accountability, performance management and risk management. | D10 | ITG |
| Simonsson and Ekstedt | 2006 | ITG is the preparation for, making of and implementation of IT-related decisions *regarding goals, processes, people and technology* on a tactical or strategic level. | D11 | GoIT |
| Bowen et al. | 2007 | IT governance is the IT related decision making structure and methodologies implemented to plan, organize, and *control IT activities* | D12 | GoIT |
| De Haes and Van Grembergen | 2009 | IT governance consists of the leadership and organizational structures and processes that ensure that the organization's IT sustains and extends the organization's strategy and objectives | D13 | ITG |
| Gerrard | 2010 | ITG is the process that ensures the effective and efficient *use of IT* in enabling an organization to achieve its goals. | D14 | GoIT |
| Huang et al. | 2010 | The goal of IT governance is to direct and oversee an organization's *IT-related decisions and actions* such that desired behaviors and outcomes are realized | D15 | GoIT |
| Ali and Green | 2012 | A structure of relationships and processes to control the enterprise in order to achieve the enterprise's goals by adding value while balancing risk versus return over IT and its processes | D16 | ITG |
| Bradley et al. | 2012 | IT governance is the capacity of top management to control the formulation and implementation of the IT strategy via organizational structures and processes that produce desirable behaviors, which will ensure that IT initiatives sustain and extend the organization's strategy and objectives | D17 | ITG |
| Chong and Tan | 2012 | IT governance is regarded as a framework in specifying the allocation of IT related decision making rights and responsibilities to the right organizational group and deploying relational mechanisms to support the alignment between business objectives and IT | D18 | ITG |

The EIT Governance process is to provide coverage and connection between business and IT to ensure that activities (projects or operations) are carried out properly and achieve the desired results (Sharma et al., 2009). This indicates that 'IT Governance' and 'Governance of IT' do overlap even when key concepts are divided across these two levels. Based on the literature review and Table 2.10, Figure 2.5 and Figure 2.6, I developed Figure 2.7 to demonstrate different levels and concepts in EIT Governance, 'IT Governance' and 'Governance of IT'. It is understood that EIT Governance is encompassed by 'IT Governance' and 'Governance of IT'. Concepts from the definitions are divided into 5 groups based on their functions and close connection. These groups are named as Business, Organization/Enterprise, Management, People and Governance. Figure 2.7 provides a map of the boundaries of different concepts which are not clear from the individual definitions. The complexity can be easily seen from this figure where multiple concepts are interlinked as well as having many overlapping layers.

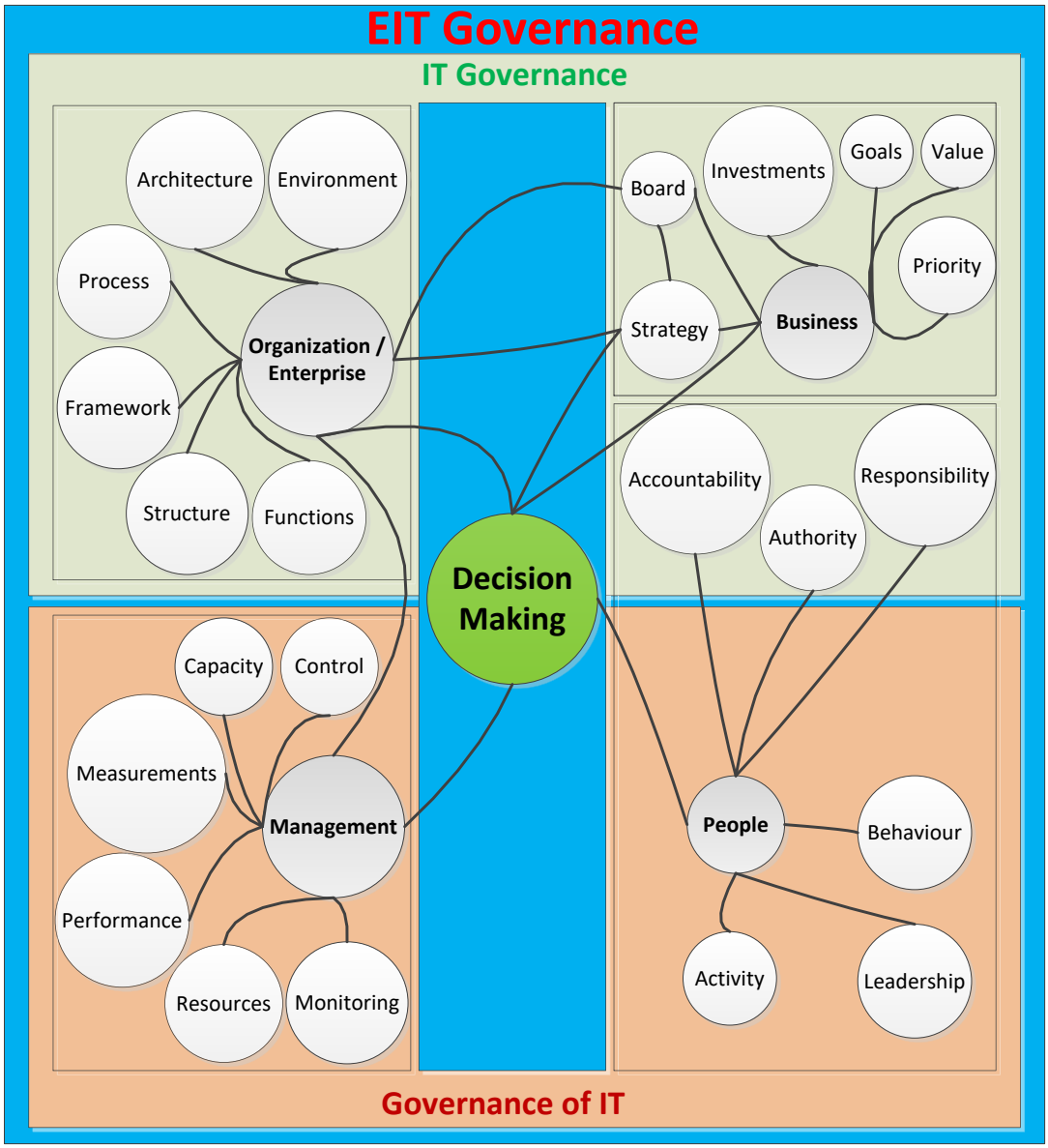



**Figure 2-7 Governance layers, Key Concept Overlapping and functional boundaries**

From the literature review, it became clear that decision-making is implemented in many forms and shapes within organizations. For IT department and functions, decision making is even more complex where organizational layers are overlapping and sometime may be competing against each other. Decision making implementation is the framework or process structure in which it is set to executed in the organization. These process, procedures, rules and responsibilities are defining structure of decision making in the organization. Whereas, clarity is the understanding and use of these set standards, processes and procedures among the people in the organization. It includes understanding and awareness about the hierarchy of decision makers in the organizational layers, who

is making what decision and how. It is evident that implementation clarity in all these cases is not only important, it is vital for better results. When applied in the project organization, it should have the same impact. Hence, a research finding is:

#### 2.2.1.1 Research Finding (RF) - 1:

Implementation clarity of decision-making leads to ASD project success

### 2.2.2 Decision-Making Distribution

Frameworks are developed for governance processes and its implementation for different layers of the organization. The organizational form of IT in the enterprise is a vital element to establishing decision rights in the governance layers (Peter Weill & Jeane W Ross, 2004). Weill and Ross categorize implementation of decision making into 6 types, 'business monarchy' for strategic IT decision making by senior business executives, 'IT monarchy' for IT decisions making by CIO and senior IT managers, 'feudal' for particular business units decision making by business unit managers, 'federal' for shared decisions and control of shared resources by business unit and IT managers, 'IT duopoly' for segregated decision making and control for IT functions and operations by IT professionals and lastly 'anarchy' where IT is spread across and embedded within business units and decision making and responsibilities are blurred. Each of these forms result in a different decision making structure and set of business processes. These decision making structures come with accountability and involvement of governance and management (Peter Weill & Jeane W Ross, 2004). 'Control Objectives for Information and Related Technology' (COBIT) is a famous framework for implementation of governance processes (Willson & Pollard, 2009). COBIT is considered as a best practice framework based on processes, performance and monitoring (Simonsson & Ekstedt, 2006). This framework was developed by 'Information Systems Audit and Control Association' (ISACA) and was designed to devise process maturity levels at the individual process level. The COBIT framework encompasses the complete IT life cycle in four broad domains that include tailored IT processes (Debreceny & Gray, 2013). The COBIT framework was developed based on other methodologies and does have flexibility to implement IT decision making structure and governance processes.

The four domains in the COBIT framework are Plan and Organize (PO), Acquire and Implement (AI), Develop and Support (DS) and Monitor and Evaluate (ME). COBIT is stated by the IT Governance Institute (ITGI) to be an IT Governance framework, and it actually comprises both governance and management components. Major aspects of the PO and ME domains are at the governance layer, while AI and DS are almost entirely at the management layer (Debreceny & Gray, 2013). Furthermore, COBIT is considered an influential framework for decision making across the investment lifecycle and business goals alignment (Rowlands et al., 2014). Other researchers confirmed that IT governance initiatives, such as steering committees, have a positive impact on achieving key business objectives. The alignment of IT deliverables with business objectives is associated with maturity of the implemented processes. This finding supports the ISACA IT governance report's conclusion that ''[t]he main driver for activities related to [IT governance] is ensuring that IT functionality aligns with business needs'' (Debreceny & Gray, 2013). COBIT identifies which resources need to be leveraged and defines the management control objectives that have to be considered (Haanappel, 2011). The COBIT framework is to implement governance processes across IT and influence the alignment of IT deliverables with business objectives.

Another commonly used control framework is 'Infrastructure Technology Infrastructure Library' (ITIL) (Willson & Pollard, 2009). ITIL was initially developed in the UK by the office of Government and Commerce (OGC) for services related processes and is considered an IT Governance implementation framework by the IT community. It is used for best practices in the IT services field but is unable to provide strategy or alignment of IT and business (Simonsson & Ekstedt, 2006). 'Australian Standard 8015: Corporate governance of information and communication Technology' (AS 8015:2005) is the first standard delivered by Australia for EIT Governance. This standard is designed without considering differences of management and governance processes. 'The international standard for corporate governance of information technology – ISO/IEC38500' is derived from AS 8015:2008 (Juiz & Toomey, 2015). 'The information security standard BS7799/ISO17799' is designed to implement risk management and segregation of duties, but it only covers security aspects of EIT Governance implementation (Simonsson & Ekstedt, 2006).

Despite availability of these standards and frameworks for corporate and EIT Governance, governance model, the amount of use, shape, size, function, strategic and

technical role at different levels is a choice of the organization (Pound, 1995) (Weill & Vitale, 2002) (Peter Weill & Jeane W Ross, 2004). Process models, categories, IT resources / assets, control objectives and their generally accepted standards, which an organization should consider, are identified by these frameworks. This standardization allows organizations to create their own customized responsibilities, accountabilities and linkage between business objectives and IT objectives relative to their industry peers for implementation and benchmarking (Broussard & Tero, 2007). These frameworks, for different layers in the organization, are represented below as standard reference models based on best practices, to allow organizations to tailor them and implement as per their requirements. Figure 2.8 represents different implementation models used at various layers in the organization, developed in response to the literature reviewed and the discussion above.

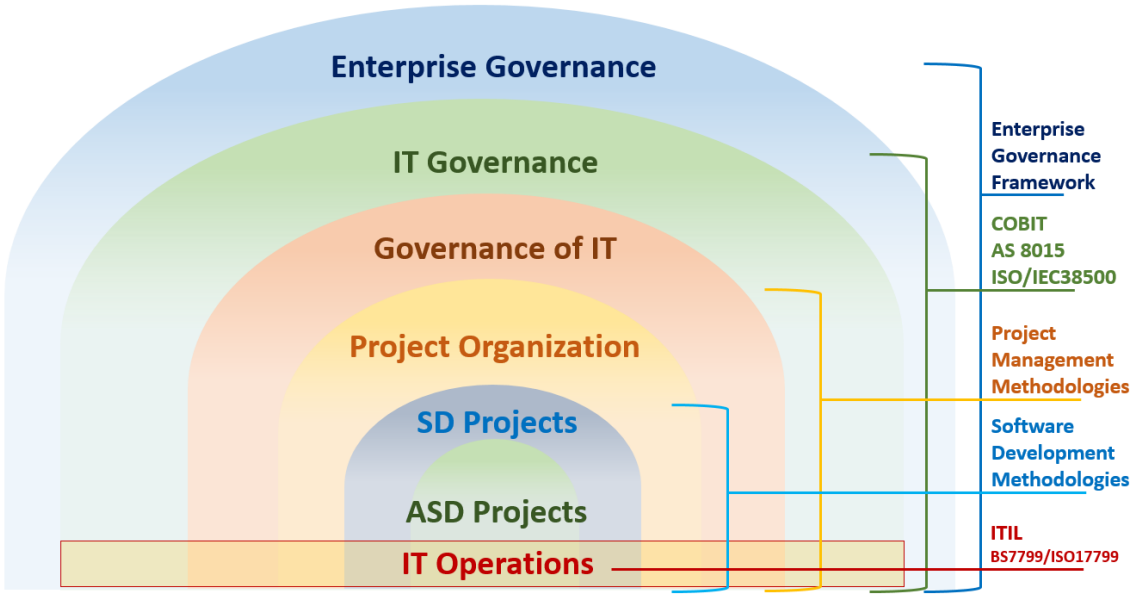



**Figure 2-8 Framework and Processes at Different Levels of Governance**

Various approaches are used to implement 'Governance of IT' at the tactical or resource level. Some IT functions are implemented as centralized, some are decentralized and others are hybrids (V.Brown & Magill, 1994). This arrangement is purely for the implementation purpose with both pros and cons. Decentralized governance of IT resources is to delegate decision making to IT professionals closest to the problem. This approach brings the advantage of better utilization of IT resources at the same time it does carry the risk of misalignment with the overall business objectives. Centralized

governance of IT resources is eliminating this risk by optimizing resource allocation to satisfy business objectives and investment, however, this approach potentially limits the decision making at the local level where managers have a better understanding of the problem and solutions (Thompson et al., 2014). The wrong approach applied to the wrong resources will lead to an adverse impact, including increasing the risk of failure and misalignment with business objectives. Differences can be clearly observed when governance layers, distribution of decision making in these layers and distribution of resources varies from the arrangements of organization layers.

ASD projects assume distribution of decision making at project level. There are resources like funding can not be distributed at project level, it is managed and controlled by the authorities at central level who can make decision for portfolio, program and projects. Decision making of project budget for weekly and monthly tasks can be distributed to project level which happens in most cases. Similarly, in other areas as well, centralized and decentralized implementation is observed and common in the organizations. For ASD project, teams are expected to be self-governed and project is expecting continuous change of requirements and direction. More distributed and decentralized implementation supports ASD projects. The difference is how this distribution is implemented and effective in the organization to support ASD projects.

Based on the above findings from the literature review, it is evident that decision making is distributed within organization and for IT department and resources. This distribution is supporting layers and boundaries of various roles and functions. When applied in the project organization, it should have the same positive impact on the ASD projects. Hence, a research finding is:

#### 2.2.2.1 Research Finding (RF) - 2:

Distribution of decision-making leads to ASD project success

### 2.2.3 Decision-Making Tailoring

EIT Governance, its layers and implementation for IT and IT resources are covered at a general level. All these aspects of Governance are further explored specifically for software development projects. This research is focused on agile software development

projects and governance specific to these projects. Organizations use projects to achieve strategic goals and business value. Project success is achievement of business value. At the same time, project processes are not independent of each other and one of the key factors in project success or failure is governance (Too & Weaver, 2014). Hierarchical layers are used in the organizations to manage and control portfolios, programs and projects. 'Governance of Projects' and 'Project Governance' are corresponding layers with EIT Governance layers.

**Project Organization Structure**

The total investment of computing and communication technology of an enterprise is defined under an 'Information Technology Portfolio' (Weill & Vitale, 2002). The definition of portfolio also reflects this notion as 'the totality of an organization's investment in the changes required to achieve its strategic objectives' (OGC, 2007). IT assets or resources including, hardware, software, telecommunications, data, people, processes and functions are incorporated into this portfolio. These resources are consumed to achieve the results to meet business objectives. A project is 'a temporary endeavour undertaken to create a unique product services or result' (PMI, 2016). A Program has been defined as 'a group of related projects that together achieve a beneficial change of a strategic nature for an organization (APM, 2006). Portfolio, program and project can be considered, by definition, as mechanisms for implementing changes to meet the organizations strategic goals and to realize business value. For example, a digital consolidation portfolio aims at the strategic level to consolidate and standardize functions and resources to reduce waste and increase productivity. It is further divided into programs and projects to achieve these objectives. Each program is a group of related projects where all individual projects are contributing to the final deliverable. Below is an example of portfolio, program and project from the workplace where I am working as project/program manager and managed such large scale programs.

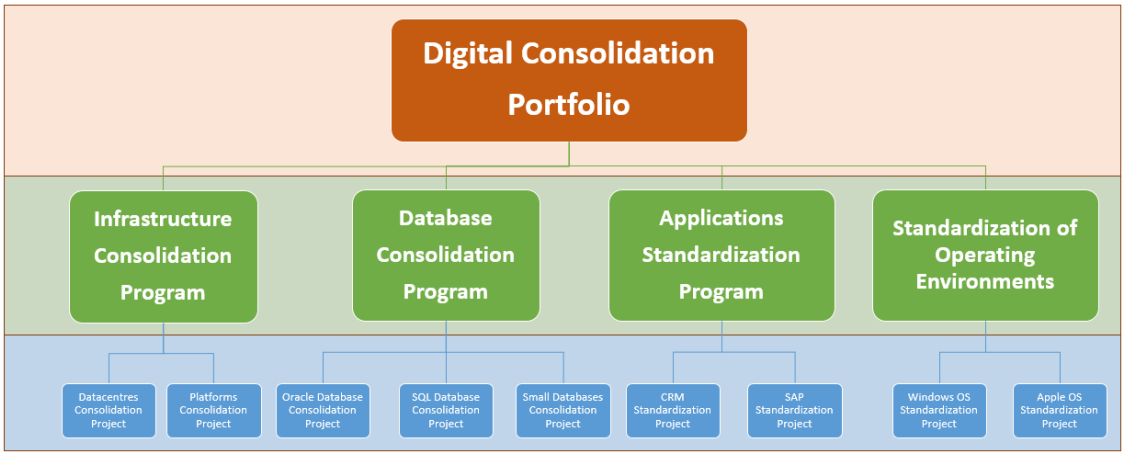



**Figure 2-9 Portfolio, Program and Projects**

The governance of the project, program and portfolio is suggested to be a sub-set of corporate governance as the basic function is to realize business value (Too & Weaver, 2014). In this structure, business value is attained by the initiatives organized as programs or projects to receive benefits from work efforts (Hanford 2005). Hanford further explained this structure where projects are within a program and/or portfolio, assessed and managed by portfolio at the top. At the enterprise level, portfolios are identified and the structure of the portfolio is aligned with business boundaries and components. Each portfolio has a core business objective, which can be the development of a specific product, business segment or delivering functionality for a separate business unit/department within a multinational organization. Each portfolio has people, funds and resources to be allocated to initiatives (projects or programs) within the portfolio and assess them as per the business objectives and requirements. Matrices, measurement and reporting are developed for each initiative, assessed with several dimensions for the core business object set by portfolio, and compared with the performance of other portfolios in the organization. Executive leadership is responsible to establish portfolio structure, measurement matrices and identify specific portfolios that offer the most benefits from the initiatives.

The primary objectives of portfolios are to identify, select, monitor, finance and maintain a suitable mix of programs and projects to achieve organizational objectives (Kellerman & Lofgren, 2008). Programs and projects are initiatives with a portfolio, however, a program is a mini structure of a portfolio where the same objectives (select, monitor, finance and maintain to achieve business objectives) are applied to group of similar

projects. Programs are created within portfolios to group similar types of work to combine efforts and resources. The basic unit which delivers the business value in the portfolio is a project. Getting maximum benefit from the projects have two parts, 'doing the project right' and 'doing the right project' (De Reyck et al., 2005). De Reyk further explained that project management is the answer for the first part where a single project is in focus, while program management is for the second where a set of project are concerned with shared goals and resources. A portfolio considers all initiatives, the entire resource pool, aggregated outcomes and compares them with overall business objectives.

Table 2.11 provides these layers of portfolio, program traditional project and agile project with their common measurement factors. The portfolio is a strategic level where business objectives and the cost is for the project organization while the program is a logical grouping to manage the same factors for a group of similar projects. The basic unit is a project where results are delivered in the form of functionality from IT. A clear difference can be seen between the traditional project and the agile project. In the traditional project, time is bound, cost and resources are limited as per the phase or deliverable, and functionality is specific and pre-defined for the project while risk is low at the level of specific functionality. On the other hand, an agile project is different in all the measurement scales. Time is flexible, the cost is variable as per required resources, functionality is very small and specific, and risk is high at the functionality level, which is transferred from the project to the individual iteration.

**Table 2-11 Measurement Indicators for Project Organization**

| | Time | Cost/ Resources | Scope | Risk |
|---|---|---|---|---|
| **Portfolio** | On going | High (in volume) | Business Objective (tangible & intangible) | Overall Business Risks (high) |
| **Program** | On going | Medium (in volume) | Business Objective (for specific area) | Specific Business Risks (Medium) |
| **Traditional Project** | Bound (medium to Large) | Limited (in volume) | Functionality (specific deliverable) | Specific Functionality Risks (Low) |
| **Agile Project** | Flexible (short in iteration) | Variable (in iterations) | Functionality (very small & very specific) | Specific Functionality Risks (High) |

## Standards used for Project Organization

There are many standard measurement methods used in traditional software development projects. These standard methods include PERT, functional point analysis, requirement and design diagrams, change control etc. Only a few standards are available for agile software development projects. For estimation, in the absence of well-defined and complete requirements, subjective estimation of agile software development is highly biased (Javdani et al., 2013). Other tools used in the agile software development projects are velocity, burndown charts, cumulative flow and change based re-work (Javdani et al., 2013). Further to that, various development approaches within agile projects may have other variations. Test-Driven development, Continuous integration, continuous delivery and parallel independent testing approaches are used for different reasons where steps of development and delivery are not same (Ambler & Lines, 2012). Agile models, iteration and structures within iteration may differ in each implementation (Kennaley, 2010) 2010) and the agile software development cycle may not be the same for various projects in the same company. Measurement indicators of agile software development may be different from company to company or within the same company they may be different for different projects.

## Governance Layers within Project Organization

A project is a complex and dynamic system that requires specific governance mechanisms. The purpose of governance is both, 1) to define standards or rules for projects and that individual projects to comply with these rules, as well as to 2) monitor the fulfilment of these rules (Ahola et al., 2014). Portfolio, programs and a collection of projects are logically grouped in the enterprise as 'project organization'. Governance of the ‘project organization’ is referred as ‘Governance of Projects’ (GoP). The focus of GoP is on value systems, accountabilities, processes and policies for projects to align project deliverables with overall business objectives (Müller, 2009). This level of governance is a board level perspective with a broader view on all the projects rather individual project itself (Müller et al., 2014). At this stage, value, accountabilities and polices are viewed for the entire ‘project organization’ and are aligned with enterprise strategy and business objectives. The entire funding for the ‘project organization’ and total business value required from this investment is controlled at this level. Also decision making is at a strategic level for all projects under ‘project organization’. Individual

project governance and control is not a consideration for GoP. Hence, GoP is considered at same level as 'IT Governance' of EIT Governance.

On the other hand, governance of the individual project is called 'project governance', which deals with structure, authority, process, resources, coordination and control within a single project (Pinto, 2014). These governing elements (structure, authority, process, resources) combined with management function are nested (portfolio to projects) in the 'project organization' (Too & Weaver, 2014). This nested structure of governance is formed as Project Management Office (PMO) for 'project organization' at GoP level, and steering committee at individual project or 'project governance' level. Resources for individual projects are allocated and controlled by project governance through a project steering committee. Therefore, 'project governance' is considered at same level as 'Governance of IT'.

Table 2.12 provides these layers for enterprise IT at general level and for Project Organization at specific level. Figure 2.10 represents combined governance to show how they are linked and overlapping in overall EIT Governance.

**Table 2-12 Governance Layers**

| | **Enterprise IT**<br>General Level | **Project Organization**<br>Specific Level |
|---|---|---|
| **IT Strategy Layer** | **IT Governance**<br>(Peterson 2004) | **Governance of Projects (GoP)**<br>(Müller 2009) |
| **IT Resource Layer** | **Governance of IT**<br>(Juiz & Toomey 2015) | **Project Governance**<br>(Ahola et al. 2014) |

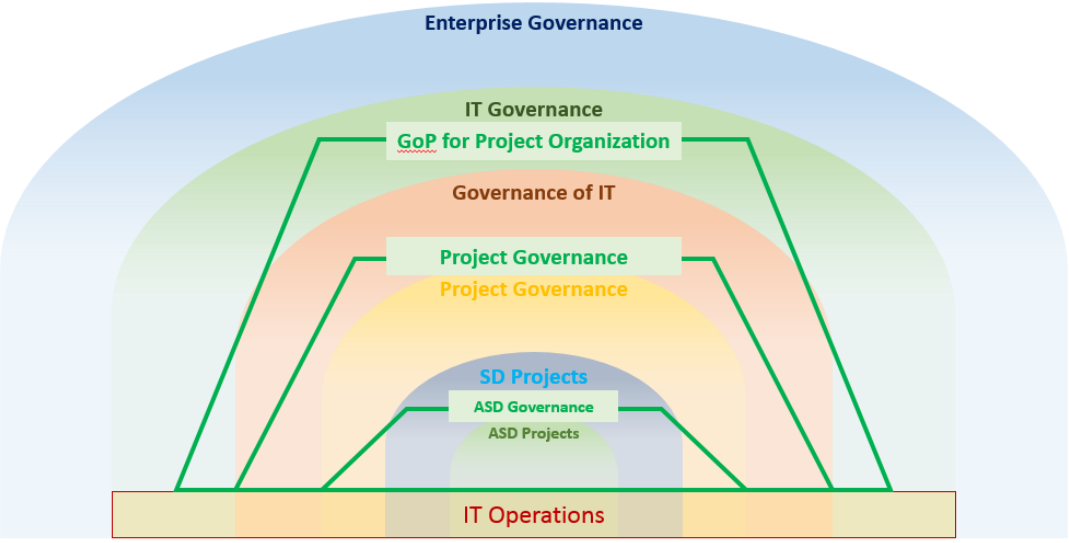



**Figure 2-10 Governance Layers for Projects**

The agile software development introduced inconsistencies to existing norms. Project governance has to make decisions in this risky environment for project value and the allocation of resources (Highsmith, 2014). However, 'project governance' which is internal to specific project, can build tailored structures, processes, authorities and resources as opposed to standard defined rules, for unique projects requirements (Ahola et al., 2014). Project governance does have the flexibility to adopt new types of challenges as well as to play a bridging role between governance layers. At an individual project level, project governance can customize governance functions to support agile project teams and at the 'IT Governance' level it can translate information for other processes and stakeholders. Effective governance is based on motivation and enablement, not command and control (Ambler & Lines, 2012). Resources can be acquired by Project governance through existing enterprise process while these resources are allocated to the project layer below as per running iterations.

Based on the above findings from the literature review, project organization is operated as a unique entity within an IT department. It does have its structure, standards and layers of governance. From the corporate level functions to the department level functions and then to the project organizations, customization and tailoring is inevitable. Decision-making is applied at different layers differently and project organization within a corporate organization is tailored for their decision making. When applied to the project

level, it is understood from the literature that decision-making is tailored for the ASD project within project organization. Hence, the research finding is:

#### 2.2.3.1 Research Finding (RF) - 3:

Tailoring of the decision-making process leads to ASD project success

## 2.3 Hypotheses

From literature review three research findings are discovered. As mentioned in the research methodology (Ch-3), under survey research methodology, to test these findings, hypotheses are developed. Each finding is transformed into a hypothesis. Related variables are linked positively with each other to confirm if that is true.

Research findings from literature review are:
RF-1 Implementation clarity of decision-making leads to ASD project success
RF-2 Distribution of decision-making leads to ASD project success
RF-3 Tailoring of the decision-making process leads to ASD project success

Each finding has two variables where one is common in all. Each statement is showing first variable is leading the second variable. When converting these findings into hypothesis, an assumption is made to be tested true. Hence, developed hypothesis will relate first variable to the second variable and assume it is true. Data collection and analysis will be based on these hypotheses.

**Hypothesis 1**:
Implementation clarity of decision making positively relates with ASD project success.

**Hypothesis 2**:
Distribution of decision making positively relates with ASD project success.

**Hypothesis 3**:
Tailoring of the decision-making process positively relates with ASD project success.

### 2.3.1 Research Data Model

A research data model is formed based on the hypotheses as stated below:

1. Implementation clarity of decision making positively relates with ASD project success.
2. Distribution of decision making positively relates with ASD project success.
3. Tailoring of the decision-making process positively relates with ASD project success.

The common factor in all the hypotheses is ASD project success. A high level model was developed where ASD project success is on one side and the factors from the hypothesis which are impacting on the ASD projects success are on the other side of the model. It is understood that these factors have a significant impact on the ASD project success, which is the base of above hypotheses. Through the survey data collection, these hypotheses were assessed for this impact of these factors on the ASD project success. Below is the diagram which denotes a hypotheses factors and their connection to the ASD project success:

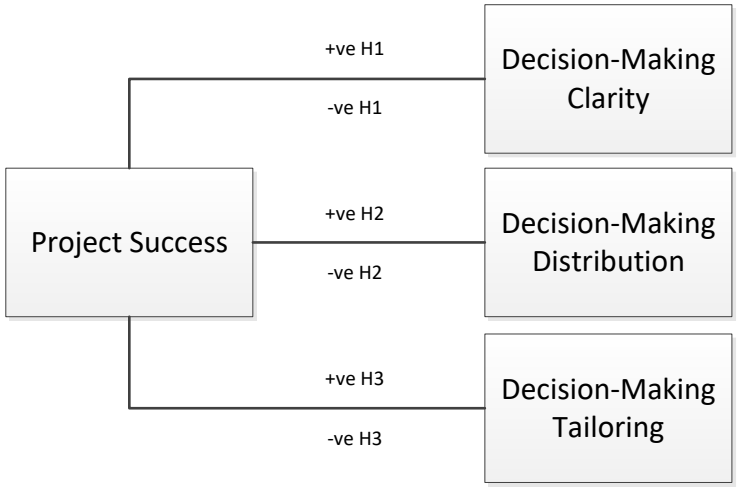



**Figure 2-11 Research Model - Hypothesis**

This research model is enhanced with the elements of data for each section which describes the type of data representing model components. These elements were extracted from the literature review while developing the hypothesis.

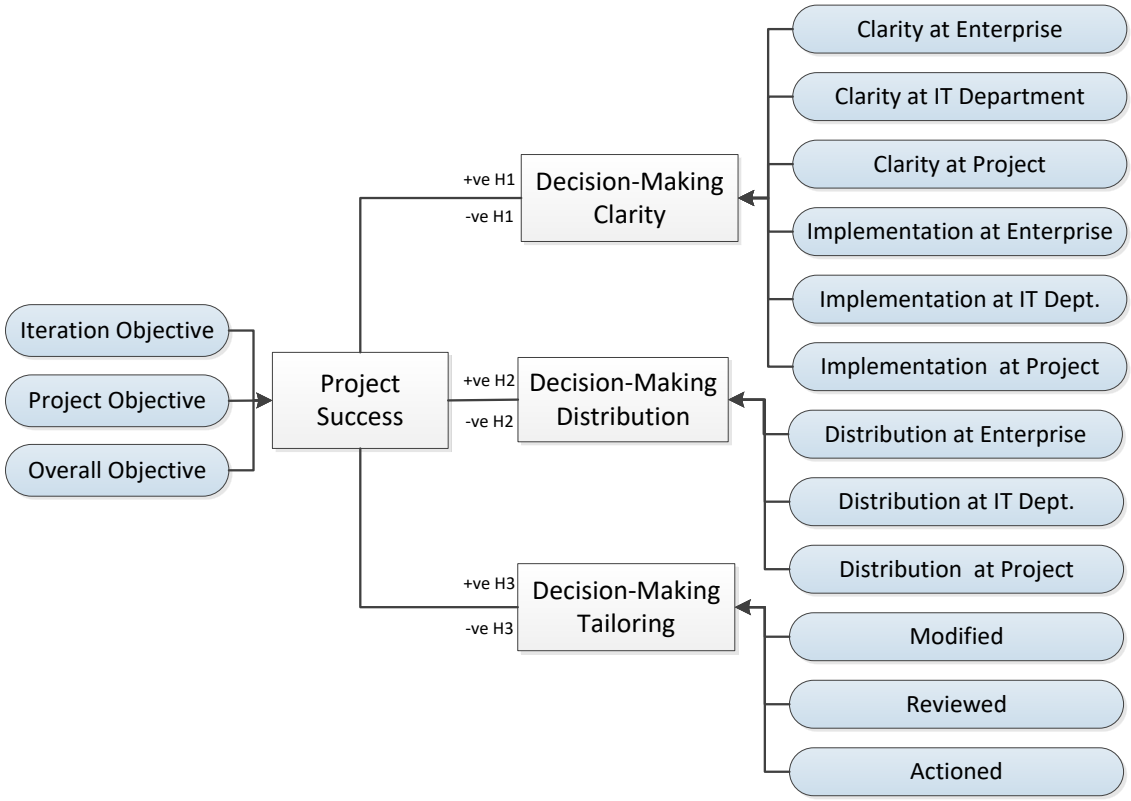



**Figure 2-12 Research Model - Data Elements**

Each data element is now described as a data item in the model to collect the actual data for validation of the hypotheses.

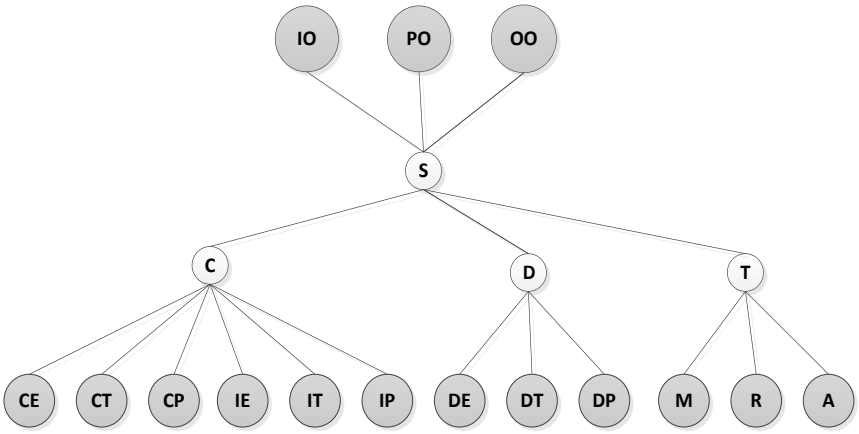



**Figure 2-13 Research Model - Data Items**

Description of each data item is provided below.

IO → Iteration Objective (Business Objective achieved from each iteration)
PO→ Project Objective (Business Objective achieved from the project)
OO → Overall Objective (time, cost, quality achieved from the project)
S → Success (Project Success in terms of Business Objective achieved)
C → Clarity (of Governance)
D → Distribution (of Governance)
T → Tailoring (of Governance)
CE → Clarity of governance at Enterprise level
CT → Clarity of governance at IT department level
CP → Clarity of governance at Agile Project level
IE → Implementation of governance at Enterprise level
IT → Implementation of governance at IT Department level
IP → Implementation of governance at Agile Project level
DE → Distribution of governance at Enterprise level
DT → Distribution of governance at IT Department level
DP → Distribution of governance at Agile Project level
M → Modified (governance processes modified)
R → Reviewed (governance processes reviewed)
A → Action (corrective actions taken for governance)

## 2.4 Second Literature Review

Stage-1 results (Ch-4) indicated a need for a further and deeper study to find missing factor(s). Stage-2 employed open-ended interviews and thematic analysis to explore factors related to decision-making. A new factor, 'team' was discovered as a result of stage-2 data analysis. This factor was not considered in this research before. The concept of people was discussed in the EIT Governance definition. A team is a group of people, and this made them a different entity due to its formation. The team was not found from a decision-making perspective for an ASD project in the earlier literature review. Essentially, another literature review is needed to find team formation or structure as a factor or other dimension(s) to impact ASD projects. A second literature review was conducted, and details are provided in section 2.5 in this chapter.

Note: Section 2.5 is a literature review triggered by the analysis of qualitative data in stage-2 (Ch-5). If readers cover Ch-5 and return to section 2.5, it might make more relevance and flow of reading.

## 2.5 Team Literature Review

The original research was to understand the governance impact on innovative software development projects, particularly agile software development projects and investigate its impact on ASD projects and recommend improvements. The stage-1 data analysis accepted two hypotheses and rejected one hypothesis (Ch-4). In stage-2, participants were asked open-ended questions to determine if any factor(s) were missed; one significant find was 'Team' (Ch-5). This was a new factor that emerged in the decision-making context and could not be found in the previously conducted literature review. Though the concept 'people' was discussed in the EIT Governance definition, "team" was not discussed. A further literature review was required on team formation/structure/composition for analysis and to explore this newly discovered factor. To understand better, this Authorconducted another literature review to find team formation in the context of decision-making and how this could be related, and what area should be focused on for further data gathering.

### 2.5.1 Team

A team is defined as “a group of people who work together” Merriam Webster (2016). The people may be grouped together for a cause or a common goal as well as to play, travel, or just for enjoyment. ‘Team’ and ‘Group’ are the phrases commonly used for the same meaning, in various situations, when people are together for a reason. Hence, both words are used interchangeably throughout this paper.

### 2.5.2 Team in the organization

The team is considered as an essential management tool for governance (Gersick 1988) and described as an “integral” part of the organization (Sundstrom, 1999). An organization consists of various teams with defined objectives. A few teams are permanent, like departmental groups (HR, Finance, Sales etc.), while others are created temporarily for specific reasons (task force, projects etc.). A software development project comprises analysis, design, coding, and testing disciplines and may require expertise from the other functional areas (HR, Finance, or Sales) of the organization. The scale and complexity of a software development project require a team instead of an individual (Mathieu et al., 2006). Individuals from various IT backgrounds and organizational departments form a team for specific software development activities. An Agile approach is introduced for flexibility in the way software is developed and delivered. Adoption of innovation is always challenging in a conventional milieu. Building a team becomes particularly challenging for agile software development projects because of the fluid nature of teams (Licorish et al., 2009). The flexibility in agile is applied to the project backlog, the activities, the agile team and the individual members of the agile team. This flexibility makes each member of the team critical for the shape and performance of the agile team. The value of individual team members and the impact of an agile team in the agile paradigm is derived from the Agile Manifesto.

### 2.5.3 An Individual’s Value in Agile

The Agile Manifesto was developed in 2001 and the first value statement in this manifesto is about people, i.e. “Individuals and interactions over processes and tools” (Alliance, 2001). The individuals and their interactions are given more importance than the

processes and tools used for the agile development and delivery of the software. This is because the processes and tools are to complete the task not to dictate and change the way people do work. If required, people in the agile projects can change the processes and tools to improve the software and the delivery. One out of the twelve principles of agile software development particularly defines the value of the individuals. The principle states, “Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done” (Beck et al., 2001). Individuals are at the core in the agile project. When the individuals are willing to take the challenge, they make a difference. The environment (process) is important and the support (tools) is still required, however, though these are not dominant factors. The second part of the rule is making the value absolute clear by emphasizing the trust in the individual. This trust includes the acceptance that the individuals can make right decisions, and if they made a mistake, they have the ability to correct it and they will. To make it happen, the individuals need to interact with each other in the team. The next important agile principle is related to the agile team, its shape and critical role in the agile software development project.

### 2.5.4 Team’s Value in Agile

The agile principle about the team states: “The best architectures, requirements and designs emerge from self-organizing teams” (Beck et al., 2001). The complex tasks like capturing the requirements (analyst is working with business personnel), building the architecture (architect is working with the coders) and setting up software flow and design (designer is working with the testers) is team work where individuals from different skill sets work together. Output cannot be incredible if the team is not at its optimum state. A prime team is possible when the individuals in the team interact, share ideas and be creative and innovative. This state can be achieved when the individuals in the team are free to perform, take their own decisions and manage their work independently. The Agile philosophy tends towards an informal approach of management in which time, efforts, communication, transparency and more flexibility is assumed among the team members as well as between the team and management itself (Crowder, 2015). An informal setup means more frequent changes within an agile project and an agile team. However, the agile team needs to be empowered to self-organize and to better deal with varying conditions. Empowerment is not a new phenomenon (Lewin 1947) and has been seen as

a powerful mechanism for increasing employee involvement (Lawler, 1986). Empowerment brings motivation and willingness to the individuals as well as the attitude towards ownership and teamwork. Empowered teams have the capability to influence a project's success (Cohen & Ledford 1994, Kirkman & Rosen 1999) (Mathieu et al., 2006). Converting an individual to an empowered team member of a self-organized and performing team requires a transition. I illustrated it in the below figure (Figure 6.1).

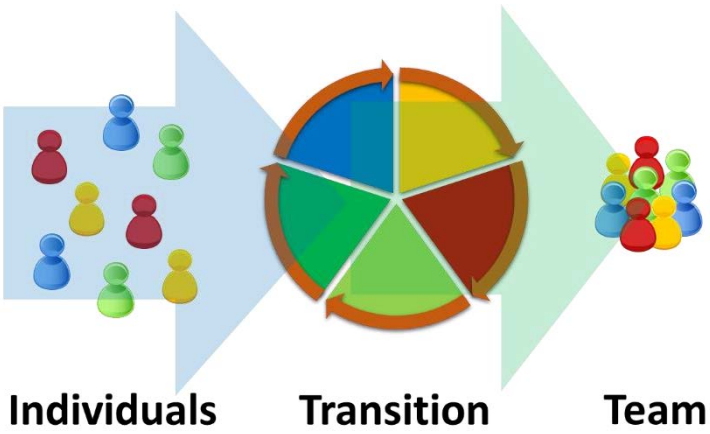



**Figure 2-14 Transition from an Individual to a team**

There could be many team models, however, a performing team in agile is which gets the job done. There could be people in the agile project who are fully committed for development and delivery (like developers), partially committed and do work on other projects simultaneous (like scrum master) and people who are only part of certain tasks (like product owners). When agile teams are discussed, all those are part of the team who are performing the tasks for a particular project. I selected the performing team as discussed by Tuckman (1965), because I found it the closest model of an agile team in the ASD projects as it was described by the participants in stage-2 data gathering and the model described by tuckman where team is build over time in stages.

### 2.5.5 Performing Team characteristics

A performing team is different than an ordinary team and contains unique characteristics. Everyone is realigned (from the existing state of an individual to an empowered team member) in a performing team. This realignment / transition takes time and resources and

should not be neglected (Moe et al., 2010). People take time to adopt to a new situation. The time and resources required for this adoption may not be considered as part of the agile project tasks or deliverables. Hence, it is easy to neglect transition activities. However, agile team development is one of the most important aspects with a direct impact on the project outcome (Crowder, 2015). Assembling or co-locating people under one structure is not the transition which can result in an effective team. Self-organized and performing teams require specific characteristics (Crowder, 2015). Individuals are given independence and trust in the team. This trust helps them to set their own goals. Individuals align their goals with the project objectives. Team members commit themselves to their goals which helps them to develop relationships and interdependence with other team members. This leads to creativity and innovation where each team member is empowered to take their own decisions. It develops team ambiance to take the job to the next level. The group becomes self-organized by adopting changes as they come, improving through a feedback loop, resolving conflicts, developing accountability, and creating more transparency. Once the team is self-organized, it can start performing with a focus on the results, improvements and stability in the team and solution delivery. These are the characteristics of a self-organized performing team.

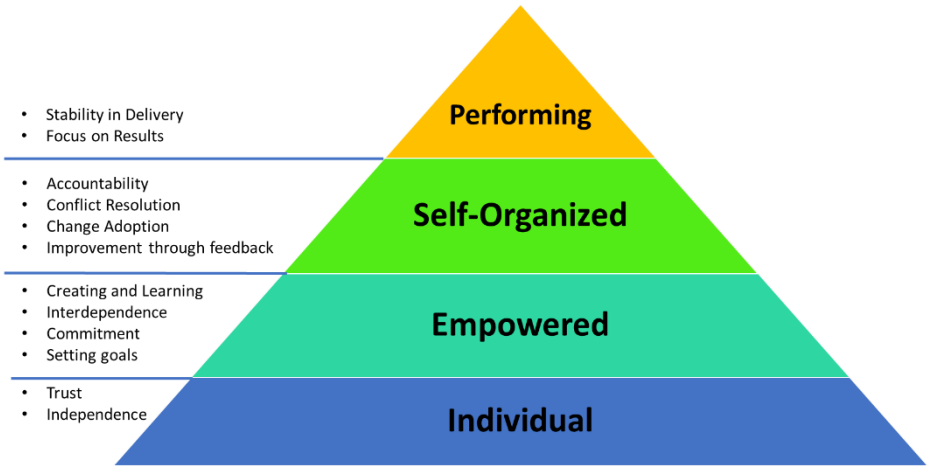



**Figure 2-15 Self-Organized Team Characteristics**

The above diagram is providing the characteristics of a performing team. If you read it from the bottom, it will show how from an individual to a self-organized perfuming team builds and characteristics of each stage.

1) Independence
2) Trust
3) Set Goals and Objectives
4) Commitment
5) Interdependence
6) Creativity and Learning
7) Improvement through Feedback
8) Change adoption
9) Conflict Resolution
10) Accountability
11) Focus on Delivery
12) Stability in Delivery

### 2.5.6 Team Transition Process

The transition is a process in which a self-organized and performing team is developed and attains the above characteristics. This process of change has been greatly studied by behavioural scientists and has been given the term of 'group development'. Tuckman (1965) is the first one who combined various studies and evolved a model of group development stages. He used classification approach based on a) the settings in which the group is formed (therapy group, t-group and natural group), b) the realm into which the group behaviour falls at any point in the time (task or interpersonal) and c) the position of the group in the hypothetical development sequence (stages of group development) (Tuckman, 1965) (Tuckman, 1965) (Tuckman, 1965) (Tuckman, 1965) (Tuckman, 1965) (Tuckman, 1965) (Tuckman 1965) Tuckman reviewed multiple studies from various researchers to develop the five stage 'group development model'.

### 2.5.7 Group Composition

The setting of the group distinguishes various group types. The group variation is based on the group features including problem area, size, demography, and duration of 'group-life' (Tuckman, 1965). These features are consolidated as the 'group composition'. Composition is defined as "the way in which something is put together or arranged"

Merriam Webster (2016). Group composition consists of the purpose (problem to solve), the arrangement (size, place etc.), make-up of parts (demography by gender), skills, experience etc.), the structure (roles, levels etc.) and the configuration (dates, time, duration etc.). Tuckman considered three group settings or types based on the compilation of research by various scientists. The three group types are therapy group, t-group and natural group.

In the therapy group, the problem area is to help individuals with their personal issues, demography by gender with the same objective or requirements, group size is from 5 to 15 individuals and group-life is less than 3 months. A therapist and trainees are assigned to each group. In the t-group, the problem area is to help individuals with interpersonal matters, demography by gender is with same objective or requirements, the group size is from 15 to 30 individuals, group-life is from 3 weeks to 6 months and one trainer or leader is assigned per each group. Therapy-group and t-group composition have many similarities, however, the natural-group is different in many aspects. Natural group is formed to perform social or professional functions. Individuals in this group are not for self-improvement but to complete a job. Group size varies depending on the task complexity, task size and task requirements. Group demography by gender is with particular skills and experience to perform the job. Group members are appointed and may not have control on their inclusion and exclusion. Group-life also varies depending on the task complexity, task size and task requirement. Duration of group-life could be from couple of months to several months. A leader is selected by the group members or by appointment. If the group composition under any settings (therapy group, t-group and natural group) are the same, more similarities in observation results are found (Tuckman, 1965). Therapy-group and t-group composition have more similarities while the natural group is largely different due to its purpose of existence.

### 2.5.8 Group Development Realms

Regardless of the settings (therapy group, t-group or natural group), each group is formed to achieve the set objective by completing the associated tasks. At the same time, in each group, members need to relate and interact with each other to perform those tasks. The group simultaneously functions in two aspects, a task-oriented function and a social-emotional integrative function. Due to these distinguishing functions, the group works as a ‘task entity’ as well as a ‘social entity’. As a ‘task entity’, activities are performed to

achieve the objective, and this is referred to as a 'task-activity'. As a 'social entity', the group members' interpersonal relationship is referred as 'group-structure' (Tuckman, 1965). I illustrated in the figure below to present 'Task-Activity' and 'Group-Structure' relation to 'Group Development'.

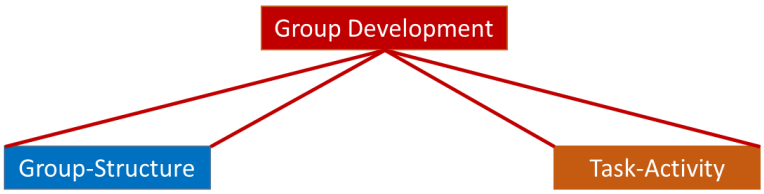



**Figure 2-16 Group Development Realms**

The 'Group-Structure' and 'Task-Activity' realms are applicable for all settings. In the therapy group and t-group, task functions and social functions overlay each other. It is because in both groups, the focus is largely on the individual and the purpose is self-improvement where social and task activities overlap. However, a natural group has a clear separation in these two areas. A natural group is formed to achieve a goal or objective, which make a clear separation between the task-activity and group-structure realms.

### 2.5.9 Group Development Stages

Tuckman described group development as having in five stages. These stages are defined as 'Forming', 'Storming', 'Norming', 'Performing', and 'Adjourning'. These stages follow a sequence based on the function and impact boundary. Both realms, Group-Structure and Task-Activity, go side by side in the group development stages and play a substantial role in the way groups are developed (Smith 1966). The diagram below shows the five stages of group development and their sequence.

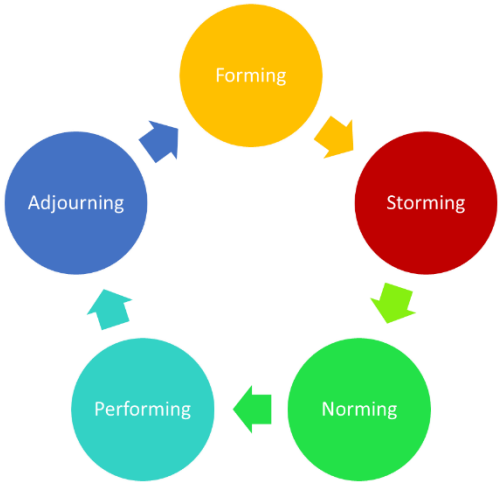



**Figure 2-17 Group Development Stages**

Similarities and difference of each realm in various stages can be found for all three settings. However, topic is not to discuss settings and their difference in the stages or realms. As previously discussed, a natural group is different as other two groups largely because of its purpose of existence, and so is very suitable to represent an agile project team, where team members are nominated for the project delivery. Hence, for the purpose of this research, only a natural group is considered for group development study and other two groups (therapy group and t-group) will not be discussed any further. Researcher will use term 'agile team' or 'team' from now on, for all discussions related to a natural group.

### 2.5.10 Natural-Group (team) Development Stages

All five stages of team development (forming, storming, norming, performing and adjourning) are required by both realms (group-structure and task-activity). I illustrated in below diagram to present sequence and relation of five development stages as well as two realms with the natural group.

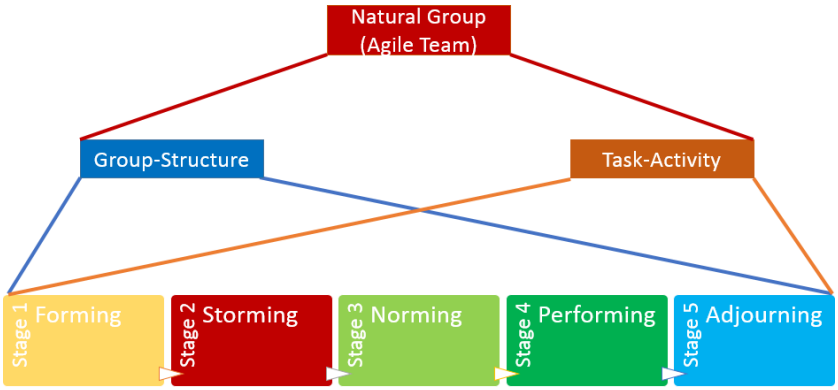



**Figure 2-18 Natural Group Development Stages**

Each team development stage is now discussed in detail with reference to both realms and how changes to group-structure and task-activity impact the project performance. Team development stages are discussed in detail here to understand how a team is formed and become a self-managed performing team.

### Team Development Stage 1: Forming

The first stage of group development is 'Forming', where group-structure is described as 'Testing and Dependence' and task-activity as 'Orientation' (Tuckman, 1965). It is the initial stage in which members are dependent upon their existing roles (outside the newly formed group) as per established traditions and fixed hierarchy of responsibilities (Modlin and Faris 1956). This stage is an absolute dependency with status quo, rigidity and submission (Schroder and Harvey 1963) where the group members categorize each other and define the situation to reduce the ambiguity (Theodorson 1953). Team members also face problems of inclusion to define and justify joining and commiting oneself or not (Schuts 1958). Group members are not clear on the boundaries and behaviours of individuals, and the behavioural state of members is described as suggestive or testing. For the task-activity, it is an orientation where members are asking or giving orientation to define the boundaries of the task, i.e. 'what is to be done' and to define the approach i.e. 'how task to be accomplished' (Bales and Strodtbeck 1951, Bales 1953).

In the context of agile project teams, in this team development stage, individuals meet each other for the first time as a project team. The existing role or status of individual is dominant and team role is not clear in the beginning. The initial social interaction happens

in the form of introduction. Individuals commence their judgment about others and placement of different roles in the team. If the team has passed this team development stage, and another member joins or an existing member is replaced or left from the team, these group-structure activities need to be performed, again. At the time of the change, it may take less time for existing group members, as the members are settled and can realize quickly where the new member will fit in. However, a new joiner does not have the same luxury. The new team member may take same or more time to adjust to others. Eventually, it impacts everyone in the team to adjust to the new situation. A new team is formed whenever a member is changed. For the task-activity, this stage sets the boundary of work, what is the objective, what is included and what is excluded. If any change in the task is to be introduced after this stage, re-evaluation of task boundary is required, which means that the activities of this team development stage will be executed again. Any change in the team composition will trigger to action activities, which will take time and have direct impact on the project performance.

**Team Development Stage 2: Storming**

The second team development stage is 'Storming', where group-structure is described as 'inter-group hostility' and task-activity as an 'emotional response to task demand'(Tuckman, 1965). It starts with unrest, friction and disharmony (Modlin and Faris 1956) with a negative Independence featuring rebellion, opposition and conflict (Harvey 1963). These features are observed to be high in the beginning of the stage and their intensity reduces over time (Theodorson 1953). This stage also faces a problem of control where individual members compete to establish their place in the group (Schutz 1958). In this team development stage, the task-activity realm becomes insignificant due to the fact that members are dealing with individual rights and autonomy in the group. The task itself is not at penetrating level and not threatening to the individuals (Tuckman, 1965) because team is working out to know what is required to be done, by whom, how and for how long

In the context of agile project teams, individual personalities collide with each other, to understand and to be understood and to compete for a place in the team. The clash could be due to the differences of individuals' expectations and demands from each other. Differences start appearing with high voltage and full force from everyone. However, all this storming is to adjust the relationships with the right placement in the team to function

well. It can happen only when everyone opens up and adjusts to everyone else. The task-activity realm is in the background at this stage of team development because the problem or associated tasks are not confronting individuals. If a person is added or replaced, this team development stage will reoccur within the team and will take time from many if not all of the team members. If the task changes, this stage may not be impacted much. Any change in the team composition will trigger action activities, which will take time and have a direct impact on the project performance.

**Team Development Stage 3: Norming**

The third team development stage is 'Norming', where group-structure is described as 'development of group cohesion' and task-activity as 'expression of opinions' (Tuckman, 1965). It is the starting point of a change in the team members' attitudes. This change can be seen in the form of team formation as a functional unit and emergence of a team dialect (We, Us) instead of the individual dialect (I, My) (Modling and Faris 1956). Team members start integrating, developing and maintaining interpersonal relationships by mutuality and conditional-interdependence (Schorder and Harvey 1963). During this stage, various trends emerged and mature over the time. The trends includes a) discovering commonalities among the team members b) growth of personal networking and friendship c) increased mutual involvement, harmony and solidarity, d) working interdependencies and e) establishment of team norms (Theodorson 1953). Relationship Problems seem to be addressed in this team development stage where members are emotionally integrated and paired with each other (Schuts 1958). On the task-activity, it is time for team members to express their opinions, where members are able to tolerate differences and can ask or give their view point (Bales and Strodtbeck 1951). This exchange of opinions provides an opportunity to evaluate and compare the ideas for the tasks including its scope, components, approach to solve and assignment as per individual's role in the team (Tuckman, 1965).

In the context of agile project teams, individuals do know the strengths, expectations, roles, placement, personalities and interaction style of each other. Interaction rules, communication style and respect for others likes and dislikes are established within the team. Individuals now have a relationship with each other. An atmosphere of togetherness is developed where individuals are not thinking about their place and function rather they

start thinking about the entire team and its achievement. People start putting their focus on the task and share their views comfortably without any fear. This builds a confidence among the team members. This confidence drives the self-organized team to make decisions and confirm a solution for the problem. If a member is added or replaced, it will impact all the previous team development stages as well as this stage where new members have to be integrated with the team and share their experience for the solution. If the task is changed, this stage will be impacted and the team has to discuss and finalize the solution again. In both cases, it will take time and will impact project performance.

**Team Development Stage 4: Performing**

The fourth team development stage is 'Performing', where group-structure is described as 'functional role-relatedness' and task-activity as 'emergence of solution' (Tuckman, 1965). This is the time when team integration reaches its peak and team philosophy becomes pragmatic where the team applies a unified approach to the task (Modlin and Faris 1956). Individual members move from conditional-interdependence to positive-interdependence where task achievement priority supersedes the social structure, individuals' needs and emotional attachments. For the task-activity, solutions emerge. This is the time when an emphasis is placed on the problem to control. (Tuckman, 1965)

In the context of agile project teams, there is no more individual in the team, everyone becomes an integral, functional and productive team member with a single focus, to complete the job at hand. It is when a team becomes a self-organized team, which manages day to day activities, faces problems and makes adjustment for any changes. The team is performing the task by discussing the problem, possible options, optimum solution and implements it without any hesitations. The final product starts to appear and shape up.

**Team Development Stage 5: Adjourning**

Tuckman's initial model had only 4 team development stages. A fifth team development stage was introduced when Tuckman revised his initial work and added results from other studies related to team development. Fifth team development is adjourning or termination (Yalom 1970) (Spitz and Sadock 1973) (Lacoursiere 1974) (Braaten 1975) (Tuckman &

Jensen, 1977). The termination heavily relates to group-structure and little is said about the task-activity. The final team development stage is concerned with sadness, self-evaluation and disengagement with anxiety about the separation and positive feelings about the project completion. Adjourning may be activated whenever a member leaves or is replaced. For the task-activity, this stage may not have any impact. Overall, adjourning does not have a direct impact on the project performance, however it is still a significant stage in the team development stages and do occur when someone leaves the team.

Few other studies related to team development stages have variations or with different names and later mapped to Tuckman's model. Zurcher (1969) discussed seven stages as 1) Orientation, 2) Catharsis, 3) Focus, 4) Action, 5) Limbo, 6) Testing and 7) Purposive. Zurcher later mapped these stages to Forming (orientation), Storming (Catharsis), Norming (Focus, Action, Limbo, Testing) and Performing (Purposive). Several other studies concluded less or same no of team development stages and eventually mapped to Tuckman's 4 model.

## 2.6 Team Composition Changes

Tuckman's team development model is well cited for team development stages. There are other team development models, however, for this research Tuckman model is considered because this Authorfound this model, based on his experience in the industry and close formation of team formation to an agile team in the corporate. The area for further exploration is the relation between the team composition change and its impact to the agile software development project. It is an important area with commercial significance to explore and find team compositing change and its impact on the agile software development projects.

With each team development stage above, agile team context is discussed. When a team member is added, replaced or left the team, it changes the team. However, when team composition is discussed, it is largely referred as the purpose (problem to solve), the arrangement (team size, place etc.), made-up of parts (demography as male/female, skills, experience etc.), the structure (roles, levels etc.) and the configuration (dates, time, duration etc.). It therefore appears that team member change (add, remove or replace one or more members in the team) is the single biggest change which can impact most (if not

all) of the components of the team composition. Hence, a team member change (add, remove or replace) is a team composition change.

The new factor ‘team’ was found in stage-2 data gathering and analysis. In this literature review, researcher found that team member change is significant enough to impact most of the parameter of a team composition. In the next stage of data gathering, research aim is to find ‘if team composition change is impacting the decision-making capability of the team and agile software development project’.

## 2.7 Team Literature-Review Conclusion

The literature review was conducted after concluding the data analysis in stage-2. Focus of this literature review was to find about team formation/structure or composition as a factor in the context of decision-making. Finding of this literature review is that team composition change has potential to impact team’s ability of decision-making. Team composition change in ASD project where it impacts ASD team’s ability of decision-making could not be found in the literature. It is still to be establish that team composition change can impact ASD team’s ability of decision-making, furthermore, this impact ASD project success. Findings of stage-2 and this literature review are significant enough to establish another stage for further imerical study.

## 2.8 Chapter Summary

This chapter covered the literature review of this research. The first part of the literature review (section 2.1) covered EIT Governance definitions and formed a working definition for this research. There is no single agreed definition of EIT Governance. This research helped to cover this gap by providing a comprehensive literature review and a definition. This definition covers concepts of previous definitions and provides a comprehensive inclusion of those concepts. The second part of this chapter (section 2.2) covered the decision-making impact on the ASD projects and formed hypotheses (section 2.3) with a data model to test. These hypotheses helped to test the relationship of governance factors. The results of the hypotheses test could provide a path to improve the governance model. The third part and last part (section 2.4 onwards) of this chapter were added after stage-1

and stage-2 data analysis. The last part covered a literature review on team formation/structure/composition and if it has any relation with decision-making. A gap is uncovered where team composition change is discovered as a governance factor. This has never been discussed in the literature and in the industry. Team change and its potential on the team's ability of decision-making have never been considered a factor for governance in ASD projects. This research uncovered this gap and provided evidence from the analysis of field data that team composition change is a governance factor and impacts ASD projects. Furthermore, this research provided a recommendation to minimize the impact on the ASD project outcomes. The next chapter (Ch-3) covers the research methods applied in this research with a research plan to collect and analyze data.

# 3 RESEARCH DESIGN

## 3.1 Introduction

This chapter describes the research method, including design, plan, execution, data management and ethical issues. Research began with a literature review which concluded with hypotheses. Quantitative data and statistical methods are used to verify hypotheses. Further research was qualitative for deeper study using open-ended interviews and thematic analysis method.

## 3.2 Literature Review

The research scope covers multiple areas, including enterprise-level business organization, governance, information technology, project management and software development. One thing which holds these fields together is governance. At the enterprise level, governance is implemented for all its departments, including IT. Within the IT departments, governance is applied to the strategy, operations and projects. To establish the scope and boundaries of the research, it is important to define governance in the context of enterprise IT, for projects and software development, especially for agile software development projects.

The literature review commenced with the aim to establish a definition of EIT Governance and hypotheses of governance factors impacting software development project outcomes. This research focuses on the governance of agile software development methodology, which supports innovation. When EIT governance definition was searched, it was found that there was no single agreed definition for the EIT Governance. To establish one definition for the research, it was decided to split the literature review in two steps as follows:

- Finalize EIT Governance Definition
- Finalize Hypotheses

A systematic literature review (SLR) (Kitchenham et al., 2009) was adopted to commence the step one in the literature review. This was because EIT Governance, which was developed, adopted and changed over time, is defined in many different ways. To the

objective evaluation and synthesis of empirical results of the relevant and particular research area (Brereton et al., 2007), the process of a systematic literature review is to provide actionable results. A working definition of EIT governance was established for this research.

"EIT Governance facilitates **decision making** and provide direction to the organization, business, management and people to achieve business value."
(Ch.2 for definition 2.1.6).

From the EIT Governance definitions, it is understood that decision-making is the core of EIT governance. Hence, focus of further literature review was on decision-making impacts on ASD project. Decision-making is used as EIT Governance or vice-versa in this thesis as per the definition finalized for this research. Finds from the literature review confirmed that decision-making factors are linked to ASD projects. These findings helped to derive hypotheses. The details of literature review and how these hypotheses are concluded can be found in Ch-2. These hypotheses are:

4. Implementation clarity of decision-making leads to ASD project success.
5. Distribution of decision-making leads to ASD project success.
6. Tailoring of the decision-making process leads to ASD project success.

## 3.3 Stage-1

A hypothesis is an understanding about the relationship of entities based on some rationale, such as a literature review, observation or experience. It is specific and clearly states the relationship which is testable to be true or false. Stage-1 was planned and designed to test the hypotheses developed from literature review. Epistemology is the understanding and knowledge of the world around us and how this knowledge is interpreted. One of the branches of epistemology is objectivism (Crotty, 1998). Under the objectivism, through a positivist perspective, a given situation or problem understanding needs to be confirmed from the research data. Hypotheses are developed to confirm/accept or reject by analysis of research data. If analysis demonstrates a strong relationship, hypotheses are accepted true and if analysis shows weak or negative relationship, hypotheses are rejected and alternative hypothesis are accepted. Based on

results of satge-1 data analysis, either this research may suggest design of a new governance model or changes to an existing governance model as a solution.

### 3.3.1 Survey Research Methodology

To validate the hypotheses, numerical data is required. Hence, a quantitative approach was applied to collect field data. A survey research methodology (Crotty, 1998) was adopted for this purpose in stage-1. In survey research methodology, questions based on research data model (Ch-2) are presented where responses are numerical or can be converted to numerical values. For this research, a 'Likert Scale' was used to record the responses. It is to ensure that collected data is uniform, spread across the possible options and flexible enough for the participants to provide as much accurate information as possible. The resultant value range was designed from 1 to 7 (1= strongly disagree to 7= strongly agree). This range will ensure that response value will not be lost for a low selection and high number will not eliminate the clarity (Matell & Jacoby, 1971).. Unveracity of Technology Sydney (UTS) field data collection policy for PhD degree requires researchers to get ethics approval prior to any such activity. Research project, methodology, plan and data gathering requirements were presented to research supervisor's panel and ethics committee and received data gathering mandate. The ethics committee approval provided mandate to collect data from the field, including direct or in-direct interaction with the participants. This mandate also provided boundaries and rules of engagement for any such activities where data is collected for this research. During this time, Candidature Assessment 1 (a PhD degree requirement in UTS to commence the data gathering phase) was completed with successful presentation of research proposal and plan to the research supervisors' panel.

Statistical Analysis Method

In Stage-1, statistical correlation analysis is used to investigate relations between the variables (Delost & Nadder, 2014). It is because the stage-1 data (Ch4) is in an ordinal form (Likert Scale). Spearman's Correlation is applied to analyse the collected data and the correlation between variables. Spearman's rank correlation coefficient is a non-parametric equivalent to Pearson's correlation coefficient (Sedgwick, 2012). Hence, Spearman's Correlation Coefficient (Gren et al., 2017) is applied which is based on ranks and provides a standard table for the indicative values for hypotheses validation.

Spearman's correlation coefficient has two conditions to measure the strength of the relationship between variables. Variable data should be

- interval or ratio level or ordinal
- monotonically related.

Interval or ordinal data means, that values are in an interval or order and any value in between those intervals is not used. Likert scale data is ordinal. A monotonic relationship is a relationship between two variables, when value of first variable (e.g. implementation clarity) increases, the value of second variable (e.g. ASD project success) increases and when value of first variable decreases, the value of second variable decreases. This assumption holds for variables in the hypotheses as per literature review. First variable in each hypothesis is leading the second variable, i.e. implementation clarity, distribution and tailoring are first variables in three respective hypotheses, leads second variable, i.e. ASD project success. Hence both conditions are met.

When Spearman's Correlation is applied to analyse the collected data, it provides a standard table for the indicative values for hypotheses validation and the correlation between variables (Gren et al., 2017). The resultant value indicates how strong or weak the correlation / relationship is between two variables. The range below from the Spearman's correlation standard table provides the relationship strength if the test result falls in any of these ranges:

- .00-.19 "very weak"
- .20-.39 "weak"
- .40-.59 "moderate"
- .60-.79 "strong"
- .80-1.0 "very strong"

A sample size is selected based on a number of variables (Bonett & Wright, 2000). Important variables for sample size are critical point and correlation significance level. In Spearman's Correlation 1-tailed test, the critical point for 25 records at a correlation significant level of 0.01 is 0.466 [Table 3 Page 251] (Ramsey, 1989). This means that if the resultant value is above the critical point (0.466), the hypothesis is accepted and if the

value is below the critical point then the hypothesis is rejected. Hence, sample size 25 or above can provide a critical point value of 0.466 or better. For this research, sample size is 30 with correlation significance level of 0.01 and critical point value at 0.425. Table below is from

*Exact critical values of r, for $3 \leq N \leq 18$ and Edgeworth approximations for $N \geq 19$*

| | | | | | *Quantiles* | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | .75 | .90 | .95 | .975 | .99 | .995 | .9975 | .999 | .9995 |
| | | | | | *Directional alpha levels* | | | | |
| | .25 | .10 | .05 | .025 | .01 | .005 | .0025 | .001 | .0005 |
| | | | | | *Nondirectional alpha levels* | | | | |
| *N* | .50 | .20 | .10 | .05 | .02 | .01 | .005 | .002 | .001 |
| 3 | 1.000 | | | | | | | | |
| 4 | 0.600 | 1.000 | 1.000 | | | | | | |
| 5 | 0.500 | 0.800 | 0.900 | 1.000 | 1.000 | | | | |
| 6 | 0.371 | 0.657 | 0.829 | 0.886 | 0.943 | 1.000 | 1.000 | | |
| 7 | 0.321 | 0.571 | 0.714 | 0.786 | 0.893 | 0.929 | 0.964 | 1.000 | 1.000 |
| 8 | 0.310 | 0.524 | 0.643 | 0.738 | 0.833 | 0.881 | 0.905 | 0.952 | 0.976 |
| 9 | 0.267 | 0.483 | 0.600 | 0.700 | 0.783 | 0.833 | 0.867 | 0.917 | 0.933 |
| 10 | 0.248 | 0.455 | 0.564 | 0.648 | 0.745 | 0.794 | 0.830 | 0.879 | 0.903 |
| 11 | 0.236 | 0.427 | 0.536 | 0.618 | 0.709 | 0.755 | 0.800 | 0.845 | 0.873 |
| 12 | 0.217 | 0.406 | 0.503 | 0.587 | 0.678 | 0.727 | 0.769 | 0.818 | 0.846 |
| 13 | 0.209 | 0.385 | 0.484 | 0.560 | 0.648 | 0.703 | 0.747 | 0.791 | 0.824 |
| 14 | 0.200 | 0.367 | 0.464 | 0.538 | 0.626 | 0.679 | 0.723 | 0.771 | 0.802 |
| 15 | 0.189 | 0.354 | 0.446 | 0.521 | 0.604 | 0.654 | 0.700 | 0.750 | 0.779 |
| 16 | 0.182 | 0.341 | 0.429 | 0.503 | 0.582 | 0.635 | 0.679 | 0.729 | 0.762 |
| 17 | 0.176 | 0.328 | 0.414 | 0.488 | 0.566 | 0.618 | 0.659 | 0.711 | 0.743 |
| 18 | 0.170 | 0.317 | 0.401 | 0.472 | 0.550 | 0.600 | 0.643 | 0.692 | 0.725 |
| 19 | 0.165 | 0.309 | 0.391 | 0.460 | 0.535 | 0.584 | 0.628 | 0.675 | 0.709 |
| 20 | 0.161 | 0.299 | 0.380 | 0.447 | 0.522 | 0.570 | 0.612 | 0.662 | 0.693 |
| 21 | 0.156 | 0.292 | 0.370 | 0.436 | 0.509 | 0.556 | 0.599 | 0.647 | 0.678 |
| 22 | 0.152 | 0.284 | 0.361 | 0.425 | 0.497 | 0.544 | 0.586 | 0.633 | 0.665 |
| 23 | 0.148 | 0.278 | 0.353 | 0.416 | 0.486 | 0.532 | 0.573 | 0.621 | 0.652 |
| 24 | 0.144 | 0.271 | 0.344 | 0.407 | 0.476 | 0.521 | 0.562 | 0.609 | 0.640 |
| 25 | 0.142 | 0.265 | 0.337 | 0.398 | 0.466 | 0.511 | 0.551 | 0.597 | 0.628 |
| 26 | 0.138 | 0.259 | 0.331 | 0.390 | 0.457 | 0.501 | 0.541 | 0.586 | 0.618 |
| 27 | 0.136 | 0.255 | 0.324 | 0.383 | 0.449 | 0.492 | 0.531 | 0.576 | 0.607 |
| 28 | 0.133 | 0.250 | 0.318 | 0.375 | 0.441 | 0.483 | 0.522 | 0.567 | 0.597 |
| 29 | 0.130 | 0.245 | 0.312 | 0.368 | 0.433 | 0.475 | 0.513 | 0.558 | 0.588 |
| 30 | 0.128 | 0.240 | 0.306 | 0.362 | 0.425 | 0.467 | 0.504 | 0.549 | 0.579 |
| 31 | 0.125 | 0.236 | 0.301 | 0.356 | 0.419 | 0.459 | 0.496 | 0.540 | 0.570 |
| 32 | 0.124 | 0.232 | 0.296 | 0.350 | 0.412 | 0.452 | 0.489 | 0.532 | 0.562 |
| 33 | 0.121 | 0.229 | 0.291 | 0.345 | 0.405 | 0.446 | 0.482 | 0.525 | 0.554 |
| 34 | 0.119 | 0.225 | 0.287 | 0.340 | 0.400 | 0.439 | 0.475 | 0.517 | 0.546 |
| 35 | 0.118 | 0.222 | 0.283 | 0.335 | 0.394 | 0.433 | 0.468 | 0.510 | 0.539 |
| 36 | 0.116 | 0.219 | 0.279 | 0.330 | 0.388 | 0.427 | 0.462 | 0.503 | 0.532 |
| 37 | 0.114 | 0.215 | 0.275 | 0.325 | 0.383 | 0.421 | 0.456 | 0.497 | 0.525 |

**Figure 3-1 Critical Values Chart (Ramsey 1989)**

### 3.3.2 Stage-1 Plan

Data collection plan is executed which includes data modelling, data collection, analysis and the development of a new governance model for agile software development projects. When hypotheses are developed, a data model for the hypotheses with definitions of data

items is developed (Ch-2) which requires numerical data for validation. Hence, a quantitative approach was applied to collect data through a survey research methodology. The survey questionnaire was developed based on a research data model. The stage-1 research data gathering plan was developed to collect the survey data. The research data model provided the elements for questions where a Likert scale (1= strongly disagree to 7= strongly agree) was used to record the responses. The Likert scale was used to ensure that collected data was uniform, spread across the possible options and flexible enough for the participants to provide as much accurate information as possible. Data collection details are provided in section 4.3 and the applied statistical method details are provided in section 4.4.

The high-level plan is given below.

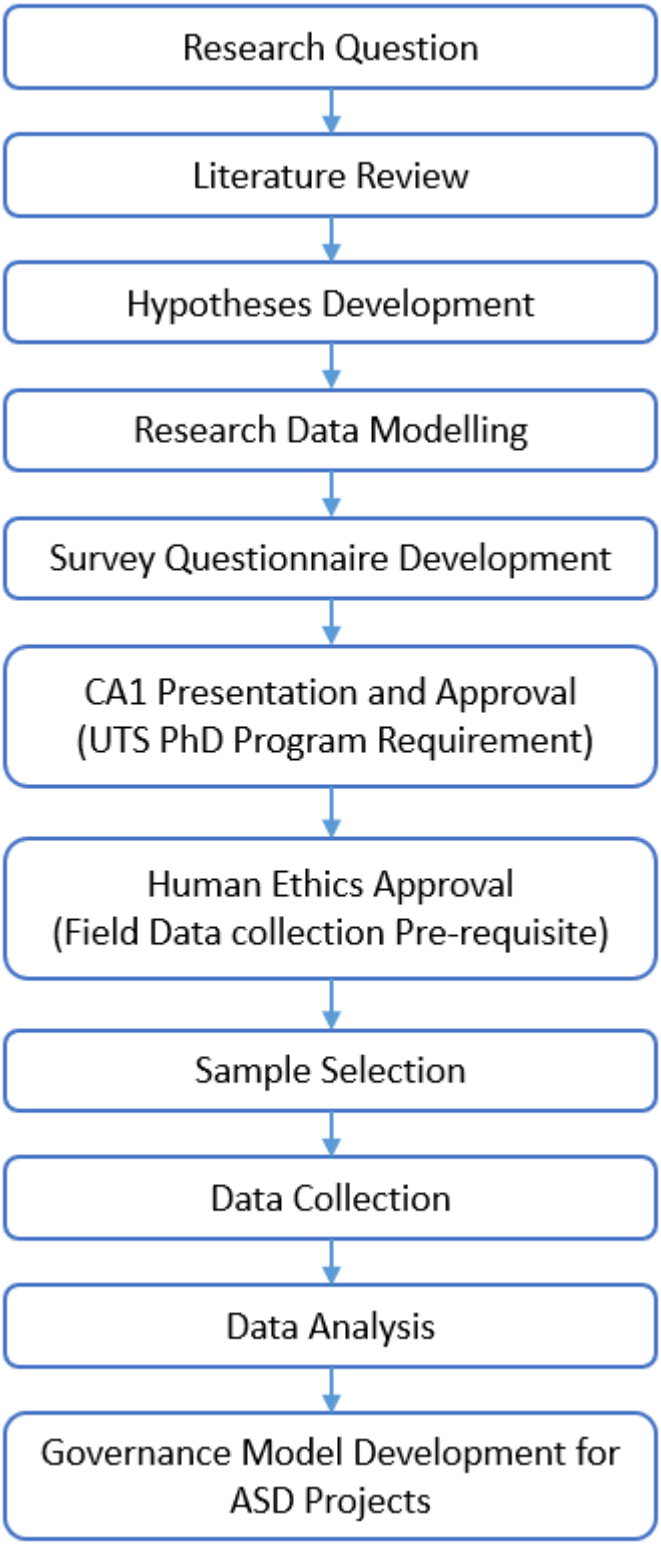



**Figure 3-2 Quantitative Research Plan – Stage-1**

### 3.3.3 Stage-1 Sample Selection

To verify the hypotheses, survey data is required from the field. Sample set must meet basic criteria to collect data which can provide accurate results. Stage-1 is validating these hypotheses , for impacts of decision-making factor son ASD project. Decision-making is core part of EIT Governance definition. Enterprise level organization where Agile is adopted for a significant time and ASD projects are major delivery tool, must be the data source. Organizations where agile software development is implemented as a major delivery vehicle are selected. The criteria of the sample set selection are:

A. Active business entity of any type (government, private, public)
B. Business has an established IT department and governance structure
C. The business develops software in house
D. Major software delivery has been done through ASD projects at least for 5 years

Participants for this research were selected from the companies meeting the above criteria. Each participant must have at least 5 years relevant experience in the field.

No specific domain or industry group was the target for data collection, it was open for all the industries. However, only those companies where Agile is considered as part of the enterprise strategy and ASD projects are the core software development delivery vehicle were considered. The participants represent three organizational layers (executive, managerial and technical) to cover the organizational dimensions as per the data model. The sample characteristics are provided in the table below.

| Respondents | No of Companies | Industries | Executive | Management | Technical | Total |
|---|---|---|---|---|---|---|
| 30 | 11 | Government | 2 | 6 | 4 | 12 |
| | | Oil & Gas | 1 | 6 | 2 | 9 |
| | | Technology | 2 | 1 | 1 | 4 |
| | | Supply Chain | 1 | 2 | 2 | 5 |
| | | | 6 | 15 | 9 | 30 |
| | | | 20% | 50% | 30% | |

**Figure 3-3 Sample Set Characteristics**

A total of 30 participants from 11 different companies responded to the research questionnaire. These companies are from 4 industries including Government, Oil and Gas, Technology development or provider and Supply Chain Management. Participants represent three levels of the organization: executive (20%), management (50%) and technical (30%).

Stage-1 Data Collection

Once hypotheses data model finalized, survey questions were developed. Based on the dataset criteria, organizations were approached to participate in stage-1 survey. These organization are selected through professional contacts from the field and contacting directly to those well-known organizations using agile as project delivery methodology. After establishing the initial contact, a formal communication sent to each organization and requested to nominate participants for this survey. A total of 43 participants were contacted, out of which 30 are included in the final survey. Delayed response or unable to participate in the survey are reasons for those who are not part of the final survey. All participants were provided the detail of the project and requested to fill an online survey. Responses of each survey were recorded in an excel file. Date of participants and survey results were stored on a computer which was password protected. Participants and companies' data was assigned ID to ensure no personal information is attached with final data. Participant's identity cannot be inferred form the analysis or results. During the analysis only the raw data from the survey data was used, no personal information or company information is used.

### 3.3.4 Stage-1 Results

Hypotheses were tested in stage-1 and results were formed using statistical analysis. If all hypotheses are accepted, it means that a solution can be suggested based on hypotheses. If all hypotheses are rejected, it means that the alternative hypotheses is true, which can also help to suggest a solution course under the same research approach. However, in this research, two hypotheses were accepted, and one rejected. The one rejected hypothesis is related to the effect of decision-making tailoring on the agile software development projects. This result is inconclusive and indicates that there could be missing factor(s).

Researcher decided to go further and deeper and search those missing factor(s) which may have impact on ASD projects.

## 3.4 Stage-2

The results of the data analysis from the survey research methodology (Stage-1) suggested to conduct further study to find factors which may impact ASD projects. Further study is focused on the factor(s) related to decision-making which has potential to impact ASD projects. These factors may be hidden or missed during the initial investigation and literature review. Stage-2 was planned to learn more about "missing" factor(s). The research aim and research questions (Ch-1) are not changed, it just expanded the research to go deeper.

### 3.4.1 Open-ended Interview Methodology

From stage-1 results, it was established to focus on finding missing factor(s). Scope and boundary of research are is clear, however, what factor(s) were missing is not clear. To find an unknow from a given area, questions should be asked where people can openly answer. This will help to find more insight about decision-making which may have been missed. An interview method under an interpretivist approach (Crotty, 1998) can help to find required details form the field. Open-ended interview questions were designed and interviews were planned to collect data.

Thematic Analysis Method

Interpretive approach was used to find the insight from the data which was unstructured and with many variations (Miles et al., 2014). Thematic analysis applied to analyse the data collected form open-ended interviews in stage-2. A Thematic Analysis is considered for systematically identifying, organizing and establishing the patterns from the data set (Terry et al., 2017). Thematic Analysis is selected to find such themes that are within the description of the phenomenon and involved multiple cycles of reading and re-reading the collected data to form the results (Fereday & Muir-Cochrane, 2006). Focus in the

thematic analysis is to find the similarities and sense of collective or common meaning among the participants.

Thematic Analysis Process

To analyse the interview responses, each question was separately analysed. A process is adopted to analysis these questions separately and extract key words or themes. Process is as follows:

1. Each open-ended question was placed in one separate document
2. Each document has only one question and 30 responses against that question.
3. Responses are added in a tabular form with ID from 1 to 30
4. Key words from each response were highlighted.
5. Key words, their alternative words or similar concepts were extracted from the responses and placed in the second column of the table. Column name is 'Key Words /Alternative Word / Similar Concepts'. (Appendix D, E, F, G)
6. Themes based on common concepts and keywords were extracted from the second column against each response and added into third column of the table. Column name is 'Themes'. (Appendix D, E, F, G)
7. Final extracted themes from these responses (third column) are placed in another table with the focused area of the question to analyse similarities. Table is provided in Ch-5.

Individual question documents with responses and concept extraction actions can be found in the Appendix D, E, F and G.

### 3.4.2 Stage 2 Plan

A data collection plan was developed after the research approach and method was finalized for stage-2. This qualitative research plan covers open-ended questions for interview and thematic analysis method to analyse the data.. The high-level plan is given below.

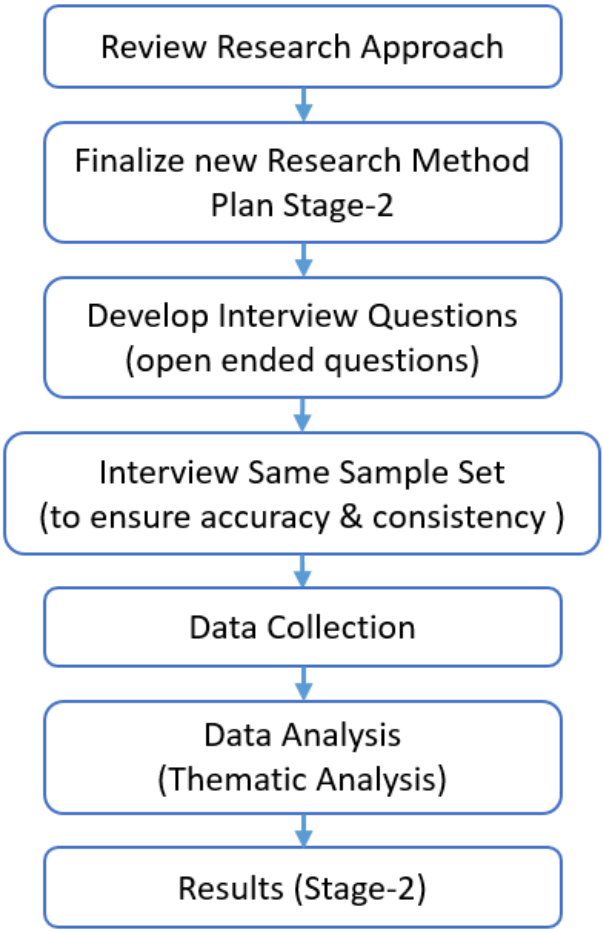



**Figure 3-4 Qualitative Research Plan – (Stage-2)**

### 3.4.3 Stage-2 Participants

Those who participated in the stage-1 survey, can be the best candidate to collect data for stage-2. It is because researcher is investigating further to go deep into decision-making to find any missing factors impacting ASD projects. Survey research data analysis rejected one hypothesis, and stage-2 focused on missing factors. Same participants can provide the insight from the same situation where previous data has rejected a hypothesis. Selection of stage-1 participants ensure data integrity by collected stage-2 data under same circumstances, boundary and scope.

The participants are same as stage-1, there is no change in the criteria of the sample selection, details can be found in section 1.3.3. In stage-1, a survey was conducted and

no directed interaction was required. In stage-2, researcher physically meet with each participant and collected data, hence, more details of individuals were collected. Researcher performed individual face-to-face interviews due to his stay in the region (Pakistan, UAE) during the PhD. Table below provides demographical details. This will help during the analysis and conclusion for stage-2.

| Company Size | Small | Medium | Large | Enterprise |
|---|---|---|---|---|
| | 3% | 17% | 40% | 40% |

| Project Size | Small | Medium | Large |
|---|---|---|---|
| | 10% | 33% | 57% |

| Established PMO | Yes | No |
|---|---|---|
| | 73% | 27% |

**Figure 3-5 Participants Demography**

**Stage-2 Data Collection**

Same participants of stage-1 are considered for stage-2 as per dataset selection criteria. These participants are formally engaged by sending email with project details, ethics approval and consent form. All participants provided the detail of the project and agreed to their participation as they have previously completed the survey. All participants who completed the survey, accepted request to be part of the stage-2 data collection. Interview time and venue finalized and calendar invite was sent to the interviewees. Responses of each interview were recorded as text during the interview. Digital copies of these responses were stored on a computer which was password protected. Participants and companies' data was assigned ID to ensure no personal information is attached with final data. As discussed in (section 1.3.1) the research ethics and approved guidelines, participant's identity cannot be inferred form the analysis or results. During the analysis only the raw data from the interviews is used, no personal information or company information is used.

For these interviews, participants were asked to consider ASD projects, possible scenarios / data or information from one project to answer the specific question and include any information you may think is related. These questions are not limited to any particular scenario, environment, type of solution or for a particular type of problem. It may include any information, direct or indirect related to any of the factors which you may consider are related. change from business, from processes, from project or from people which could help to improve results. The reason for the questions being open is to find out any factor(s) which can have any relation to any part of the problem or solution. The responses may establish and explore the areas of dire need for improvement in the ASD project and may provide direction / common themes for a solution. (participants provided unanticipated responses without any prompt or leading questions) ,

### 3.4.4 Stage-2 Results

From stage-2 a new factor ‘team’ (Ch-5) emerged as a result of the interview data analysis. The new factor ‘team’ was not discussed or considered before in the context of decision-making or impacting ASD projects, even in the previous literature review where EIT governance, Project Management and Agile Software Development Projects were considered to develop the model. A noticeable fact here is the EIT Governance literature review, where ‘People’ was one outstanding factor (details can be found in section 2.1.6) and covered all people involved in the EIT governance. However, when people form a particular structure like a team, they can have an entirely different impact. Especially when a team is discussed in a particular situation like ASD project. This dimension of people as a ’team’ was not discussed or discovered in the EIT governance (decision-making), project management and ASD project’s scenario in the literature review. In literature, researcher found ‘people’ as key word in EIT definition, but not team. A team is a different structure and considered as a different entity than people as general. It is important to have another literature review to understand team structure and formation to find if anything related to this structure (team) has an impact on decision-making and eventually to ASD projects.

## 3.5 Second Literature Review

The rejected hypotheses (Ch-4) and discovery of a new factor, 'team', (Ch-5), led to conduct another literature review. Focus is shifted to 'team' in agile development projects where decision-making impacts the results and how a 'team' is a factor in the decision-making impact. Team is made up of people, however, a team itself works as an entity in this case. This literature review was focused to understand how a team is significance in governance.

The second literature review found that 'team changes' are discussed as well as 'team changes impact' on the decision-making abilities in the literature. It seems that connection between the team changes and decision-making which impacts the agile software development projects was not established in the literature. Details of second literature review are provided in Ch-2 section 2.5. There is a need to understand the team changes and how these changes impact the decision-making in the agile software development projects. Stage-3 was planned based on both stage-2 results where a new factor 'team' is emerged and second literature review which provided 'composition change' as a dimension of 'team' which has potential to impact decision-making in ASD projects.

## 3.6 Stage-3

Because a new factor was found from data analysis in stage-2, which is further supported by the second literature review (Ch-2), further research was required to ascertain iwhat impact this factor has on ASD projects and decision-making/governance. Stage-3 data collection and analysis was planned. From the literature review, it was established that team composition change has impact on decision-making ability of the team. This finding is focus of stage-3 to collect data form the field and analyse if this factor has impact on ASD projects.

### 3.6.1 Semi-Structured Interview Methodology

To make interview comprehensive and cover team composition changes in the given scope, semi-structure interviews were conducted. Interview questions methodlogy in

stage-3 is different from stage-2, to cover the specific topic but stay open and netutral. Questions presented in a sequence from general to subsequent specific deatil questions. These questions were designed and planned to collect data in relation to team composition changes. However, no leading hints were provided to the interviewees. Focus in the semi-structured interview is to get as much detail as possible to understand how a team composition change is impacting the decision-making and eventually impacts ASD projects.

Stage-3 interview questions can be seen in the Appendix

**Thematic Analysis**

Stage-3 of this research falls under the Interpretivism perspective of epistemology. Thematic analysis was chosen to develop a profound understanding of the situation in which the meaning is constructed from the participant's/interviewee's experience. Research revisited the overall situation of an agile software development project in reference to EIT governance and searched for the meanings which may be hidden (not explored yet) to form a new meaning and understanding or explore new factors which may already there but not considered.

**Thematic Analysis Process**

Data collected from all the interviews was combined in a table. Responses of individual questions were analysed by combining the responses from all participants. Starting with the first open-ended question in the interview a new document was created. Overall process of analysis planned with these steps.

1. Combine question by question in separate table. It means Q1 of all interviews are added in one table, Q2 of all interviews are added second table and so on.
2. All responses to the question were added in the "Response" column and the interview number was added into the "No." column of the table. A total 12 fields were added for each question covering 12 interviews.
3. Key statements from each response were extracted and added into the "Statement" column against each response.

4. A two-column table with field names “Pattern” and Variation” was added to the last column “Finding”.
5. Each statement from the “Statement” column was analysed. Activity is performed to systematically identify patterns from these statements. It helps to find the common themes from each response. These patterns have variations, in responses of various participants. Patterens and variation fields.
6. Patterns and variations fields are providing the findings and are further analysed to form the conclusion.

The above process was repeated for each question to find patterns and variations within those patterns from the responses. Detailed execution of the above method can be viewed in Ch-7 and more details can be found in the appendix.

### 3.6.2 Stage 3 Plan

The research plan was revised for stage-3 data collection plan. New plan was quite similar to the previous thematic analysis plan of stage-2, as same research approach is used. It has some changes due to the addition of literature review and selection of new participants for collect data. The new research plan is given below.:

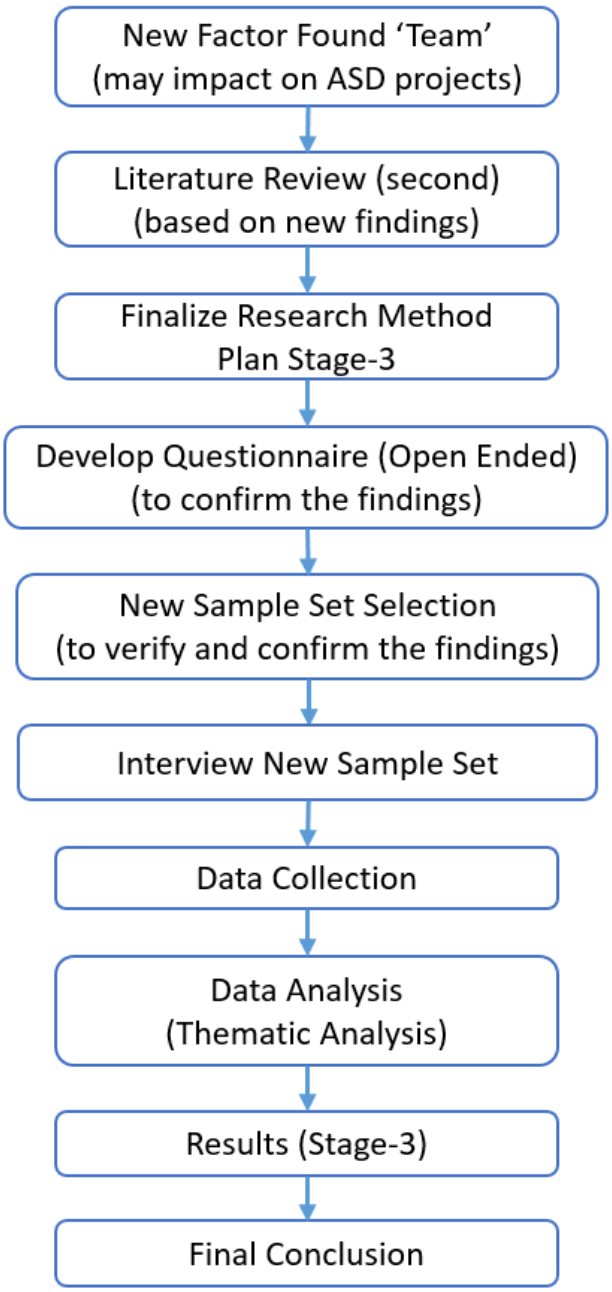



**Figure 3-6 Qualitative Research Plan (Thematic Analysis – Team)**

### 3.6.3 Stage-3 Participants

Data is required from the companies where agile software development is implemented as a major delivery vehicle. In stage-3, participated companies are different from those in the previous stages. Different participants in stage-3 will provide confidence in the results of previous staged and verify if 'team' factor exists and 'team composition change' is

impacting decision-making in ASD projects. Those companies who met the below criteria are selected for stage-3.

A. An active business entity of any type (government, private, public)
B. The business has an established IT department
C. The business develops software in house
D. There has been major software delivery through ASD projects at least for 5 years
E. Different companies than stage 2 participants

The demographic of interviewees covered background of the company, project and participants.

| Industry | Finance | Health | Construction | Others |
|---|---|---|---|---|
| | 33% | 25% | 17% | 25% |

| Company Size | Small | Medium | Enterprise |
|---|---|---|---|
| | 8% | 8% | 83% |

| Project Size | Small | Medium | Large |
|---|---|---|---|
| | 8% | 25% | 67% |

| Enterprise Level | Executive | Manager | Technical |
|---|---|---|---|
| | 8% | 42% | 50% |

**Figure 3-7 Stage-3 Participants Demography**

### Stage-3 Data Collection

After developing the data collection plan and finalizing the criteria of dataset, organizations were approached to participate in stage-3 data collection. These organization are found by searching the internet, through professional contacts from the field and contacting HR deportments of well-know organizations using agile as project delivery methodology. People who signed up for the interview are formally engaged by

sending email with project details, ethics approval and consent form. Interview time and venue finalized and calendar invite was sent to the interviewees. Each interview was recorded after getting the consent from the interviewee. This data was stored on a computer which is password protected and the participants and companies' data was assigned ID to ensure no personal information is attached with final data. Furthermore, their identity cannot be inferred form the analysis or results. During the analysis only the raw data from the interviews is used, no personal information or company information is used.

### 3.6.4 Stage-3 Results

A number of themes emerged from the stage-3 data analysis. Most important finding were related to team composition change impacts on team's ability of decision making and how it positively or negatively impacts ASD project. From interview responses, patterns and variations provided insight of team composition dynamics how organizations are managing ASD projects. Three questions (Q7, 11 and 12) were more significant than others to clarify team composition and decision-making (details in CH-7). This stage provided team factor, insight of team composition change, impact of team composition change on team's ability to make decisions and impact on ASD projects. Complete analysis details of stage-3 can be found in Ch-6.

## 3.7 Chapter Summary

This chapter covered research methods applied in this research. First section of this chapter (3.2) covers the litratire review, what methods were used and how literate review provided base of this research to establish hypothesis. Section 3.3 coveres details of stage-1 of this reseaech which had quantitative data collection through survey and statistical method to analyse the data. Section 3.4 covers research method and plan of stage-2 of this research which had qualitative data collection through open-ended interview and thematic analysis method. Section 3.5 covers second literature review conducted in this research. Section 3.6 covers third and last satge of this research which had qualitative data collection through semi-structured interview and thematic analysis. Next chapter (Ch-4) is discussing the suravy analysis and results of stage-1 where quantitative data is collected to test the hypotheses.

# 4 SURVEY RESULTS

This chapter covers the quantitative data gathering, analysis and results. Research data model and hypotheses are presented in Ch-2. Based on findings, 3 hypotheses are developed. The survey research methodology, statistical analysis and satge-1 plan are presented in Ch-3.

# 4.1 Preparation

## 4.1.1 Questionnaire Development

The survey questionnaire was developed based on a research data model (Ch-2). This research data model was developed along with the hypotheses. Data model provides variables and their relationship. Each hypothesis has two variables. Questions are designed to collect data in numeric form. Likert scale (details in Ch-3) is used, hence, each question is provided with options from 1 to 7 where 1 is lowest and 7 is highest (1= strongly disagree to 7= strongly agree).

The Questionnaire is provided in Appendix A

## 4.1.2 Participation Confirmation

Based on the sample selection criteria (Ch-3) companies are searched for participation in this survey. The shortlisted companies who met the criteria are from three countries (Australia, UAE and Pakistan). These countries are selected due to professional contacts of the researcher in these countries. After finalizing companies for survey, these companies are contacted through their official email. Those who responded and confirmed participation are further communicated with the research project details. Details of sample selection, data gathering and demographics of participation in survey are provided in Ch-3 under Stage-1.

# 4.2 Survey Data Gathering

This section provides the data gathering steps. Survey sample set is discussed in Ch-3.

### 4.2.1 Survey Questionnaire Responses

Experts from each of these participating companies were contacted and provided with the project brief and consent form. Upon completion of required documentation, questionnaire was sent to collect their responses. These responses are received electronically with IDs of the participants.

### 4.2.2 Data Storage

An excel spreadsheet (Microsoft tool to manage data) was used to store the raw data. Individual responses were received from the Subject Matter Experts (SMEs), i.e. participating organizations. These responses are added into the excel sheets without identifiable information of the organization or respondents. This data is stored on a computer which was password protected and cloud storage as backup.

## 4.3 Analysis

Spearman's correlation coefficient was used to measure the strength of the monotonic relationship between variables (Ch-3 for more details on selection of analysis method). A total of 30 respondents data is analysed for spearman correlation coefficient using correlation significance level of 0.01 and critical point value at 0.425.

## Table 4-1 Spearman's Ranked Correlation Coefficient

Critical Values of the Spearman's Ranked Correlation Coefficient ($r_s$)
*Taken from Zar, 1984 Table B.19*

| n | α(2): 0.50 α(1): 0.25 | 0.20 0.10 | 0.10 0.05 | 0.05 0.025 | 0.02 0.01 | 0.01 0.005 | 0.005 0.0025 | 0.002 0.001 | 0.001 0.0005 |
|---|---|---|---|---|---|---|---|---|---|
| 4 | 0.600 | 1.000 | 1.000 | | | | | | |
| 5 | 0.500 | 0.800 | 0.900 | 1.000 | 1.000 | | | | |
| 6 | 0.371 | 0.657 | 0.829 | 0.886 | 0.943 | 1.000 | 1.000 | | |
| 7 | 0.321 | 0.571 | 0.714 | 0.786 | 0.893 | 0.929 | 0.964 | 1.000 | 1.000 |
| 8 | 0.310 | 0.524 | 0.643 | 0.738 | 0.833 | 0.881 | 0.905 | 0.952 | 0.976 |
| 9 | 0.267 | 0.483 | 0.600 | 0.700 | 0.783 | 0.833 | 0.867 | 0.917 | 0.933 |
| 10 | 0.248 | 0.455 | 0.564 | 0.648 | 0.745 | 0.794 | 0.830 | 0.879 | 0.903 |
| 11 | 0.236 | 0.427 | 0.536 | 0.618 | 0.709 | 0.755 | 0.800 | 0.845 | 0.873 |
| 12 | 0.217 | 0.406 | 0.503 | 0.587 | 0.678 | 0.727 | 0.769 | 0.818 | 0.846 |
| 13 | 0.209 | 0.385 | 0.484 | 0.560 | 0.648 | 0.703 | 0.747 | 0.791 | 0.824 |
| 14 | 0.200 | 0.367 | 0.464 | 0.538 | 0.626 | 0.679 | 0.723 | 0.771 | 0.802 |
| 15 | 0.189 | 0.354 | 0.446 | 0.521 | 0.604 | 0.654 | 0.700 | 0.750 | 0.779 |
| 16 | 0.182 | 0.341 | 0.429 | 0.503 | 0.582 | 0.635 | 0.679 | 0.729 | 0.762 |
| 17 | 0.176 | 0.328 | 0.414 | 0.485 | 0.566 | 0.615 | 0.662 | 0.713 | 0.748 |
| 18 | 0.170 | 0.317 | 0.401 | 0.472 | 0.550 | 0.600 | 0.643 | 0.695 | 0.728 |
| 19 | 0.165 | 0.309 | 0.391 | 0.460 | 0.535 | 0.584 | 0.628 | 0.677 | 0.712 |
| 20 | 0.161 | 0.299 | 0.380 | 0.447 | 0.520 | 0.570 | 0.612 | 0.662 | 0.696 |
| 21 | 0.156 | 0.292 | 0.370 | 0.435 | 0.508 | 0.556 | 0.599 | 0.648 | 0.681 |
| 22 | 0.152 | 0.284 | 0.361 | 0.425 | 0.496 | 0.544 | 0.586 | 0.634 | 0.667 |
| 23 | 0.148 | 0.278 | 0.353 | 0.415 | 0.486 | 0.532 | 0.573 | 0.622 | 0.654 |
| 24 | 0.144 | 0.271 | 0.344 | 0.406 | 0.476 | 0.521 | 0.562 | 0.610 | 0.642 |
| 25 | 0.142 | 0.265 | 0.337 | 0.398 | 0.466 | 0.511 | 0.551 | 0.598 | 0.630 |
| 26 | 0.138 | 0.259 | 0.331 | 0.390 | 0.457 | 0.501 | 0.541 | 0.587 | 0.619 |
| 27 | 0.136 | 0.255 | 0.324 | 0.382 | 0.448 | 0.491 | 0.531 | 0.577 | 0.608 |
| 28 | 0.133 | 0.250 | 0.317 | 0.375 | 0.440 | 0.483 | 0.522 | 0.567 | 0.598 |
| 29 | 0.130 | 0.245 | 0.312 | 0.368 | 0.433 | 0.475 | 0.513 | 0.558 | 0.589 |
| 30 | 0.128 | 0.240 | 0.306 | 0.362 | 0.425 | 0.467 | 0.504 | 0.549 | 0.580 |
| 31 | 0.126 | 0.236 | 0.301 | 0.356 | 0.418 | 0.459 | 0.496 | 0.541 | 0.571 |
| 32 | 0.124 | 0.232 | 0.296 | 0.350 | 0.412 | 0.452 | 0.489 | 0.533 | 0.563 |
| 33 | 0.121 | 0.229 | 0.291 | 0.345 | 0.405 | 0.446 | 0.482 | 0.525 | 0.554 |
| 34 | 0.120 | 0.225 | 0.287 | 0.340 | 0.399 | 0.439 | 0.475 | 0.517 | 0.547 |
| 35 | 0.118 | 0.222 | 0.283 | 0.335 | 0.394 | 0.433 | 0.468 | 0.510 | 0.539 |
| 36 | 0.116 | 0.219 | 0.279 | 0.330 | 0.388 | 0.427 | 0.462 | 0.504 | 0.533 |
| 37 | 0.114 | 0.216 | 0.275 | 0.325 | 0.383 | 0.421 | 0.456 | 0.497 | 0.526 |
| 38 | 0.113 | 0.212 | 0.271 | 0.321 | 0.378 | 0.415 | 0.450 | 0.491 | 0.519 |
| 39 | 0.111 | 0.210 | 0.267 | 0.317 | 0.373 | 0.410 | 0.444 | 0.485 | 0.513 |
| 40 | 0.110 | 0.207 | 0.264 | 0.313 | 0.368 | 0.405 | 0.439 | 0.479 | 0.507 |
| 41 | 0.108 | 0.204 | 0.261 | 0.309 | 0.364 | 0.400 | 0.433 | 0.473 | 0.501 |
| 42 | 0.107 | 0.202 | 0.257 | 0.305 | 0.359 | 0.395 | 0.428 | 0.468 | 0.495 |
| 43 | 0.105 | 0.199 | 0.254 | 0.301 | 0.355 | 0.391 | 0.423 | 0.463 | 0.490 |
| 44 | 0.104 | 0.197 | 0.251 | 0.298 | 0.351 | 0.386 | 0.419 | 0.458 | 0.484 |
| 45 | 0.103 | 0.194 | 0.248 | 0.294 | 0.347 | 0.382 | 0.414 | 0.453 | 0.479 |
| 46 | 0.102 | 0.192 | 0.246 | 0.291 | 0.343 | 0.378 | 0.410 | 0.448 | 0.474 |
| 47 | 0.101 | 0.190 | 0.243 | 0.288 | 0.340 | 0.374 | 0.405 | 0.443 | 0.469 |
| 48 | 0.100 | 0.188 | 0.240 | 0.285 | 0.336 | 0.370 | 0.401 | 0.439 | 0.465 |
| 49 | 0.098 | 0.186 | 0.238 | 0.282 | 0.333 | 0.366 | 0.397 | 0.434 | 0.460 |
| 50 | 0.097 | 0.184 | 0.235 | 0.279 | 0.329 | 0.363 | 0.393 | 0.430 | 0.456 |

| n | α(2): 0.50 α(1): 0.25 | 0.20 0.10 | 0.10 0.05 | 0.05 0.025 | 0.02 0.01 | 0.01 0.005 | 0.005 0.0025 | 0.002 0.001 | 0.001 0.0005 |
|---|---|---|---|---|---|---|---|---|---|
| 51 | 0.096 | 0.182 | 0.233 | 0.276 | 0.326 | 0.359 | 0.390 | 0.426 | 0.451 |
| 52 | 0.095 | 0.180 | 0.231 | 0.274 | 0.323 | 0.356 | 0.386 | 0.422 | 0.447 |
| 53 | 0.095 | 0.179 | 0.228 | 0.271 | 0.320 | 0.352 | 0.382 | 0.418 | 0.443 |
| 54 | 0.094 | 0.177 | 0.226 | 0.268 | 0.317 | 0.348 | 0.379 | 0.414 | 0.439 |
| 55 | 0.093 | 0.175 | 0.224 | 0.266 | 0.314 | 0.346 | 0.375 | 0.411 | 0.435 |
| 56 | 0.092 | 0.174 | 0.222 | 0.264 | 0.311 | 0.343 | 0.372 | 0.407 | 0.432 |
| 57 | 0.091 | 0.172 | 0.220 | 0.261 | 0.308 | 0.340 | 0.369 | 0.404 | 0.428 |
| 58 | 0.090 | 0.171 | 0.218 | 0.259 | 0.306 | 0.337 | 0.366 | 0.400 | 0.424 |
| 59 | 0.089 | 0.169 | 0.216 | 0.257 | 0.303 | 0.334 | 0.363 | 0.397 | 0.421 |
| 60 | 0.089 | 0.168 | 0.214 | 0.255 | 0.300 | 0.331 | 0.360 | 0.394 | 0.418 |
| 61 | 0.088 | 0.166 | 0.213 | 0.252 | 0.298 | 0.329 | 0.357 | 0.391 | 0.414 |
| 62 | 0.087 | 0.165 | 0.211 | 0.250 | 0.296 | 0.326 | 0.354 | 0.388 | 0.411 |
| 63 | 0.086 | 0.163 | 0.209 | 0.248 | 0.293 | 0.323 | 0.351 | 0.385 | 0.408 |
| 64 | 0.086 | 0.162 | 0.207 | 0.246 | 0.291 | 0.321 | 0.348 | 0.382 | 0.405 |
| 65 | 0.085 | 0.161 | 0.206 | 0.244 | 0.289 | 0.318 | 0.346 | 0.379 | 0.402 |
| 66 | 0.084 | 0.160 | 0.204 | 0.243 | 0.287 | 0.316 | 0.343 | 0.376 | 0.399 |
| 67 | 0.084 | 0.158 | 0.203 | 0.241 | 0.284 | 0.314 | 0.341 | 0.373 | 0.396 |
| 68 | 0.083 | 0.157 | 0.201 | 0.239 | 0.282 | 0.311 | 0.338 | 0.370 | 0.393 |
| 69 | 0.082 | 0.156 | 0.200 | 0.237 | 0.280 | 0.309 | 0.336 | 0.368 | 0.390 |
| 70 | 0.082 | 0.155 | 0.198 | 0.235 | 0.278 | 0.307 | 0.333 | 0.365 | 0.388 |
| 71 | 0.081 | 0.154 | 0.197 | 0.234 | 0.276 | 0.305 | 0.331 | 0.363 | 0.385 |
| 72 | 0.081 | 0.153 | 0.195 | 0.232 | 0.274 | 0.303 | 0.329 | 0.360 | 0.382 |
| 73 | 0.080 | 0.152 | 0.194 | 0.230 | 0.272 | 0.301 | 0.327 | 0.358 | 0.380 |
| 74 | 0.080 | 0.151 | 0.193 | 0.229 | 0.271 | 0.299 | 0.324 | 0.355 | 0.377 |
| 75 | 0.079 | 0.150 | 0.191 | 0.227 | 0.269 | 0.297 | 0.322 | 0.353 | 0.375 |
| 76 | 0.078 | 0.149 | 0.190 | 0.226 | 0.267 | 0.295 | 0.320 | 0.351 | 0.372 |
| 77 | 0.078 | 0.148 | 0.189 | 0.224 | 0.265 | 0.293 | 0.318 | 0.349 | 0.370 |
| 78 | 0.077 | 0.147 | 0.188 | 0.223 | 0.264 | 0.291 | 0.316 | 0.346 | 0.368 |
| 79 | 0.077 | 0.146 | 0.186 | 0.221 | 0.262 | 0.289 | 0.314 | 0.344 | 0.365 |
| 80 | 0.076 | 0.145 | 0.185 | 0.220 | 0.260 | 0.287 | 0.312 | 0.342 | 0.363 |
| 81 | 0.076 | 0.144 | 0.184 | 0.219 | 0.259 | 0.285 | 0.310 | 0.340 | 0.361 |
| 82 | 0.075 | 0.143 | 0.183 | 0.217 | 0.257 | 0.284 | 0.308 | 0.338 | 0.359 |
| 83 | 0.075 | 0.142 | 0.182 | 0.216 | 0.255 | 0.282 | 0.306 | 0.336 | 0.357 |
| 84 | 0.074 | 0.141 | 0.181 | 0.215 | 0.254 | 0.280 | 0.305 | 0.334 | 0.355 |
| 85 | 0.074 | 0.140 | 0.180 | 0.213 | 0.252 | 0.279 | 0.303 | 0.332 | 0.353 |
| 86 | 0.074 | 0.139 | 0.179 | 0.212 | 0.251 | 0.277 | 0.301 | 0.330 | 0.351 |
| 87 | 0.073 | 0.139 | 0.177 | 0.211 | 0.250 | 0.276 | 0.299 | 0.328 | 0.349 |
| 88 | 0.073 | 0.138 | 0.176 | 0.210 | 0.248 | 0.274 | 0.298 | 0.327 | 0.347 |
| 89 | 0.072 | 0.137 | 0.175 | 0.209 | 0.247 | 0.272 | 0.296 | 0.325 | 0.345 |
| 90 | 0.072 | 0.136 | 0.174 | 0.207 | 0.245 | 0.271 | 0.294 | 0.323 | 0.343 |
| 91 | 0.072 | 0.135 | 0.173 | 0.206 | 0.244 | 0.269 | 0.293 | 0.321 | 0.341 |
| 92 | 0.071 | 0.135 | 0.173 | 0.205 | 0.243 | 0.268 | 0.291 | 0.319 | 0.339 |
| 93 | 0.071 | 0.134 | 0.172 | 0.204 | 0.241 | 0.267 | 0.290 | 0.318 | 0.338 |
| 94 | 0.070 | 0.133 | 0.171 | 0.203 | 0.240 | 0.265 | 0.288 | 0.316 | 0.336 |
| 95 | 0.070 | 0.133 | 0.170 | 0.202 | 0.239 | 0.264 | 0.287 | 0.314 | 0.334 |
| 96 | 0.070 | 0.132 | 0.169 | 0.201 | 0.238 | 0.262 | 0.285 | 0.313 | 0.332 |
| 97 | 0.069 | 0.131 | 0.168 | 0.200 | 0.236 | 0.261 | 0.284 | 0.311 | 0.331 |
| 98 | 0.069 | 0.130 | 0.167 | 0.199 | 0.235 | 0.260 | 0.282 | 0.310 | 0.329 |
| 99 | 0.068 | 0.130 | 0.166 | 0.198 | 0.234 | 0.258 | 0.281 | 0.308 | 0.327 |
| 100 | 0.068 | 0.129 | 0.165 | 0.197 | 0.233 | 0.257 | 0.279 | 0.307 | 0.326 |

The resultant values from one tailed Spearman's test provides correlation between variables as

- .00-.19 "very weak"
- .20-.39 "weak"
- .40-.59 "moderate"
- .60-.79 "strong"
- .80-1.0 "very strong"

## Table 4-2 Spearman Correlation Results

**Correlation Results**

| | | | Clarity | Distribution | Tailoring |
|---|---|---|---|---|---|
| Spearman's rho | **Project Success** | Correlation Coefficient | 0.798** | 0.712** | 0.266 |
| | | Sig. (1-tailed) | 0.000 | 0.000 | 0.078 |
| | | N | 30 | 30 | 30 |

** Correlation is significant at the 0.01 level (1-tailed)

Hypothesis Test based on Spearman's Correlation

### 4.3.1 Hypothesis – 1 Accepted

Hypothesis Test for Decision-Making clarity and ASD project success

H0: Implementation clarity of decision making is not positively related with ASD project success

H1: Implementation clarity of decision making positively relates with ASD project success

Spearman's Correlation 1 tailed test critical value for 30 records at 0.01 is 0.425

Spearman's rho: 0.798

Decision: Strong evidence is found to reject the null hypothesis

Conclusion: Implementation clarity of decision making positively relates with ASD project success

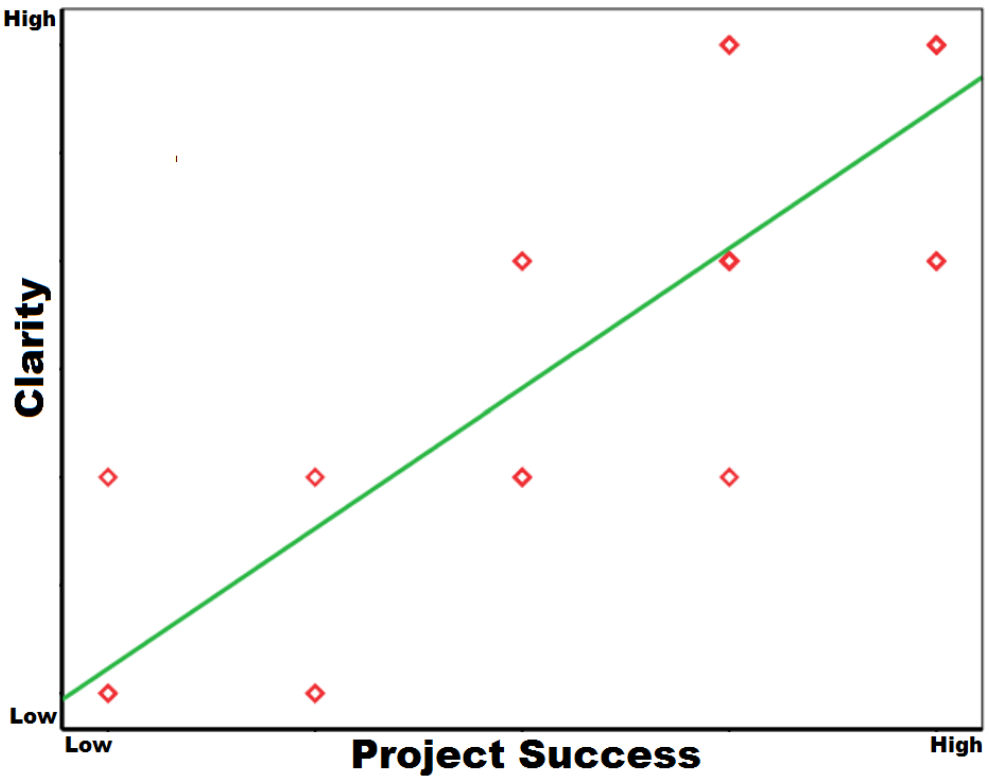



**Figure 4-1 Hypothesis Result – Clarity Vs Project Success**

### 4.3.2 Hypothesis – 2 Accepted

8.2 Hypothesis Test for Decision-Making distribution and ASD project success

H0: Distribution of decision making is not positively related with ASD project success

H1: Distribution of decision making positively relates with ASD project success

Spearman's Correlation 1 tailed test critical value for 30 records at 0.01 is 0.425

Spearman's rho: 0.712

Decision: Strong evidence is found to reject the null hypothesis

Conclusion: Distribution of decision making positively relates with ASD project success

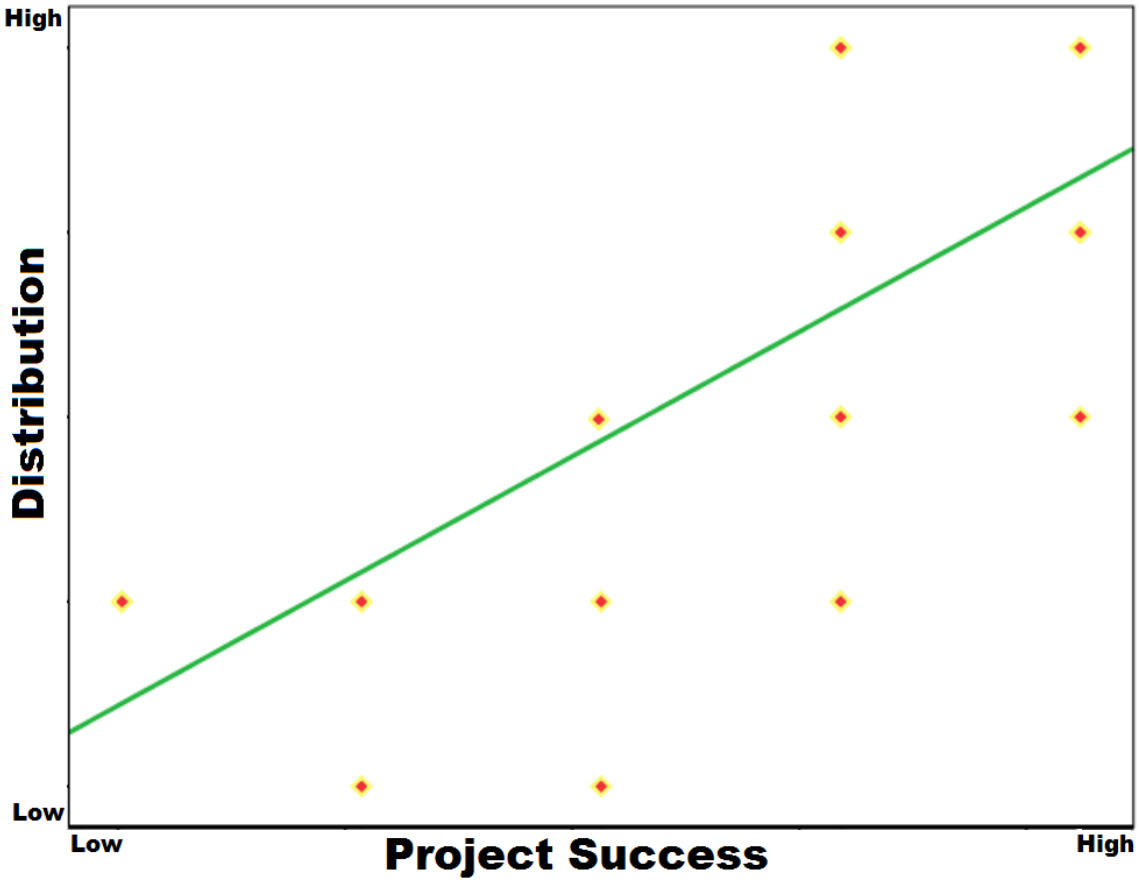



**Figure 4-2 Hypothesis Result – Distribution Vs Project Success**

### 4.3.3 Hypothesis – 3 Rejected

Hypothesis Test for Decision-Making tailoring and ASD project success

H0: Tailoring of the decision-making process is not positively related with ASD project success

H1: Tailoring of the decision-making process positively relates with ASD project success

Spearman's Correlation 1 tailed test critical value for 30 records at 0.01 is 0.425

Spearman's rho: 0.266

Decision: Insufficient evidence to reject the null hypothesis

Conclusion: Tailoring of the decision-making process is not positively related with ASD project success

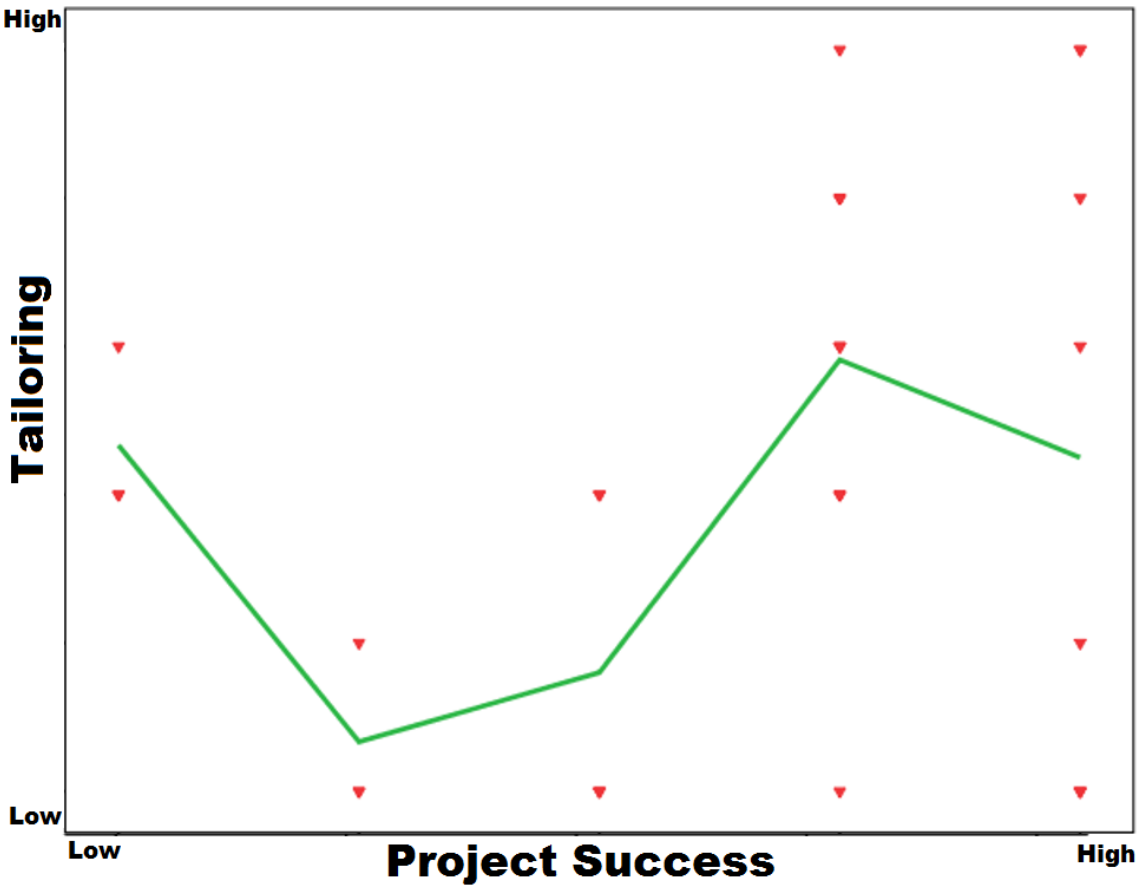



**Figure 4-3 Hypothesis Result – Tailoring Vs Project Success**

## 4.4 Results

As shown in the Table 4.2, the correlation coefficient between decision-making implementation clarity and project success is 0.798, which falls into the ‘strong’ range of Spearman’s correlation coefficient standard table, and is significantly above the critical value of 0.425. This means that the research data provides evidence to accept the hypothesis and validate a strong relationship between decision-making implementation clarity and project success. Similarly, the correlation coefficient between decision-making distribution and project success is 0.712, which falls into the ‘strong’ range of Spearman’s correlation coefficient standard table and way above the critical value of 0.425. This means that the research data provides the evidence to accept the hypothesis and validate a strong relationship between decision-making distribution and project success.

However, the correlation coefficient between the decision-making process tailoring and ASD project success is only 0.266, which falls into the ‘weak’ range of Spearman’s correlation coefficient standard table and is significantly below the critical value of 0.425. This means the research data provides the evidence to reject the hypothesis and it could not validate a strong relationship between decision-making process tailoring and project success.

As a result of this section, it is concluded that Two hypotheses are accepted and one is rejected. This shows that the problem does exist, however, requires more details to explore if there are other missing factor(s) for the decision-making impact on the ASD project.

## 4.5 Chapter Summary

The result of stage-1 analysis are not conclusive. Two hypotheses are accepted and one hypothsis is rejected. It indicateds there may be some factors in realtion to tailoring of decision-making in the ASD projects are missing. To find missing factor, research methodology and plan were revisited and stage-2 of this research was designed and planned (details in Ch-3). Next chapter (Ch-5) provides deatil and data analysis of satge-2 of this research.

# 5 Qualitative Results - Team Factor

This chapter covers the qualitative data gathering, analysis and results. Research methodology and plan are provided in Ch-3. The results of quantitative analysis in Ch-4 are inconclusive, this chapter provides details of qualitative research and thematic analysis.

# 5.1 Preparation

## 5.1.1 Interview Questions

Interview questions were designed to find as much data from the participants which can help to investigate any missing factor(s). Scope of research is not changed and area of research is more defined after stage-1. Interview questions are focused and specific with the area of research still are broad enough to fetch more information on the ground.

Interview Questions are provided in the Appendix C.

## 5.1.2 Contact and Confirmations

Participants of satge-2 are same as satge-1 (Ch-3 for more details). Participants contact details were available because they have participated in the stage-1 survey. They were contacted officially through email and requested for their participation in an interview. All have accepted to take part in a face-to-face interview. Participants were sent formal interview meeting request after finalizing date and venue, except few, all interviews were conducted in their office premises.

## 5.1.3 Interview Data Gathering

Interviews are conducted face-t-face with each participant. Only two participants could not come for the interview on designated date, due to some urgent tasks and interviews were rescheduled. All interviews were conducted in English, all transcripts recorded in

English and data analysis tables are in English. These transcripts are stored on a computer which was password protected.

## 5.2 Stage-2 Interview Data Analysis

The consolidated data of all interviews, in the excel sheet, was used for further analysis. The first set of interview questions provides the demographics of the company, the project and the participants. This demographic information provides the data source details and helps to establish the depth and breadth of the source. The second set of interview data consists of open-ended questions to find out as much details as possible to establish common theme(s) for further investigation.

### 5.2.1 Demographic Discussion

Demographic data of participents and company help to understand the overall situation and environement in which ASD projects were executed. This data supports analysis and final findings. Demographic data is presented in the table below.

| Industry | Government | Oil & Gas | Software House | Others |
|---|---|---|---|---|
| | 50% | 27% | 6% | 17% |

| Company Size | Small | Medium | Large | Enterprise |
|---|---|---|---|---|
| | 3% | 17% | 40% | 40% |

| Project Size | Small | Medium | Large |
|---|---|---|---|
| | 10% | 33% | 57% |

| Enterprise Level | Executive | Manager | Technical |
|---|---|---|---|
| | 20% | 47% | 33% |

| Established PMO | Yes | No |
|---|---|---|
| | 73% | 27% |

**Figure 5-1 Participants Demography**

When research commenced and companies were approached, it was not targeted to any particular industry and criteria was used to make a selection decision. The demographic information here is of those companies participated in the research. The data about the companies represents 50% government and 50% non-government companies. Government organizations are using technology and developing software in-house. It shows that government organisations are not behind and have adopted new trends as agile software development practices are well in place. These results also indicate that government organizations in the Middle East region are fast paced in selecting and adopting new technologies and competing with non-government companies in technology adoption.

Second largest participants group is from Oil and gas. It could be because of the nature of the region where oil and gas is one of the key industries. Though oil and gas industry is not dealing with end customers directly, data shows they still are progressing well in IT and adopting new technologies. Oil and gas with a 27% presence is the highest among the non-government organizations. Software house industry may not be well established in Australia, but in Pakistan this industry is bringing significant revenue for the country. Software house was 6% participation and mainly from Pakistan. The others category (17%) covers services, retail, utility and construction companies. As the data shows, technology adoption is not bound to one industry and companies across the industries are upgrading their technologies.

**Company Size**

Company size does matter for software development especially while adopting new technologies. In small and medium companies, implementing changes are easier than in large and enterprise level companies. The data collected shows that 80% of the participating companies are either large (40%) or enterprise (40%) level. Agile software adoption in the large and enterprise level companies indicates that companies are determined for change and adopting new technologies. Small (3%) and medium (17%) participating companies are showing the data is covering all levels of companies.

Only agile software development projects are considered. Participants were asked to consider one project to answer the interview questions. Participants selected large projects (57%), medium projects (33%) and small size projects (10%). The data shows that agile is used for all size of projects and that participants selected more large projects indicates that companies have been using agile approach for some time and that agile is well adopted.

Most organizations have three levels of decision-making implementation as discussed in detail during the literature review. Each level has its decision-making boundaries. The Executive level makes decision with a companywide impact, managerial decision making may impact at department levels and tactical/technical level decision making covers a particular area of work. For agile software development projects, all these levels do have an impact. Participants are from three levels where 20% are executive, 47% are managers and 33% are technical. The range of participants indicates that the collected data comprehensively covers the organizational levels and input from all those have impact on the agile software development projects.

Lastly, participants were asked about the established PMO (Project management office) in the organization. Standards and processes are developed and followed in the organizations, particularly for the project based organizations. Software development projects are not different than other projects, however, adopting new technologies and introducing change makes it complex and difficult. If organizations have established a PMO, responsible for standards and implementation of processes, then change become easier. Data shows that the majority of the organizations (73%) have established a PMO while rest (27%) do not have an established PMO. This indicates that organizations generally do realize the importance of PMO and have established proper structures.

### 5.2.2 Question by Question Data Analysis

The first open ended question in the interview was asked from the project perspective:

**What is the most important data required by project management about agile software development project for better decision-making?**

Participants were asked to consider projects, possible scenarios / data or information which is required for decision making. It may include time, cost, quality, scope, iteration cycle, release cycle, resources, backlog, velocity and retro actions. This may lead to further questions within the scope to know about project structure, process, accountability, delegation, deliverables, performance measurement methods, corrective action or any other area / aspect which can impact the ASD decision making.

For this question, participants can have few immediate thoughts related to a project. Time, cost, quality and scope comes to mind first. Similar patterns were seen in the responses while interviewing. Discussion and further elaboration of the question helped participants to think about other aspects and how various scenarios shaped the project. The common words used in most responses were status, scope, time, cost, risk, issue, capacity, velocity, backlog, estimation, budget, people, process, resources, schedule, forecast, communication and more. Less common words or concepts used against this question are: impediments, context, change adoption, historical data, cultural differences, training, team capability, commitment, driving force and role influence.

Keywords from the responses are highlighted. These key words, their similar alternatives (where required) and similar concepts to make the uniformity of words were written in the second column of the Word document (See Appendix D,E,F and G). For example, some responses are, uncertail requirements, gap in the specifications, unclear functionality, lack of business understanding, change in requirements etc. All these responses are indicating ‘clarity of scope’. Using this process, similar concepts are combined in a theme. This action shapped up the similar patterns of answer with more clarity. Response key words which were related to the capacity of something and to provide the update / status, (i.e. velocity, capacity, delivery, work completed etc.) were replaced with Capacity Based Status. Similarly, key words related to the value of something and to provide the update / status, (i.e. burndown, remaining, stories, backlog, quality, defects etc.) were replaced with Value Based Status. Keywords which indicated a problem or potential project, mitigation or action plan for events were replaced with Risks and Issues. Keywords with indications of communication (i.e. meetings, discussions, communication, working together etc.) were combined into Communication and Collaboration.

There were keyword and concepts which could not be combined in one concept. Whereas the word ‘team’ was used, it was used in different contexts. Words used with teams are commitments, capability and role influence... Other unique concepts were culture, driving force, training, historical data, flexibility data, management interventions and product technology.

The next open ended question in the interview was asked from the business perspective:

**What is the most important data required by the project’s steering committee (decision authority) about the business objectives from the product owner (business) for better decision-making?**

Participants were asked to consider ASD project, possible scenarios / data or information from a business perspective which is required for decision making. It may include business value, priority, goals, quality, acceptance criteria, consumer, purpose, dependencies and other business related details. This may lead to further questions within the scope to know about individual iteration outcomes, overall delivery, customer benefits or any other area / aspect which can impact the ASD decision making. In ASD projects, product owner is delegated role to bridge between business needs and IT teams. From the responses, concise data directly related to the question was recorded in the document against the question.

From a business perspective, requirement, problem to be solved, solution to be delivered, value to be achieved, and acceptance criteria can be the first thoghts in particpents mind. Similar patterns were seen in the responses while interviewing. Discussion and further elaboration of the question helped participants to think about other dimensions. The common words used were customer needs, requirements, priority, business value, scope, problem, solution, acceptance criteria. New words and concepts surfaced against this question such as, comparative product, competitive product, historic data, market intelligence, training, team expertise and vertical domain data.

Keywords from the responses are highlighted, these key words, their similar alternatives (where required) and similar concepts to make the uniformity of words were written in the second column of the document. Keyword like user needs, customer needs, problem,

requirements, specifications, user stories, objective and purpose are replaced with Problem to Solve. Keyword including business value, required outcomes, business objective, achievement, component value, expectation, targets and return on investment are replaced by Value to Achieve. Keywords which indicated customer priority, delivery priority, key priorities and relative priorities were changed to Customer Priorities. Keywords with indications of acceptance criteria either for technical outcome or non-fictional outcome, customer acceptance criteria and end user needs were replaced with Customer Acceptance Criteria.

There were keyword and concepts which could not be combined in one concept. Whereas the word ‘team’ was used, it was again used in different context. Team expertise is used by various users as well as roles and accountabilities and training needs which are also linked to the team. Other unique concepts are customer perspective, comparative product information, competitive product information, historical data, market intelligence and training and vertical domain data.

The next open ended question in the interview was asked from the problem perspective:

**What are the 3 major problems faced in the agile software development project? (Any type of problem related to agile software development project)**

Participants were asked to consider ASD projects, possible scenarios / data or information from a problem perspective which may impact the project. This question is not limited to any particular type of problem. It may include any issue from business, from processes, people or outside factors. The reason for being so open is to investigate what kind of problem ASD projects may have and if there are any commonalities. Also this question may establish if the project and business perspective for ASD project is different for the participants and they may consider other issues more important. The question was discussed with more details and elaboration to find detailed information from the participants. From the responses, concise data directly related to the question was recorded in the document against the question.

From a problem perspective, anything which negatively impacts the project can be considered as a problem. Participants were asked to think about a problem which

impacted the agile software development project decision making. Common problems were around the clarity of the scope, vague requirements, breaking work into smaller chunks, business not being clear what they wanted and scope creep. Furthermore, areas were discussed which could cause a problem if not well managed such as, training, team skills, team assignment, understanding of technology, communication and collaboration, common terminologies, organizational changes, process changes, meeting standards and estimations. Discussion and further elaboration of the question during the interview encouraged participants to discuss the not so obvious areas and think about other dimensions too. New words and concepts surfaced against this question such as, cultural adoption, priority definition, accountability definition and quality standards.

Keywords from the responses are highlighted, these key words, their similar alternatives (where required) and similar concepts to make the uniformity of words were written in the second column. Common concepts were around clarity of scope training and team assignment. Other concepts were communication and collaboration, culture, priority, accountability and standards.

There were keyword and concepts which could not be combined in one concept. Whereas the word ‘team’ was used it was used in different contexts. The team concept is used with training, assignment, communication, accountability and delivery.

Last open-ended question in the interview was asked from the solution perspective:

**What are the 3 most important changes in project governance that can help the agile software development project?**

Participants were asked to consider ASD projects, possible scenarios / data or information from a solution perspective which could improve the project outcomes. This question is not limited to any particular type of solution or change for a particular type of problem. It may include any change from business, from processes, from project or from people which could help to improve results. The reason for the questions being open is to find out what kind of solutions participants are thinking of, what they experience and how they see the fix for their problem. This questions may establish and explore the areas of dire need for improvement in the ASD project and may provide direction / common

themes for a solution. The question was discussed with more details and elaboration to find detail information from the participants. From the responses, concise data directly related to the question was recorded in the document against the question.

From a solution perspective, anything which positively impacts the project can be considered as a solution. Participants were asked to think about the changes as solutions which impact the agile software development project decision making. Common discussion was around the decision making authority, well documentation, performance assessment regulations, structured delegation, standardization, customer awareness, end user involvement, early business testing, tailoring practices, and flexibility of processes, flexible delivery and adoptability in the governance processes. Furthermore, areas were discussed which could help as solution such as, define ownership, training, reduce management layers, define success, and good communication among the teams and management layers. Discussion and further elaboration of the questions during the interview encouraged participants to discuss the not so obvious solutions and think through other dimensions too. New words and concepts surfaced against this question such as, cultural adoption, trust building, customer awareness, development in business premises, passive team interactions, and avoid scope changes.

Keywords from the responses are highlighted, these key words, their similar alternatives (where required) and similar concepts to make the uniformity of words were written in the second column. This action start shaping up the similar meanings and showed patterns of answers in much more clarity. Common concepts were around process definition, customer involvement and tailoring practices. Other concepts were training, defining the problem, communication, skilled team, historical references and involvement of stakeholders from the beginning.

There were keyword and concepts which could be combined in one concept. Whereas the word ‘team’ was used, it was used in different context. Team concept was used with training, ownership, communication, interactions and commitments.

# 5.3 Stage-2 Results

## 5.3.1 Theme Extraction

Once the open-ended interview questions were separately analysed and themes from the individual questions were extracted, it was time to combine the themes of each question and find the patterns or common theme(s) in each question.

The last column of each document (as presented in Appendix D,E,F and G) was copied into an excel sheet, side by side, to find the commonalities. Table/Figure 5.3.5 below shows the extracted themes from each question, side by side, with colour coding to present the common theme(s) presented in each question.

| Project Management | Business | Issues to Solve | Solution |
|---|---|---|---|
| Value Based Status | Problem to Solve | Clarity of Scope | Define Process |
| Risks and Issues | Value to Achieve | Training | Customer Involvement |
| Capacity Based Status | Customer Priorities | Team Assignment | Tailoring Practices |
| Team Capability | User Acceptance Criteria | Communication and Collaboration | Define Ownership |
| Team Commitments | Team Expertise | Culture Adoption | Training |
| Dependencies Impact | Business Process | Defined Priority | Define Problem |
| Roles Influence | End User Details | Defined Accountability | Reduce Management Layers |
| Communication and Collaboration | Customer Acceptance Criteria | Quality Standards | Communication |
| Improvements | Customer Perspective | | Define Success |
| Accurate units of Measurements | Comparative Product Information | | Skilled Team |
| Actionable data | Competitive Product Information | | Historical Reference |
| Cultural Influence | Dependencies | | Define Tools |
| Driving Force | Driving Force | | Involve All Required |
| Execution method | Historical Data | | Build Trust |
| Feedback Loop | Market Intelligence | | Culture Adoption |
| Flexibility data | Regulations and Constraints | | Customer Awareness |
| Historical Data | Roles and Accountabilities | | Define Dependencies |
| Management Interventions | Training Needs | | Development in Business Premises |
| Objective Deviations | Vertical Domain Data | | Documentation |
| Product Technology | | | Passive Team Interactions |
| Training | | | Stop Scope Change |
| | | | Team Commitments |

**Figure 5-2 Stage-2 Theme Extraction**

## 5.3.2 Emergent Themes

In all questions, participants talked about the team without any prompting by the candidate. In the first question, this idea was discussed as team capability and team commitment. In the second question, it was discussed as team expertise while in the third question, it was discussed as team assignment. In the last question it was discussed as skilled team, passive team interactions and team commitments. Team was the only theme

which was common in all the questions. Further analysis showed that there were a few other common themes presented in all the questions and they were directly linked to the concept of team. The first type of team concepts were related to roles and accountabilities. In the first question it was described as role influence, in the second question it was mentioned as roles and responsibilities, in the third question it stated as defined accountabilities and in the last question it was termed as defined ownership and reduced management layers. Other themes which were common in all questions and directly linked to the team was training.

Hence, this Authorconcluded that ‘team’ is a significant emergent theme, common in all questions and discussed in many ways. Moreover, team was not found or discussed in the decision-making context before in this research. A concept, ‘people’, was discussed, however, team is a different entity different then ‘people’.

## 5.4 Chapter Summary

Team is the most common used concepts and emerged as an important factor in the ASD project scenario. This factor (team) was not discussed before in the literature review or in the context of decision-making. A concept of ‘people’ was discussed in the EIT Governance definition. Concpet of people is different then a team, which is a formation or structure of people. This newly discovered factor requires further investigation and how it is impacting decision-making. It is also concluded that another literature review is required to study team formation/strcture/composition in decision-making context. Ch-2 (section 2.4 onwards) provides second literature review. Next chapter (Ch-6) provides details of satge-3 data anlsyis of this research which covers team composition change impact on the ASD projects.

# 6 Qualitative Results - Team Composition Change

‘Team’ was found as a new factor in decision-making (Ch-5). Team was not discussed in the literature or in this research as governance factor. Further literature review provided details about team where team composition change has potential to impact team’s ability of decision-making (Ch-6). Stage-3 was designed (Ch-3) to find if team composition change has any impact on ASD project in the enterprise level organizations. If so, what is that impact. It became vital to find team composition change relation to the decision-making and its impact on the ASD projects. This chapter is providing the analysis and results of stage-3

## 6.1 Stage-3 Interview Data Analysis

In this section, responses against interview questions are analysed using thematic analysis (Ch-3 1.6.3). Demographic questions are consolidated first. Core interview questions are processed for results in three parts. Firstly, each interview is considered as a project and data is sorted as per single project view. This provides decision-making and team compositing changes impacts in a single project view. Secondly, interview responses are sorted and placed question by question. Lastly, complied both views to draw together a complete picture of the findings.

### 6.1.1 Demographic Discussion

The demographic questions covered background of the company, project and participants. Figure 7.1 provides the demographic details.

| Industry | Finance | Health | Construction | Others |
|---|---|---|---|---|
| | 33% | 25% | 17% | 25% |

| Company Size | Small | Medium | Enterprise |
|---|---|---|---|
| | 8% | 8% | 83% |

| Project Size | Small | Medium | Large |
|---|---|---|---|
| | 8% | 25% | 67% |

| Enterprise Level | Executive | Manager | Technical |
|---|---|---|---|
| | 8% | 42% | 50% |

**Figure 6-1 Stage-3 Participants Demography**

**Industry**

When the research commenced and the companies were approached, it was not targeted to any particular industry and the criteria was used to make a selection decision. The demographics data shows 33% financial companies, 25% health companies, 17% construction companies and 25% other companies including telecom and multinationals. No government organizations participating in this stage which was the major participant in the stage 2. It shows a very different set of industries and different companies which will provide a good cross reference data.

**Company Size**

Mainly enterprise level organization participated in stage-3 with a significant 83% share. Only 8% small organization and 8 % medium level organizations participated.

**Project Size**

Only agile projects were considered, where participants were asked to select one example which they could provide the best and most information about the project. Participants described large projects (67%), medium projects (25%) and small size projects (8%). Data shows that agile is used for all size of projects and that participants selected more large

projects indicates that companies have been using the agile approach for some time and that agile is well adopted.

**Participants Level**

Participant organizations have three levels of decision making implementation as discussed during the literature review. Each level has its decision making boundaries. The Executive level makes decision with a companywide impact, managerial decision making may impact at department levels and tactical/technical level decision making covers particular area of or work. For agile software development projects, all these levels do have an impact. Participants in this stage covered three levels where 8% were executive, 42% were managers and 50% were technical. The range of participants indicates that the collected data comprehensively covered the organizational levels and input from all those have impacted on the agile software development projects.

Data also revealed other statistics about the structure of governance and team's development as well as number of team changes in a certain period of project. Table below shows the data in %age. This data is showing the overall picture of organizations, projects and team changes of sample set.

| | | | |
|---|---|---|---|
| **Established PMO** | **No** | **Yes** | |
| | 50% | 50% | |
| **Team Size** | **4 or Less** | **5 to 10** | **Over 10** |
| | 17% | 75% | 8% |
| **Formal Training/Development** | **No** | **Limited** | **Mandatory** |
| | 33% | 50% | 17% |
| **Providing Agile Training** | **No** | **Yes** | |
| | 67% | 33% | |
| **Providing Personal Development** | **No** | **Yes** | |
| | 75% | 25% | |
| **No of Team Changes** | **1 or Less** | **2 to 5** | **Over 5** |
| | 33% | 67% | 0% |

**Figure 6-2 Stage-3 Structure and Team Development**

### 6.1.2 Project by Project Data View

Each interview provided full snapshot of a project. A detailed project by project analysis was conducted. This analysis provided in-depth understanding of each project and impacts of team changes. However, an individual project is not able to provide the trend or how a factor is impacting project can be considered as general rule for other projects. To establish such a result, multiple responses need to be considered together and analysed. Project by project data was established and analysed, you can find details under Appendix K.

### 6.1.3 Question by Question Analysis

This analysis is from the collected data and provides a question-by-question outcome (Ch-3 section 1.6.3. The first aim was to find what common ideas were expressed by the participants and derive patterns from these ideas. This section is to provide question by question details of those pattern and variations (ideas). The process adopted for extracting these patterns from the variations was a step by step approach where all answers were written in a document against each question. Many different words may have been used for various ideas, and these words and ideas were combined and reviewed as a whole statement. Once this step was complete, these variations (ideas) were written together to determine if any pattern was apparent. Final results of patterns and variations are provided here, more details can be seen in Appendix P.

Next question by question patterns and variations are provided where patterns are extracted from the variations. It means, a pattern statement does cover all variations. Also each pattern is further supported with the number of respondents who had described one or more variations (ideas). First part of interview questions were related to demographic and project details, form question 5 to question 12 are research question of stage-3 data gathering.

For each question, complete statement of the question as presented in the interview is provided here, full list of interview questions can be viewed in Appendix J. Each table provided here against each question is only providing the patterns and variations (Ch-3). Detail of each question, responses of each participants, how variations are extracted and how patterns are extracted from the variations can be reviewed in Appendix L.

**Question 5:** Could you please tell me about the governance process and structure in place?
(formal, informal, guidelines, written processes or established structure like PMO etc)

**Table 6-1 Stage-3 Question-5 Patterns extraction from variations**

| Patterns | Variations |
|---|---|
| Governance process and procedures are in-place<br>(from 11 respondents) | Governance procedures are in place and vary from project to project.<br>Governance structure is at Program level<br>Governance structure is in place at organization level, No hierarchy structure between project and business<br>Governance structure is in place at project level<br>Governance structure is in place for the projects, More flexibility in project governance for Agile projects<br>Governance structure is in place for the projects<br>Governance structure is in place at organization level, Governance structure is flexible due to geographical distributed teams<br>Governance processes exists at project level<br>Governance structure is in place at organization level, No hierarchy structure between project and business<br>Governance processes does exist and implemented differently for technical and agile projects.<br>Governance processes are formally implemented according to department needs. |
| No established PMO<br>(from 5 respondents) | No established PMO |
| An established PMO<br>(from 6 respondents) | An established PMO is in place, PMO is at strategic level and planning execution is at project level<br>A strong PMO is in place<br>PMO is established with selective execution |

| | |
|---|---|
| | PMO is making the decision of projects and their prioritization.<br>PMO is established and using a structured environment.<br>PMO is established |
| Governance process and procedures are not established | No written form processes for running the projects, No documentation is available for any kind to execute the projects |
| PMO exist but not functional | Company does have a PMO, No steering committee, no structure or formal process in place. |

Half of the participants mentioned that they have an established PMO in the organization, which is either fully functional, partially functional or little function for only selective areas, while other half mentioned that the organization does not have any established structure, process or organization for project management functions. It was also evident that the organizations without established a PMO, do not have a structure for decision making, governance or execution of the projects. There is only one exception found in the data, where an organization which does not have a PMO, decision making and execution of the project (selected project for this research in the organization) does have a defined structure.

**Question 6:** Can you tell me about the agile trainings or formal courses offered in the organization?
(for individuals or for teams)

**Table 6-2 Stage-3 Question-6 Patterns extraction from variations**

| Patterns | Variations |
|---|---|
| Agile training is not provided<br>(from 4 respondents) | No agile training is provided by the organization |
| Personal and individual growth is encouraged<br>(from 2 respondents) | Company do encourage personal efforts and capabilities building, however, no monitory benefits are offered<br>Organization also encourage team members for personal growth |

| | |
|---|---|
| Agile training is provided<br>(from 8 respondents) | Organization is providing specific agile training, however, it is not mandatory<br>Organization is providing specific agile training<br>Organization is providing specific agile training, however, it is not mandatory<br>Organization provides specific agile training, mandatory with exam<br>Organization provided specific agile training, mandatory for IT teams<br>Organization provided specific agile training to agile project teams only<br>Organization provided specific agile training to IT and business, however, only people in the large projects and agile impacts took the training.<br>Organization provides specific agile training for agile project team only |
| Personal and individual growth is not encouraged<br>(from 3 respondents) | Members of the agile team took trainings and certification by their own, no support is provided by the company<br>Most of the agile team does have formal trainings and certifications. Company does not have a career building plan for employees.<br>Agile team members help each other, no support is provided by the company |

It is evident from the data that organizations are not keen to train their employees and only providing optional training for agile teams. About 60 % of organizations provide agile training, but this is optional and mostly given to the project teams (it means IT teams only and functional teams are not considered). Only one organization provided the mandatory training with an exam. No organization provided certification level training, however, 2 organizations encouraged project teams to be certified.

**Question 7:** How do you describe the process of agile team development in your organization?

(formal or informal process e.g. team bonding, workshops, team work courses etc)

(Do the company follow any team development models?)

(forming, storming, norming and performing of Tuckman)

**Table 6-3 Stage-3 Question-7 Patterns extraction from variations**

| Patterns | Variations |
|---|---|
| Team building process does not exist<br>(from 7 respondents) | Company does not provide any formal or informal setup for team building<br>No formal process of team development is in place<br>Team development process or structure is missing in the organization<br>No formal or informal process of team building |
| At organization level, team development stages (FSNP) are not recognized<br>(from 8 respondents) | Team development stages are not recognized at the organization level. |
| Individual team level bonding do exist<br>(from 4 respondents) | Personal and team level informal events and social gathering does exist<br>Team level activities does exist for bonding and team building<br>Personal and team level informal events exist |
| Team building process do exist<br>(from 5 respondents) | Formal process of team development exist<br>Team building process is managed through hiring people who can fit in the organizational culture and later balanced as per there best fit.<br>Organization recognizes and support team building activities |

| | |
|---|---|
| Company organize events for team bonding (from 2 respondents) | Organization do organize events to help team bonding<br>Organization supports events for team building |
| Team development stages (FSNP) are recognized at personal level | At person level, team development stages are understood and recognized |
| At organization level, team development stages (FSNP) are recognized<br>(from 3 respondents) | Team development stages are recognized |

Only one organization has a formal process of team building, the rest do not have a formal process of team building but a few organizations seems to have an informal process of team building. Only 25% of organizations support team bonding and team building activities in the organization. In the remaining 75% of the organizations, team bonding informal events may be conducted at a personal level such as team dinners, coffee catch-up etc. Team building stages are not recognized and 70% organizations had no clue what it is.

**Question 8:** Can you describe the team composition in the ASD project?
(composition (people, skills, roles etc),
team purpose (the problem to be solved),
arrangement (place of work, location etc),
demography (male/female etc) and
time-scale (dates, time, duration etc) )

**Table 6-4 Stage-3 Question-8 Patterns extraction from variations**

| Patterns | Variations |
|---|---|
| Team is formed from multiple departments<br>(from 11 respondents) | Team consist of people from management, functional and technical areas<br>Team consist of people from various groups |

| | |
|---|---|
| Team is formed from one department | All team members are from the development group |
| Team Size is Small (1 to 4)<br>(from 2 respondents) | Team size is 4 people |
| Team size is Medium (5 to 7)<br>(from 4 respondents) | Team size is 7 people<br>Team size is 6 people |
| Team size is Large (8 or more)<br>(from 6 respondents) | Team size is 16 people<br>Team size is 10 people<br>Team size is 9 people |
| Team works from multiple locations<br>(from 4 respondents) | Team is working from multiple locations |
| Team is collocated<br>(from 8 respondents) | Team is working from one location |
| Team gender is all males | All team members are male |
| Team gender is mixed<br>(from 11 respondents) | 25% Female, 75% Male<br>20% Female, 80% Male<br>45% Female, 55% Male<br>30% Female, 70% Male<br>30% Female, 70% Male<br>16% Female, 84% Male<br>40% Female, 60% Male<br>30% Female, 70% Male<br>10% Female, 90% Male<br>40% Female, 60% Male<br>30% Female, 70% Male |

Teams in all the organizations are multidisciplinary where people are from various groups or skill sets. Only one exception was found, where all team members were from one discipline, i.e. development. Team size varies, with teams generally ranging from 4

people to 10 people, with one exception where team size was 16. Mostly it is a mid-range from 6 to 10 people. In all projects the majority gender is male with median 30% female and 70% male. Half of the teams are collocated and half of the teams worked from multiple locations in the project.

**Question 9:** How often does the team composition change throughout the ASD project?
(team composition change when expanded, contracted, replaced)
(per iteration and in the overall project)

Most of the projects (about 70%) observed team composition changes (meaning the project team changed in the project) while 30% had seen no change throughout the project. Most of the changes are replacement, expansion and contraction are observed once for each.

**Question 10:** Would you be able to share the common reason(s) of the team composition changes?
(reason may be same or different for each change expanded, contracted, replaced)

**Table 6-5 Stage-3 Question-10 Patterns extraction from variations**

| Patterns | Variations |
|---|---|
| Leaving the team<br>(from 11 respondents) | Resignation<br>Resignation, Priority Change, Internal Mobility<br>Resignation, Global Situation Changes, People are assigned on multiple projects<br>Resignation, Priority Changes, Workload and skill balancing among the running projects, Performance issues<br>Priority Changes, People are assigned on multiple projects, Leave (annual or sick)<br>Resignation, Priority change, Leave (planned or emergency)<br>Resignation, Priority change, Performance Issues<br>Resignation, Priority change |
| Expanding the team | Scope and requirement changes |

| | |
|---|---|
| (from 2 respondents) | |
| Reducing the team | Priority changes impact to reduce the team size |

Over 80% respondents mentioned that resignation was the main cause of team composition change. The second biggest cause was priority change in the project itself. Multi-project assignment and performance issues were also significant causes. There are other causes discussed by the interviewees which are not common. Global situation changes impacted multi-location teams, internal mobility and rotation is another one. Only one respondent mentioned no cause / change at all.

**Question 11:** Would you be able to share the impact of agile team composition change, with example?
(discuss scenario like expansion, contraction and replacement)
(what about change of 1, 2, 3 or more people change in above scenarios)
(change in skills and change in the team)

**Table 6-6 Stage-3 Question-11 Patterns extraction from variations**

| Patterns | Variations |
|---|---|
| Project is negatively impacted when someone leaves the team<br>(from 4 responses) | When a person leaves the team, in the middle of an in-flight project, it negatively impacts the project.<br>When a person with a particular skill leaves the team, it negatively impacts the project.<br>When a person leaves the team, in the middle of an in-flight project, it negatively impacts the project. However, if the person leaving had management role (project manager, team lead) only a mild impact on the team performance.<br>When a person left the team, it does matter what is project stage. If the project is in a critical stage, the change has a high negative impact. If change is at the beginning of the project, the impact is less.<br>Due to the work priority changes, if the team is changed, it impacts negatively to the team. |

| | |
|---|---|
| | When a person leaves the team, the remaining work is readjusted and individuals workload increases. This impact negatively to the project delivery. |
| Project is negatively impacted when someone joins the team (from 7 responses) | When a new person joins the project team, members of the team have to provide support and cannot deliver their own work timely.<br>When a new person joins the team, will take time to adjust and learn.<br>When a new person joins the team, will take time to establish the place in the team.<br>When a new person joins the team, will not be productive for some time.<br>A person added with less experience has a negative impact on the team performance.<br>When a new person joins the team, will not be productive for some time.<br>When a person is replaced, the new person joins the team, will take time to adopt the new situation and adjust with the team.<br>When a person joins the team, it takes time to adjust for the new person as well as the existing team members. It takes time to regain the same performance level after the change. |
| More than one team composition changes impact negatively. (from 2 responses) | When more than one team composition changes occur in a project, it impacts the velocity of the team and delays the overall project delivery.<br>When team members are shifted from project to project, it does impact on the project performance for all projects involved.<br>If more than 1 persons leave the team together, the impact is more than double. |
| A team composition change creates demotivation, confusion | A team composition change creates demotivation, confusion and worries among the team members.<br>During the team composition change, all team members become defensive and not take initiatives. |

| | |
|---|---|
| and worries among the team members.<br>(from 2 respondents) | |
| Project is positively impacted when someone joins the team<br>(from 4 responses) | Involvement of the management as part of the agile team positively impact the team performance and delivery.<br>Work driven changes in the team to cover a specific work item, positively impacts the team performance.<br>A new person added with more experience has a positive impact on the team performance.<br>A new person added with more experience has a positive impact on the team performance. |
| Teak composition change impact can be minimized if it is managed well.<br>(from 5 respondents) | If workload is shared from multiple projects and properly managed, it minimizes the impact of change.<br>If team composition changes occurred between the Phases or Stages, it has minimum impact on the team performance.<br>The impact of the team composition change depends on the positions, skills and experience of the people involved in the change.<br>If a replacement of a person is triggered due to the performance issues, it is expected that the new join will have more experience.<br>Better transparency, cultural awareness and mutual respect help team performance. |
| In Agile, large size team is counter performance | Generally, more people in the project means more performance. In agile, the team over 10 members is counterproductive. |
| Team composition change impacts traditional project more than agile projects. | Team composition change negatively impacts both traditional and agile projects, however, the impact is more to the traditional projects. |
| Team composition changes are not impacting the required | Team composition changes are not impacting the required work effort to finish the work, these changes impact the team's ability to deliver the work in time. |

| | |
|---|---|
| work effort to finish the work, these changes impact the team's ability to deliver the work in time. | |
| Any team composition change would have an impact on the team performance either positive or negative. | Whenever a person is changed in the team, it impacts the team performance, positive or negative. |

This question had varied outcomes with important evidence on team change impacts. In all projects where team composition change occurred, replacement is observed in all those cases. However, when a question about the impact of team composition change on the team performance was asked, participants discussed the impact of a new joiner, a few could not explain the impact of leaving person separately. It is perhaps the visibility of a new person joining the team and the impact of the person leaving is combined due to replacement activity. There was no evidence found that 2 or more changes, either expansion, contraction or replacement, occurred in the project at the same time. Twenty-five percent of the respondents mentioned that a skilled person leaving has a negative impact and 33% mentioned that a skilled person joining has a positive impact on the team performance.

A number of new factors surfaced. Changes in the early stages of the project have less impact. Change of a person who is performing a key role has more impact. An agile team with over 10 people is more negatively impacted by a change. Adding more people when project needs to deliver has positive impacts.

**Question 12:** How team composition change influence ASD project team's ability in decision-making?
(discuss different scenarios like expansion, contraction and replacement)

**Table 6-7 Stage-3 Question-12 Patterns extraction from variations**

| Patterns | Variations |
|---|---|
| Decision-making ability of the team is negatively impacted when someone leaves the team.<br>(from 8 respondents) | When a team member leaves the team, team has to re-evaluate and re-adjust the work which negatively impacts the team ability of decision making.<br>When a team member left the team, and team balance (skilled non-skilled ratio, experienced, non-experienced ratio etc) is disturbed, it negatively impacts the team's ability in decision-making.<br>When a team member left the team, its role and position in the team determines the impact on the team's ability in decision-making. A person with Scrum Master role can impact negative because this role is driving the decision making process in the team.<br>When a team member left the team, its experience determines the impact on the team's ability in decision-making. A person leaving with more experience can impact negative because team lacks the options and ability to make right decisions without such experience.<br>When a team member left the team, the time of this change in the team determines the impact on the team's ability in decision-making. A person leaves at the critical stage of the project has negative impact on the team's ability in decision-making.<br>When a team member left the team, and is not replaced, the impact on the team's ability in decision-making is negative. It is because remaining member do not have bandwidth for it.<br>When a team member left the team, its experience determines the impact on the team's ability in decision-making. A person leaving with more experience can impact negative because team lacks the options and ability to make right decisions without such experience. |

| | |
|---|---|
| | When a team member left the team, its role and position in the team determines the impact on the team's ability in decision-making. A person with Scrum Master changes, it created a communication gap and tool time for the team to adjust with negatively impacted the decision-making process in the team.<br>When a skilled and experienced developer leaves, a new person cannot take the decision for the already developed areas until understood completely. |
| Decision-making ability of the team is negatively impacted when someone joins the team.<br>(from 4 respondents) | When a new person joins the team, it negatively impacts the team's ability in decision-making where point of view of the new person has to be added.<br>When a new person joins the team, with a senior/managerial position, it creates discomfort within the team and it negatively impacts the ability of decision making.<br>When a new person joins the team, it negatively impacts the team's ability in decision-making where the new member take time to be acquainted to the culture and norms. It slow down the team decision-making process.<br>When a new person joins the team, it creates performance issues. |
| Decision-making ability of the team is negatively impacted when influencer/contributor is replaced.<br>(from 2 respondents) | If composition is changed and that influencer is replaced, it impacts the overall decision making ability of the team.<br>When a contributor is replaced, it negatively impacts the team decision-making ability due to heavy dependency. |
| Decision-making ability of the team is negatively impacted, whenever a team composition change happens.<br>(from 2 respondents) | Team composition change impacts the team ability of decision making, replacing and adding is similar where time is required to adopt the change and decision are delayed or take longer time.<br>Whenever there is a change in the team composition, it slows down the Decision making process. People go defensive and |

| | |
|---|---|
| | do the minimal engagement in the decision-making without taking any broader decisions. |
| Decision-making ability of the team is positively impacted when someone joins the team.<br>(from 2 respondents) | When a person added with good domain or technical knowledge, it benefits the team ability to make decision.<br>A new person joins who is more open-minded agile practitioner and more experienced, can help the team's ability to make decisions. |

Question 12 is most important part of the interview, where many new findings are emerged. When a team member left the team, re-evaluation, re-adjustment and re-setting tasks are performed which impacts the team's ability in decision making. When a team member left, this disturbed the team balance (skilled non-skilled, experienced non-experienced ratio) and it negatively impacted the team's ability in decision making. When a team member left, his/her role and position determines the impact on the team's ability in decision making. A person at a higher position or playing a key role in the team has a more negative impact when this person leaves the team. For example, the scrum master role usually drives the decision making process in the team and so a change of the person in this role impacts directly on the decision making process of the team. Key patterns are further described below.

**Team Member Leaving**

When a team member leaves, the time of the change determines the impact on the team's ability in decision making. Change at critical project stages has high impact. When a new person joins, it impacts the team's ability in decision making where the point of view of new person has to be added.

**Adding a Team Member**

When a new person joins a team in a managerial position, it impacts the team's ability in decision making where team members do not feel comfortable to take initiatives. When

a new person joins, it impacts the team's ability in decision making by slowing it down, while the new person gets acquainted with the culture and norms in the team.

**Replacing a Team Member**

When a new person joins, at a decision accountability position (Product Owner level etc), it positively impacts the team's ability in decision-making. The impact of the Team composition change has the potential to change the direction of the entire project.

When decision-making and decision-support roles are shifted from one person to another within the project team, this can negatively impact the team's ability in decision-making. People in the team with the right and required skills impacts positively the team's ability in decision making

There was no case found where a team composition change improved the decision making process pace or immediately impact positive to the team ability to perform better.

It was found that when a team member changed in the team, the company age (field experience and time in the market) determined the impact on the team's ability in decision-making. A company with a long history has senior level employees and those employees are likely resist the change. A relatively new company has young employees, who are more likely to be ready to adopt change. Hence, negative impact on the team's ability in decision-making is high for the companies who have more senior level people.

## 6.2 Stage-3 Results

### 6.2.1 Theme Extraction

A number of patterns emerged from stage-3 data. To make a clearer picture of these findings, another round of analysis is conducted. In this round, themes are extracted from these patterns. This section provides the themes which were extracted where two or more factors have similar impact. The theme statements provide a clear indication of what was happening for most of the people, most of the time (patterns) in most of the conditions (variations). Patterns and variations are described in section 7.3.3 in the tables for each question. These themes are the final results of stage-3 data gathering. Tables in this

section are extracted from the tables from section 7.3.3. Only three questions (Q-7, Q-11 and Q12) have themes which are directly link to the core of the research topic.

Detail of patterns and variation of selected questions (7, 11 and 12) were taken for theme extraction. Details of themes extraction from the patterns can be reviewed in the Appendix M. Here only extracted themes and patterns are provided with questions as they are asked. Full interview questions can be seen from Appendix J.

**Question 7:** How do you describe the process of agile team development in your organization?
(formal or informal process e.g. team bonding, workshops, team work courses etc)
(Do the company follow any team development models?)
(forming, storming, norming and performing of Tuckman)

**Table 6-8 Stage-3 Question-7 Theme extracted from Patterns**

| Theme | Patterns |
|---|---|
| Team-Building, Team-Development do not Exist | Team building process does not exist (from 7 respondents) |
| | At organization level, team development stages (FSNP) are not recognized (from 8 respondents) |
| Team-Building, Team-Development do exist | Individual team level bonding do exist (from 4 respondents) |
| | Team building process do exist (from 5 respondents) |
| | Company organize events for team bonding (from 2 respondents) |
| | Team development stages (FSNP) are recognized at personal level |
| | At organization level, team development stages (FSNP) are recognized (from 3 respondents) |

**Question 11:** Would you be able to share the impact of agile team composition change, with example?
(discuss scenario like expansion, contraction and replacement)
(what about change of 1, 2, 3 or more people change in above scenarios)
(change in skills and change in the team)

**Table 6-9 Stage-3 Question-11 Theme extracted from Patterns**

| Theme | Patterns |
|---|---|
| Composition Change Impacts Negatively | Project is negatively impacted when someone leaves the team (from 4 responses) |
| | Project is negatively impacted when someone joins the team (from 7 responses) |
| | More than one team composition changes impact negatively. (from 2 responses) |
| | A team composition change creates demotivation, confusion and worries among the team members. (from 2 respondents) |
| Composition Change Impacts Positively | Project is positively impacted when someone joins the team (from 4 responses) |
| Composition Change Impact can be minimized | Teak composition change impact can be minimized if it is managed well. (from 5 respondents) |
| Other Impacts | In Agile, large size team is counter performance |

| | |
|---|---|
| | Team composition change impacts traditional project more than agile projects. |
| | Team composition changes are not impacting the required work effort to finish the work, these changes impact the team's ability to deliver the work in time. |
| | Any team composition change would have an impact on the team performance either positive or negative. |

**Question 12:** How team composition change influence ASD project team's ability in decision-making?
(discuss different scenarios like expansion, contraction and replacement)

**Table 6-10 Stage-3 Question-7 Theme extracted from Patterns**

| Theme | Patterns |
|---|---|
| Decision-making ability is negatively impacted | Decision-making ability of the team is negatively impacted when someone leaves the team.<br>(from 8 respondents) |
| | Decision-making ability of the team is negatively impacted when someone joins the team.<br>(from 4 respondents) |
| | Decision-making ability of the team is negatively impacted when influencer/contributor is replaced.<br>(from 2 respondents) |

| | |
|---|---|
| | Decision-making ability of the team is negatively impacted, whenever a team composition change happens.<br>(from 2 respondents) |
| Decision-making ability is positively impacted | Decision-making ability of the team is positively impacted when someone joins the team.<br>(from 2 respondents) |

### 6.2.2 Project Demographic Findings

**Industry**

A particular industry was not focused in this research. It was important to cover as many industries as possible to ensure enough coverage for data collection. For stage-3 data gathering, participants were from the construction, financial, health, multinational and telecom industries. All these are major industries and distinguished from each other. It provided the required coverage for a strong data set to be analysed.

**Organization Size**

This research was focused on the enterprise level IT governance and ASD projects in such environments. Enterprise level organizations were the target, and over 80% of the participants were from the enterprise level organizations. One medium and one small organization data was part of this analysis.

**Project Scale**

The research was not focused on any particular size of the project. Large projects may have more variations and may provide more data and insight. Small and medium projects were also part of the final data set. Over 75% projects were large in this stage.

**Participants' Positions**

It was important that information was collected from all levels in the organization to provide the full spectrum of views. Most of the participants were from technical and managerial background, while a small number were from executive level background.

**Governance Structure**

This research is focused on governance and its impacts on the ASD projects. Questions and data gathering is focused and pointed to one direction that is governance. It is found that most of the organizations have weak governance with no PMO in place.

### 6.2.3 Other Team Factors

**Team Training**

Stage-3 was focused on the team aspects. The majority of the questions in the interview were related to team or team aspects in the ASD project. It is important to find out how organizations view the team contribution in the projects and in the organization. A useful way to find this is to gather information about how organizations provide training to their team members. It was found that over 80% of organizations have no or limited training for the team members.

**Teaming Up**

The next important aspect was how teams were supported to work as a team; how organizations support team activities so people can know each other and can be more productive. It was found that about two third of the organizations were not supporting or had no structure to support teaming up activities or personal development program in place.

**Team Development Stages**

A structured way of developing a team is very important for any organization and project. Research has revealed that a structured approach to develop high performance teams is

important. Forming, storming, norming and performing are well known stages (as described in Ch-6), however, It was found that over 66 % of organization have no understanding or structure to support any such activities.

**Team Size**

Team size was important in the ASD project. Small teams can be quick to adopt and change while large team may struggle a little. It was found that most of the teams are sized from 6 to 10.

**Team Composition Change**

Team composition changes can have major impacts on the project outcome. Mostly team composition is changed due to a replacement within the team; only 1 case was found for removal and 1 for addition to the team. Common reason for replacement is the resignation of a team member which requires a replacement.

**Performance Impact**

The impact of the team composition changes on the team performance is negative in almost all cases. However, only few scenarios were found where such changes impacted the team performance positively.
The impact of the team composition changes on the team ability of decision making was found to be negative in almost all cases. However, scenarios were found where such changes impacted the team ability of decision making positively.

## 6.3 Chapter Summary

A number of findings are concluded in this chapter. Most important finding is team composition change impacts team's ability of decision making in ASD project. Team composition change has never been discussed as a governance factor. This finding is significant for the practisioner as well as acadamians. Governance can be impacted just by a change in the team, which has potential to impact the project success. This finding

is an actionable discovery which can improve results in . Furthermore, this chapter provides data analysis findings including team factor, insight of team composition change, impact of team composition change on team's ability to make decisions and impact on ASD projects success. Next chapter (Ch-7) provides a detail discussion on the conclusion and findings of this research covering literatiure review, satge-1 finidngs, stage-2 findings, stage-3 findings, conclusion / answers of research questions, recommendations and further research aspects.

# 7 Discussion and Conclusions

This chapter concludes the work of this research with contributions, recommendations, and next steps. Discussion on the conclusions and how they are derived is provided by evidence from the research work.

## 7.1 Overview

This research commenced to understand and investigate Enterprise IT Governance (EIT Governance) impacts on Agile Software Development Projects (ASD Projects). The aim was further refined into research questions (Ch-1 section 1.3). These questions were to find

a) what is EIT Governance,
b) what impact does EIT Governance have on ASD projects and
c) what are EIT Governance factors that impact ASD projects outcome.

This research covered all the above questions and has made significant discoveries and contributions.

The first contribution of this research is an extensive literature review and analysis to develop a ‘working definition’ that covers core concepts of previously developed and widely used definitions. ‘Decision-making’ is the core of EIT Governance from the extracted definitions through a systematic literature review (Ch-2 section 2.1.7). This finding formed a focal point for this research, i.e., decision-making is the core of EIT Governance.

The second contribution of this research is the discovery of a relationship between decision-making and ASD project outcomes, also derived from the literature review (Ch-2 section 2.2) and data analysis (Ch-6). This discovery helped to develop (Ch-2 Section 2.3) and test hypotheses (Ch-4). Test results from the hypotheses provided insight into this relationship.

‘A gap is identified in theory and practice in each of three IT Governance dimensions, structure, process and people’ (Ko, D. and Fink, D., 2010). As a concept, 'people' was discussed, and ‘team’ was not mentioned in the decision-making context. A team, as a

formation of people, is different from 'people'. ‘When people coordinate as a ‘team’, they accomplish more than they would be working alone’ (Gorman, J.C., 2014). A second literature review was conducted to find team formation or composition (Ch-2 section 2.4 onwards). Stage- 3 (Ch-6) data collection is designed based on learning and understanding of stage-2 results and the second literature review.

This research's most important discovery and contribution came from the data analysis of stage-3 (Ch-6).

- ‘Team composition change' was found as a factor that can impact decision-making, eventually changing the project outcome.
- One important conclusion of this research is that neither a governance model nor a governance process tailoring positively correlates with better ASD project outcomes.
- Any ‘team composition change’, whether someone left, joined or was replaced in the team, impacts the team's decision-making ability.
- Several ways, including better transparency, team changes made only between project phases and managing replacement team members with better skills, can minimize team composition change impact.

These discoveries and contributions are further discussed with the research questions in the upcoming sections.

## 7.2 What is EIT Governance?

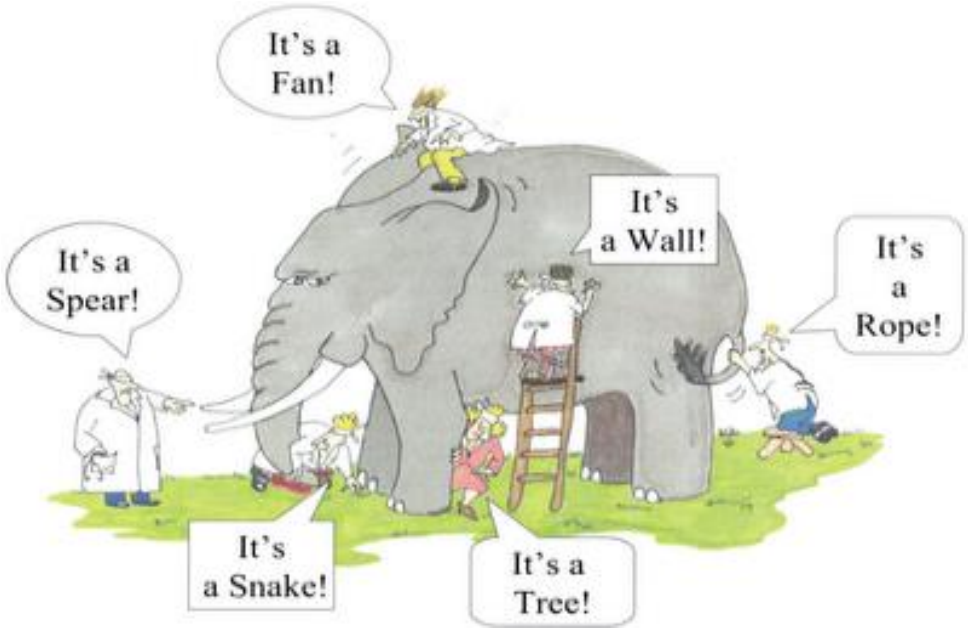
### 7.2.1 Understanding Governance

Understanding EIT governance and its operation in an enterprise-level organization is vital for this research. Several definitions for EIT Governance exist. These definitions were developed over time and widespread confusion is revealed about the scope and alignment of Enterprise Governance and EIT Governance (Webb et al., 2006). Several definitions and differences are discussed in the literature review (Ch-2). A working definition of EIT Governance was required, which is established, and used throughout this research. It appears that widespread confusion of EIT governance definition is due to the different outlooks or viewpoints of the various authors (Ryan Peterson (2004), Wilson

and Pollard (2009), (Sharma et al., 2009), (Goh et al., 2013), (Di Tullio & Staples, 2013), (Di Tullio & Staples, 2013) details in Ch-2). It can be illustrated by an ancient story (Saxe, 2016).

The story is about 6 blindfolded men. Each was asked to touch various parts of an elephant and describe it (Figure 7.1). Everyone described it differently as per the part of the elephant's body they touched. We map these characters to real entities to elaborate and understand it in the EIT Governance context. Enterprise IT Governance is huge like an elephant, because it covers many areas. Organizations/industries operate their own processes and may have no understanding of other organizations or industries and are blind to how others are operating. Blind men in this story can be considered as organizations. When any organization uses EIT Governance, it only considers the areas of its interests, like blind men touching the elephant and only finds the function of that part. This story helps to better understand why there are so many variations in EIT Governance definitions and why there is confusion.

**Figure 7-1 Blindfolded Men Story**




## 7.2.2 EIT Governance Working Definition

Without a definition of EIT governance, this research could not progress any further. All the papers found focused on forming their definition with their own needs, not using the

definition. Hence, an aggregate working definition of EIT Governance was formed and used throughout this research. The following definition came out of author's previous work (Awais et al., 2018) in assimilating and processing the literature review (Ch-2 section 2.1.7):

"EIT Governance facilitates **decision-making** and provides direction to the organization, business, management and people to achieve business value."

This unique working and original definition have not been used or published in the same structure of words. This working definition developed as part of this research clarifies decision-making as the core of EIT Governance (Awais & Gill, 2016). Several definitions were considered and discussed in detail in the literature review (Ch-2). Here is a discussion of how these definitions varied and how the working definition covers all areas.

In earlier research, EIT and decision-making was considered at a strategic level. "The distribution of IT decision-making rights and responsibilities among enterprise stakeholders, and the procedures and mechanisms for making and monitoring strategic decisions regarding IT" Ryan Peterson (2004). This definition does cover a critical aspect of the organization but does not address EIT at other organization layers. From another definition, EIT governance was considered for aligning IT and business goals. "IT Governance is the strategic alignment of IT with the business such that maximum business value is achieved through the development and maintenance of effective IT control and accountability, performance management and risk management" Wilson and Pollard (2009). Each function in the organization aims to ensure business objectives are met. This definition covers alignment very well but could not clarify if EIT Governance is only for strategic alignment and not for other functions, for example, tactical and operational layers.

Other authors performed significant work to define EIT Governance in detail. "A set of agile IS development practices that are sensing centric, in which the focus is to develop capabilities to accurately sense the project uncertainties stated above to meet the urgency of project completion and to develop capabilities that allow for proactive response to these uncertainties." (Goh et al., 2013). Such detail in the definition is helpful for implementation. However, it is only providing for project perspective. Another author

defined EIT Governance with more entities involved in the enterprise. “The means of achieving the direction, control and coordination of wholly or partially autonomous individuals and organizations on behalf of an OSS development project to which they jointly contribute” (Di Tullio & Staples, 2013). This definition covers direction, control, people, organization and projects, still, it limits to focus of the project.

Changes in the definitions over time are discovered due to the impact of various factors (Ch-2). As the business grew over time, IT needs and use grew, reflected in the EIT Governance definition. “Governance of IT is the system to direct and control use of IT’ (Juiz & Toomey, 2015). This definition shows a broader role of Governance in the use of IT. This definition covers the concept of Governance being used in all areas of IT, still, not providing clarity. After carefully analyzing definitions and trends in the IT, a working definition covering all of the areas discussed above was developed as part of this research. This concludes the first question, what is EIT Governance? Decision-making is core for all EIT Governance layers and entities. Thus, in this research, Governance and decision-making have the same meaning and are used interchangeably.

## 7.3 What impact does EIT Governance have on ASD Projects?

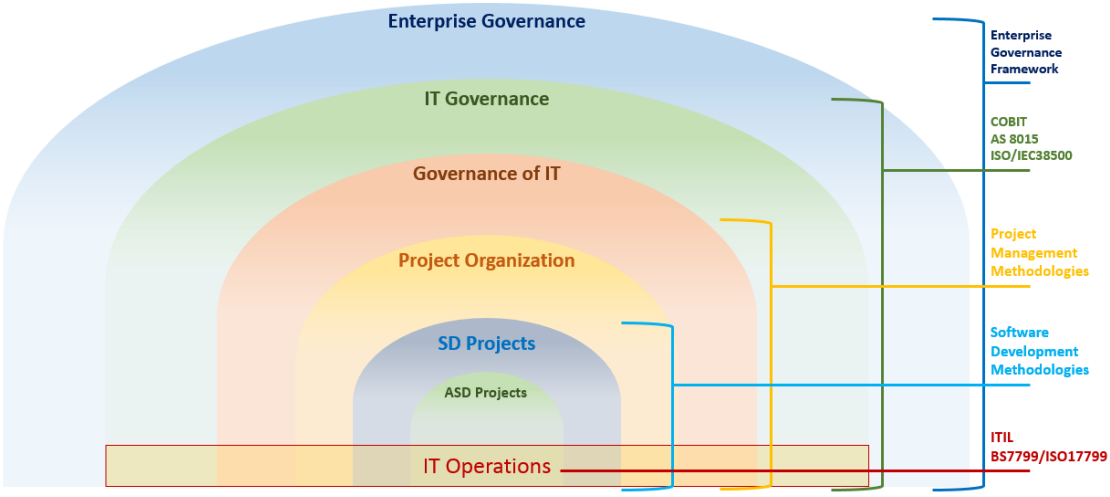
The second question of this research was,
What impact does EIT Governance have on ASD Project?
This section will cover the literature review, analysis, hypotheses test results and answer to the above question.

### 7.3.1 Implementation Clarity, Distribution and Tailoring

The literature review and analysis establish a clear distribution and relationship in a diagram (Figure 7.2). Starting from the top of the diagram, “EIT Governance is a subset of Enterprise Governance and IT Governance works at the strategic level” (Peterson, 2004). EIT governance in the organization works in multiple layers. “IT Governance and Governance of IT are two different levels” (Juiz & Toomey, 2015), which seem overlapping but completely distinctive in implementation. Many standards and frameworks for corporate and EIT Governance are available and employed by organizations in many different ways. Frameworks are used to implement Governance.

"Frameworks have mechanisms in place to achieve longer-term strategies while maintaining current operations" (Too & Weaver, 2014), distribute work in governance layers (Brown & Grant, 2005) and make clear to implement (Sharma et al., 2009) as per the organization's requirements. This diagram (Figure 7.2) was developed as part of this research from the literature review (Ch-2), which provides a clearer view of various governance layers and maps the respective standards and frameworks to these layers. The diagram below is an illustration of the above text for better understanding.

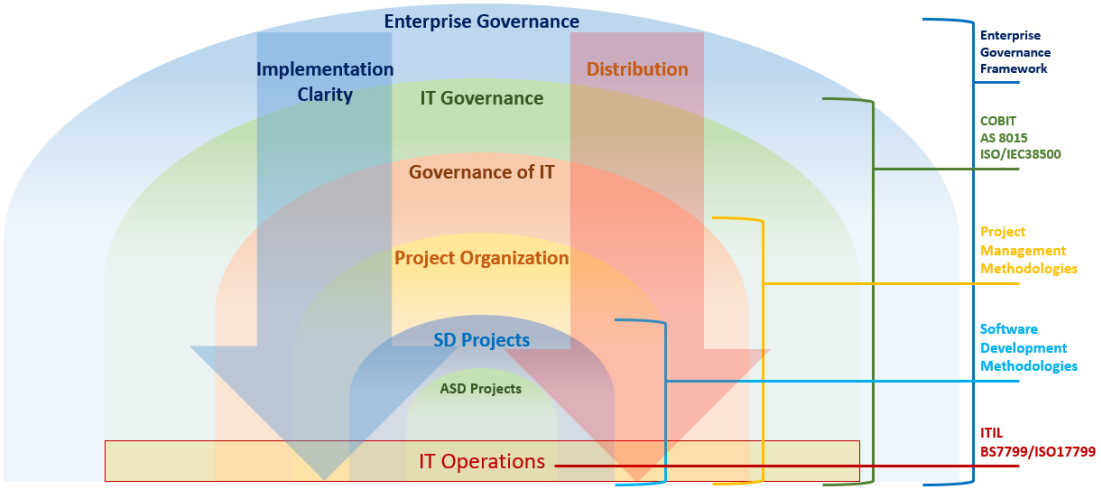
**Figure 7-2 Framework and Process at Different levels of Governance (reference form Ch-2)**




The above model is a result of literature review, analysis and organization layers found in the literature. The diagram implied in an enterprise is either well-defined or blurred lines of various layers. This diagram helps to understand various concepts from literature visually and concisely. Literature provided topics of Governance, level of Governance, enterprise-level organizational layers and various function areas or departments (all discussed in detail under Ch-2). The above diagram provides a graphical representation of all these topics and demonstrates how organizational layers and governance levels are applied with various governance frameworks. Software development is under IT department, including project organization, whereas ASD projects are under the project organization.

Further to the above, the literature review analysis discovered three implementation factors. The first factor is implementation clarity of decision-making (Ch-2 section 2.2.1), the second is the distribution of decision-making (Ch-2 section 2.2.2), and the third is tailored implementation of decision-making (Ch-2 section 2.2.3). Based on these factors, hypotheses are developed and tested using field data. The analysis of data collected during the research (Stage-1 Ch-4) showed that implementation clarity and decision-making distribution impact the ASD projects. However, tailoring of the decision-making did not significantly impact the ASD projects. These results are mapped on the previously developed diagram (Figure 7.2) that produced figure 7.3) to demonstrate the findings of this research and its contribution to understanding EIT Governance and its impacts on ASD Projects.

**Figure 7-3 Governance Implementation and Impact Direction (New updated figure)**



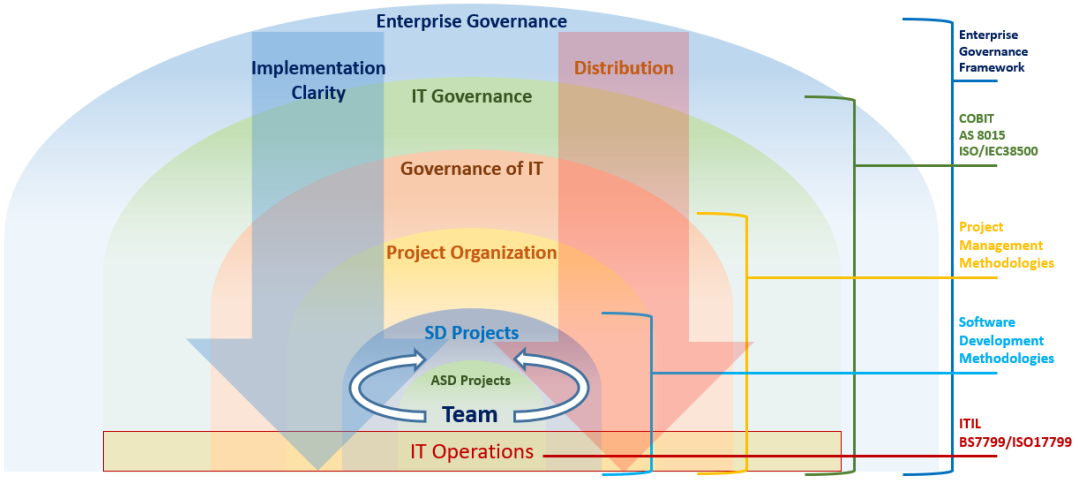

The above diagram illustrates the quantitative results and is produced as part of this research. Two factors, implementation clarity and distribution of decision-making, are denoted with arrows and describe the impact from the strategic layer downwards to the tactical and operational layers. “There is little research available that specifically looks at how organizations define and implement their inter-organizational governance of information technology” (De Haes et al., 2012). This research provides organizational layers' relation with governance levels and the impact of decision-making distribution and implementation clarity (two factors derived from qualitative data analysis). “In organizational practice, the boundaries of work teams are in fact fluid” (Li et al., 2018),

and as the boundaries of these layers. Implementation clarity means clarity of Governance at different layers, who is responsible for what and how decision-making is 2executed in various layers. Distribution means the decision-making in various layers and levels of decisions that are distributed among the organizational layers. These factors are derived from literature and tested through hypotheses. Diagram 7.3 demonstrates the impact of implementation clarity and distribution of decision-making which is from top layer and goes towards bottom in the organization.

### 7.3.2 New Finding ‘Team Factor’

Stage-2 analysis of qualitative data gathered through open-ended interviews revealed many factors (Ch-5). However, one factor stands out with its high occurrence and variety of different forms. This new factor is 'team' which is mentioned in various forms and in all questions in the interview. It is further analysed with previously gathered information and added to the diagram (Fig 7.4). This new factor, 'team', works at the project level because it is described as a project team. 'Team' was not discussed before in the literature for decision-making for ASD projects in the governance context. “From an IT Governance aspect, People are a critical part of the organization’ (Teo et al., 2013). Various definitions were analysed and discussed for the use of Governance in the organization domain. “The domain denotes what the decisions should consider. It comprises four-dimensional units: Goals, processes, people and technology” (Simonsson and Ekstedt, 2006). When discussing centralized, decentralized and federated Governance, people are described as stakeholders Andriole (2015). When discussing group behavior, IT Governance is demonstrated through those traits. “Six IT governance archetypes that describe the people who are involved in making these decisions (business monarchy; IT monarchy; feudal, federal, IT duopoly and anarchy)” (Webb, Pollard and Ridley, 2006). The literature review did reveal a concept of 'people' in the EIT Governance through definitions and implementation in the organization. However, 'team' was never discussed. Figure 7.4 below shows this critical finding and placement of “Team” in the previously developed model. “Teams are a means of organizing work so that individuals can accomplish more than they can on their own” (Bell et al., 2018). In the diagram, under multiple organizational layers, projects are developed, and a “ Team” is an organization for productivity over individual efforts. It became clear in the diagram to understand where a team plays its role under the organizational layers for projects.

**Figure 7-4 Governance Implementation and Impact Direction with Team (New updated figure)**




## 7.4 What are the EIT Governance factor(s) which impact upon an ASD project's outcome?

The third question of this research was, what are EIT Governance factor(s) which impact ASD Project outcome? As described in the previous section, a new factor, 'team' was discovered from the stage-2 data analysis (Ch-5), and mapped to the diagram above. "The configuration of team member attributes, called team composition, has a fundamental influence on teamwork" (Bell et al., 2018). Team formation/composition in relation to Governance and decision-making was not discussed or reviewed previously in the published literature under Governance. A second literature review provided further details on team formation and composition (Ch-2 section 2.4 onwards). The last and 3rd stage was designed (Ch-3 section 3.5) based on learning and understanding of Stage-2 data analysis and the second literature review. Stage-3 was conducted with a semi-structured interview to collect data for team composition change and its impact on decision-making in ASD projects. It was not certain if team composition change could

impact ASD project outcome. Stage-3 data analysis provided insight into a team composition change and its impact on the team's decision-making ability that can alter the ASD project outcome.

This caused the research focus to change to 'team'. Several models have been developed and used for team structure or development. For this research, the author selected the Tuckman model for the following reasons.

The first model is GRIP Model, designed and used for team support to motivate teams and how members work together and focus on their game (Beckhard, R., 1972). GRIP stands for Goals (what to achieve), Roles (each individual's role/position and responsibility), Interpersonal (knowing each other for better communication and collaboration), and Processes (rules, procedure, flow and boundaries).

Other models are developed and adopted for teams to support conflict management and productivity. Some focused on approaches and issues itself. The thomas-Kilman conflict mode model can help understand the positive and negative impacts of various approaches to help individuals and teams (Thomas, K.W., 2008). This model consists of 5 approaches; Competing, Accommodating, Compromising, Avoiding, and Collaborating. Another model is Lencioni Model, from his book The Five Dysfunctions of a Team, which outlines common problems people experience in a team (Lencioni, P., 2012). Lencioni Model consists of these five problems that can impact performance: Lack of Trust, Fear of Conflict, Lack of Commitment, Avoidance of Accountability and Inattention to Results.

One of the more recent models is the DISC model, developed to help people perform better by understanding behavior based on personality traits (Marston, W.M., 2013). This model focus to help in conflict management by better understanding people and how they will react in a team situation. DISC stands for these personality behaviors; Dominance (which personal strength dominates), Inducement (how an individual puts his skills to influence others), Submission (how an individual's reliability, predictability and supportiveness help others), and Compliance (how an individual's values, commitment and respect with others). This can be used in a team environment and helps team members better understand each other, better work together and deliver the best outcomes.

The author of this research selected the performing team, as Tuckman (1965) discussed, because it matches the closest of an agile team. “Agile suggests creating small teams generally consisting of 10-12 people” (Maqsood et al., 2020). “One of the most influential models has been Bruce W. Tuckman’s description of the stages of development in small groups.” (Denise A. Bonebright, 2010) suggests the Tuckman team development model is the closest model for ASD in this research. All other models are valid and used for different team structures and different situations. Tuckman model is for small teams for a specific goal to achieve for some time and team is developed as a productive team over time in stages. All these characterises map well on an agile team. “This model is well known and adopted in many enterprise level organizations. At the beginning of the twenty-first century, the model was being applied in studies of various work settings from project teams” (Denise A Bonebright, 2010). Hence, the Tuckman model is best suited for ASD and is selected over other models.

### 7.4.1 The Role of the Team in Governance

In an ASD project, people from various backgrounds are part of the project. In a typical ASD project, the product owner, scrum master, business analyst, designer, architect, developer, tester and operational resources are from different backgrounds and disciplines. Yet, all must be well-equipped with an agile philosophy to deliver the best results as self-organized teams. “Effective governance of agile software teams is challenging but required to enable wide adoption of agile methodologies” (Talby & Dubinsky, 2009). The literature discusses the Governance of agile projects and the use of methodology without acknowledging the impact of a team in Governance. This research helped identify “team” factor in Governance and how it impacts particularly in ASD decision-making.

Team Training

Ch-2 covered the characteristics of a self-organizing team, including creativity and learning. It was found from the literature that training is missing for the agile team (Crowder, 2015); however, agile team training concerning Governance and its impact on Governance is not mentioned. This research highlighted from stage 3 results that many enterprise-level organizations do not provide agile training to their staff. Those organizations that do offer agile training may achieve desired results. If the agile training focus is not aligned with the delivery outcomes, it may not produce results. When a team

composition is changed and individuals are not trained to manage such a situation, it impacts their performance. Another finding is that training is not provided to entire teams or is not relevant enough to make a difference. Also, most of these organizations do not consider individual team member's personal growth and development. Team training for agile was discussed in the literature. However, training related to Governance and awareness about the impact of team changes is missed, which this research covered. For future projects, a few steps towards agile skill building are suggested.

The first step is internal team training by the project team members. In this training, team members should train each other on agile understanding and implementing relevant knowledge in their projects. The second step is to develop a cross-functional and cross-departmental dialog system to understand teamwork, team changes, and how to reduce the impact of such changes. Lastly, encouraging individuals to develop their personal and professional targets and establish develop a growth plan. Based on individual needs, a continuous learning stream within project teams helps a strong team and fills gaps if team composition changes. A skilled and motivated person performs much better and delivers desired results.

**Figure 7-5 ASD Project and Team Impact (Part taken from Figure 7.4)**


A team consists of individuals and "Team diversity, as a pivotal aspect of team composition, refers to team members' differences in demographic and psychological attributes" (Li et al., 2018). "Team composition shapes the emergence of affective states, behavioral processes, and cognitive states" (Bell et al., 2018). When team members in a team are changed, the diversity of the team composition changes. This research formed five themes for team composition change. (Ch-6 for details). "Substantial field research indicates that the composition of teams has a significant influence on many outcomes" (Mello & Ruckes, 2006). This research finds the team composition change impact on the team's decision-making ability, which can impact the ASD project outcomes. These

themes have provided great insight into the team composition changes and how they impact the ASD projects, as discussed below.

**Team Building / Team Development Process**

No formal team building or team development process is found in most organizations studied in this research. “Teams should create a broad culture that can influence the collective behavior in whole enterprise, in order to give rise to a cohesive organizational awareness.” (Luna et al., 2014). Organizational support in developing such a culture is not seen. Similarly, this research shows that most organizations do not understand team development stages (such as Forming, Norming, Storming, and Performing (Tuckman)) and how they impact an individual to transform into a team structure.

Awareness about team development only exists at the individual level. Individuals do take steps for team development activities at their level. A handful of companies are providing any facility or encouragement for such activities.

**Negative Impact of Team Composition Change on Decision-Making**

A significant number of companies have observed and experienced a negative impact when a team composition is changed. “Team composition has a fundamental influence on teamwork.” (Bell et al., 2018). This negative impact is when someone leaves the team or someone, a new member, joins the team. In the case of a replacement, both sides have a negative impact (leaving and joining a team). It is also noted that impact intensity is more when someone joins because it takes time for the individual to adjust in the team as well as each member of the existing team makes efforts to accommodate the new joiner. When multiple changes occur, the impacts also multiply.

“Teams composed of individuals with rational decision styles were more likely to adopt rational decision strategies, which led to better team performance.” (Zhu et al., 2021). If individuals from the team are changed, it impacts team’s decision-making ability. Our research found team's ability for decision-making is negatively impacted when the team composition is changed. This finding is the most significant contribution of this research. When someone leaves the team, it creates a gap, and if the person who leaves is in an

active leadership role, such impact is more keenly felt. The same applies when someone joins the team, as it takes time and effort to make the team's decisions.

The participants discuss some negative impacts, which may not strictly concern the team composition change. However, they are related. Adding more people to agile projects appears to be counterproductive.

**Positive Impact of Team Composition Change on Decision-Making**

It is also noted that team composition change can positively impact the team's decision-making ability. When a person joins with significant decision-making powers in the organization, it positively impacts the team's decision-making ability.

"After an unforeseen change in the task context, performance was superior for teams with members who had higher cognitive ability, achievement, and openness and who had lower dependability" (LePine, 2003). Our research shows when a new team member joins either with high experience, from management, with advanced technical strength or any combination of these qualities, it positively impacts the team. In this case, team composition change positively impacts the ASD project outcome.

Finally, if someone leaves or joins the team, such change will impact the team's decision-making ability, either positively or negatively.

## 7.5 EIT Governance and Team Composition Changes in ASD Projects

A new factor emerged from this research, i.e. 'team' in EIT Governance. "There is little research available that relates IT governance to factors that are external to the mechanisms and structures of IT governance itself." (Willson & Pollard, 2009). The team was not considered a factor in the Governance. The most interesting and important finding is that team composition change can impact Governance. This research also provides insight of

the interoperability function among the EIT Governance, Agile Software Development, Project Management and Team to understand better and implement Governance.

Team composition change and recomposition impacts team performance (DeRue et al., 2008). Composition change and recomposition were not linked with Governance or decision-making. Mainly it was discussed under team behavior and individual emotional stability. Team composition change is considered as addition, subtraction and replacement (Mathieu et al., 2014), as discussed in this research; however, it was not linked with decision-making impact for ASD projects in the literature. Various models are discussed where individual and team are the focus. These models could not describe the link to decision-making in ASD projects. Adoption and post-change team performance affects individuals' cognitive ability and personality (LePine, 2003). Team change is considered when someone leaves the team and impacts the cognitive ability of the individuals (Summers et al., 2012). Team composition influences teamwork through individuals' behavioral processes and cognitive status (Bell et al., 2018). The addition and subtraction of the team member are considered team composition changes. In these cases, impacts on the cognitive ability of the individuals are discussed. These studies have discussed team composition changes and their impacts on individuals; however, it does not have any link of team composition change with decision-making and ASD projects.

### 7.5.1 Misconception about Governance

A common understanding about any enterprise-level organization is that governance processes and procedures are well-defined and implemented across the board. “IT governance is a broad-reaching concept that consists of multiple components” (Webb et al., 2006). It is assumed that enterprise-level organizations cannot afford to avoid implementing well-structured Governance due to the enormity of scale in all areas. However, this research highlighted the dark side. Governance processes are not well-defined and not implemented uniformly across the board in many organizations. “The emerging importance of the Project Management Office (PMO) is associated with the increasing number and complexity of Projects” (Too & Weaver, 2014). Especially in the project management space for software development, this research found that most enterprises do not have an effective PMO. Executing a project with the assumption that governance processes are well defined, established, uniformly implemented, and required support is available in the organization could be very problematic when a major risk hits

the project if these assumptions are not true. Based on learning from this research, a project manager should take a proactive approach to define and publish the project governance processes with other groups before the project kick-off. This change will avoid surprises and ensure that all involved have transparency and clarity on the working model and expected outcomes.

### 7.5.2 Team Composition Change – A Governance Matter

"Determining factor for governance implementation range across culture, structure, size, industry, region, maturity, strategy, ethics and trust" (Pereira & da Silva, 2012). This research has provided new insights on the team that was not considered before as factors impacting Governance. "The success of an ASD project is often linked to people factors" (Nguyen, 2016). However, it is a common assumption that changes in the teams and moving people due to day-to-day operations are management matters and do not relate to Governance. The most significant finding of this research is team composition changes and how these changes impact the ASD project, project governance and enterprise IT Governance. This research considered any change in the number of team members, either someone is taken out (removed), replaced or added into the team as a team composition change. When such a composition change occurs, the old team (as a structure and composition) vanishes and a new team forms. In almost all cases, team composition change negatively impacts the team and its decision-making ability. These findings could imply a difference in how teams will be managed in the projects.

## 7.6 Final Conclusions

**Governance as Decision Making**

Governance is a convoluted subject and is perceived differently by various sections of the same organization. The first finding of this research is that no standard and agreed definition exists for EIT Governance in the business enterprise. Confusion mounts when one finds many definitions with differing conceptual keywords. Further, these conceptual keywords are repeated over time with slight changes. Governance of IT and IT Governance (as described in Ch-2) represent different scales of Governance in an

enterprise-level IT organization. Governance influences agile software development (ASD) projects at all levels in the enterprise. For this research, we needed a reference or benchmark to establish Governance in an enterprise to study its impact on ASD projects. A definition was formed with the core concept covering aspects of Governance in the organization and making a clear problem statement, direction, and scope. This definition was used throughout this research to form the results.

EIT Governance facilitates **decision-making** and provides direction to the organization, business, management and people to achieve business value.

This research found that the core of all governance operations is decision-making—implementation clarity and distribution of the Governance in an enterprise help ASD projects to produce better results. Agile software development was adopted due to limitations in the waterfall method. Tailoring of Governance is required for the newly adopted method; however, this research found that tailoring of Governance has no or limited impact on the ASD project success. When further research and analysis were conducted of the dynamics of ASD projects, it was found that the team is a crucial factor that is not considered for governance impact. Agile software development is based on principles that are designed to work lean, clean and fast. One of the agile fundamentals is making the team autonomous to deliver results. The agile software development framework grants a team more authority and responsibility for decision-making than other common frameworks. It distributes the enterprise IT Governance at the project level.

### Team Factor

The team was not the factor considered for Governance in this research at the beginning. When this factor was established, further study was conducted and data were collected to further explore this factor and its impact on Governance. In the Tuckman model (1965), it is suggested that a team is developed through stages. The Tuckman model is the closest to an agile team and is well-known in the industry. Whether or not these stages are recognized, observed and supported by the organizations, they exist and people go through those stages. Individuals go through various experiences in each stage and become cohesive team. Once a team is established at its Performing stage, it is at its optimum level to run the project and decision-making is at its best. A team's ability in

decision-making is impacted whenever a team is changed. Whether a person leaves or a new person joins the team, it impacts the team's ability to make decisions. In most cases, the impact of team change is negative, while in some instances, the impact is positive. A team change impacts the team's decision-making ability, project governance and overall EIT governance.

## Concluding Statement

The significant theoretical contribution of this research is proving a link between team composition change and decision-making in ASD projects, which has the potential to change project outcomes. Previously published work from the research done for this thesis is cited by other researchers to point out the difficulties of the rigid implementation of EIT governance through frameworks. There is no previous literature linking team composition change and its impact on decision-making. This research provides a working definition of EIT Governance where decision-making is a core function of Governance. Anything that impacts decision-making ability will impact Governance. This research demonstrates that team composition change impacts decision-making, thus compromising the Governance of ASD projects. More effective Governance requires the organization to acknowledge and better manage team composition changes in ASD projects.

# 8 APPENDICES

# Appendix A – Stage-1 Survey Questionnaire

Record #:

## Enterprise IT Governance Survey

**HRE16-0270**

**Clarity of Governance**: Enterprise IT Governance can have many forms and definitions, for this research, governance is considered as decision-making function to align deliverables and business value. Organizational decision-making can be very clear or can be very unclear. At the excellent end of the scale it is clear what type decisions can be made by each level of the organization, who is involved in the decision-making and when decisions will be made. At the very poor end of the scale no-one knows who makes decisions about something or when, so trying to get something done becomes very frustrating.

Q1: In the top management level, how clear is who (person or committee) makes decisions, what they can decide, and when it will be decided?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

Q2: In the IT department, how clear is who (person or committee) makes decisions, what they can decide, and when it will be decided?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

Q3: In the agile software development project, how clear is who (person or committee) makes decisions, what they can decide, and when it will be decided?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

**Governance Implementation**: Organizational decision-making usually happens in executive meetings, steering committee meetings, project meetings where the decisions concern allocation of tasks, funds and resources. At the excellent level the committees are established, meet regularly and are seldom cancelled, and seldom defer decisions. At the very poor level, committees sometimes exist, sometimes meet and sometimes make a decision.

Q4: In the top management level, how well decision-making is implemented?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

Q5: In the IT department, how well do you think decision-making is implemented?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

Q6: In the agile software development project, how well do you think decision-making is implemented?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

**Decentralized Decision Making**: Within each level of the organization accountability needs to be closely matched to decision-making authority. Various organizational levels have different accountabilities and responsibilities distributed within that level. Decision-making decentralization means that each level has given authority to make and implement decisions related to their accountable area. At top level in the organization, distribution is among the various departments and executives, at IT department level, distribution is among the various IT groups (database, development, projects, operations etc) and project level distribution is among the steering committee, product owner, project manager and project team.

Q7: In the top management level, how well do you think decision-making is distributed?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

Q8: In the IT department, how well do you think decision making is distributed?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

Q9: In the agile software development project, how well do you think decision making is distributed?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

**Project Governance Tailoring**: Tailoring means that the traditional project governance process is modified for agile software development. It may include adopting and accepting different measurement scales, risk based decision-making, flexible benchmarks and delegating more responsibilities at various levels of agile software development project.

Q10: In the agile software development project, how well is project governance tailored?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

Q11: In the agile software development project, how well is project governance reviewed by someone like the steering committee or the PMO?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

Q12: In the agile software development project, how well are governance corrective actions implemented?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

**Project Success/Failure**: Questions should be answered for the project success in terms of business objective achievement from the agile software development project. Objectives set for individual iteration can be different and scope of project may change throughout for agile software development. Successful achievement of various iteration objectives may be different and may not reflect overall success of the project and achieving overall business objectives from the project. Project and/or iteration success should be considered by it business objective achievement at the time of its completion.

Q13: In the agile software development project, how well are (or were) the business objectives of each of the iteration achieved?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

Q14: In the agile software development project, how well are (or were) the business objectives of the project achieved?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

Q15: In the agile software development project, how successful is (or was) the overall project?

○ Very Poor ○ Poor ○ Fair ○ Good ○ Very Good ○ Excellent ○ Exceptional

# Appendix B – Stage-1 Raw Data Collection from the Survey

| ID | Q-1 | Q-2 | Q-3 | Q-4 | Q-5 | Q-6 | Q-7 | Q-8 | Q-9 | Q-10 | Q-11 | Q-12 | Q-13 | Q-14 | Q-15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 161331121864 | 5 | 3 | 5 | 3 | 4 | 5 | 5 | 5 | 5 | 2 | 2 | 3 | 2 | 6 | 6 |
| 161331266769 | 3 | 4 | 5 | 3 | 4 | 5 | 1 | 3 | 4 | 5 | 3 | 1 | 4 | 5 | 4 |
| 161331276511 | 5 | 6 | 4 | 3 | 5 | 5 | 3 | 6 | 6 | 4 | 3 | 5 | 5 | 4 | 5 |
| 161331303857 | 5 | 5 | 4 | 3 | 4 | 5 | 3 | 4 | 2 | 6 | 4 | 4 | 3 | 5 | 5 |
| 161331316244 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 1 | 1 | 5 | 6 | 6 |
| 161331334956 | 5 | 6 | 4 | 6 | 6 | 5 | 5 | 6 | 6 | 2 | 6 | 4 | 5 | 6 | 5 |
| 161332273465 | 5 | 5 | 4 | 3 | 4 | 5 | 3 | 4 | 4 | 4 | 2 | 3 | 5 | 5 | 4 |
| 161332294769 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 4 | 6 | 6 | 6 | 6 |
| 161334265160 | 5 | 6 | 7 | 6 | 5 | 7 | 5 | 5 | 6 | 6 | 2 | 4 | 6 | 6 | 6 |
| 161334265453 | 6 | 6 | 7 | 5 | 5 | 6 | 6 | 6 | 6 | 5 | 2 | 5 | 6 | 5 | 5 |
| 161422284868 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 6 | 4 | 5 | 5 | 4 |
| 161422334910 | 5 | 2 | 3 | 5 | 2 | 4 | 5 | 2 | 5 | 3 | 3 | 3 | 5 | 5 | 5 |
| 161426301453 | 5 | 3 | 5 | 5 | 3 | 4 | 3 | 2 | 4 | 1 | 1 | 1 | 5 | 5 | 4 |
| 161427252034 | 5 | 6 | 7 | 3 | 5 | 6 | 3 | 5 | 7 | 6 | 3 | 7 | 5 | 6 | 6 |
| 161427261367 | 6 | 5 | 6 | 6 | 5 | 6 | 5 | 6 | 7 | 6 | 5 | 5 | 5 | 6 | 6 |
| 161427292441 | 4 | 4 | 6 | 4 | 5 | 6 | 4 | 3 | 4 | 5 | 3 | 3 | 5 | 5 | 5 |
| 161428335553 | 3 | 2 | 3 | 4 | 4 | 3 | 2 | 3 | 4 | 4 | 3 | 2 | 2 | 2 | 4 |
| 161429104145 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 1 | 1 | 3 | 4 | 3 |
| 161429114237 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 2 | 2 | 2 |
| 161429265221 | 1 | 3 | 4 | 2 | 1 | 3 | 5 | 1 | 3 | 3 | 1 | 4 | 4 | 2 | 1 |
| 161430253240 | 4 | 5 | 5 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 1 | 1 | 4 | 5 | 4 |
| 161430265657 | 6 | 6 | 6 | 3 | 4 | 4 | 6 | 6 | 4 | 6 | 6 | 6 | 4 | 5 | 5 |
| 161430281739 | 6 | 5 | 4 | 3 | 4 | 5 | 4 | 4 | 5 | 5 | 1 | 1 | 6 | 6 | 5 |
| 161430286628 | 6 | 6 | 7 | 6 | 6 | 6 | 5 | 6 | 6 | 6 | 1 | 1 | 6 | 4 | 6 |
| 161430301131 | 4 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 |
| 161431253048 | 3 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 1 | 1 | 1 | 4 | 5 | 3 |
| 161431265211 | 6 | 6 | 6 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 4 | 4 | 2 |
| 161431325143 | 4 | 4 | 5 | 5 | 5 | 6 | 3 | 5 | 6 | 6 | 5 | 4 | 4 | 5 | 5 |
| 161434233812 | 5 | 3 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 2 | 1 | 1 | 6 | 3 | 3 |
| 161434235225 | 4 | 5 | 3 | 5 | 5 | 6 | 2 | 4 | 4 | 3 | 1 | 1 | 4 | 6 | 4 |

# Appendix C – Stage-2 Open Ended Interview

**Record #:** **Location:**

## Enterprise IT Governance of Innovative Software Development Projects

**HRE16-0270**

**Scope of Project Specific Interview questions**: This data collection interview scope is Enterprise IT Governance and innovative software development project governance. A particular completed project and its environment bounders during the project time need to be considered to answer these questions. It means, answers should be given based on the situation and facts at the time of the project execution. (Project Size, Small 3 to 5 months, Medium 6 to 9 months, large over 10 months)

| | AUS | US | EU |
|---|---|---|---|
| Small | <15 | <250 | <50 |
| Medium | <200 | <500 | <250 |
| Large | <500 | <1000 | <1000 |
| Enterprise | >500 | >1000 | >1000 |

Innovative Project means a project to develop a new product/solution to solve a problem.

Q1. **Industry:** Choose an item. Q2. **Company Size:** Choose an item.

Q3. **Software Development is:** ☐ **Onshore** ☐ **Offshore** Q4. **End-User Clients:** ☐ **Internal** ☐ **External**

Question should be answered for a specific project, please select a project for next questions:

Q5. **Agile Development:** ○ Yes ○ No Q6. **Innovative Project:** ○ Yes ○ No

Q7. **Project Size:** ○ Small ○ Medium ○ Large Q8. **Established PMO:** ○ Yes ○ No

Questions are specific to the interviewee:

Q9. **Enterprise Level:** ○ Executive ○ Manager ○ Technical Q10. **Role in the project:**

### Open Ended Questions

**Project Information for decision-making**: Questions should be answered for an agile software development project. Project information means any data which is related to the project, it may include but not limited to project performance indicators (related to time, cost, quality and scope 'in case of agile there could be different measures like iteration cycle, release cycle, resources, backlog, velocity, retro actions etc'), project structure / process, project accountability delegations, deliverable performance measurement methods, corrective actions and any other data which can be used to make any decisions for the project

Q11: What is the most important data required by project management about agile software development project for better decision-making?

**Business deliverables data and product owner**: Questions should be answered for an agile software development project. Business deliverables data means any information related to the value, priority, goal, quality, acceptance criteria, consumer, purpose, dependency and details of required project outcomes (it includes outcomes of individual iteration, release and/or overall project outcomes). Product owner is a delegated role to bridge between business and agile software development project.

Q12: What is the most important data required by project steering committee (decision authority) about the business objectives from the product owner (business) for better decision-making?

Q13: What are the 3 major problems faced in the agile software development project? (Any type of problem related to agile software development project)

Q14: What are the 3 most important changes in project governance can help the agile software development project?

# Appendix D – Stage-2 Data Analysis – Table - 1

Q-11: What is the most important data required by project management about agile software development project for better decision-making?

| # | Data | Key Word / Alternative Words / Similar Concepts | Themes |
|---|---|---|---|
| 1 | 1. Impediments (technical or management or operation)<br>2. Velocity (team capability)<br>3. Burndown data (how much is achieved and how much is remaining | Impediments / Problems and Issues (R and I)<br>Velocity / delivery / work completed (CBS)<br>Burndown / remaining vs completed work (VBS) | Risk and Issues<br>Capacity Based Status<br>Value Based Status |
| 2 | 1. Context of the current status of the overall product (not what is completed and remaining in terms of stories, but a detailed picture of the product development status)<br>2. Deviations from the oriental business request, issues, risk of the development and product<br>3. How a story was executed, was acceptance criteria clear and meet and how scope of work was delivered | Context of current status/Remaining vs Delivered (VBS)<br>Deviation from original (deviations)<br>Risks and issues / problems(R and I)<br>How Acceptance Criteria is met<br>How work is executed | Value Based Status<br>Risk and Issues<br>Objective Deviations<br>Execution method |

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| 3 | 1. Scope driven or time driven<br>2. Flexibility data on the resources, scope and time<br>3. Capacity and capability and guestimates<br>4. Capability of the product owner about the product and story writing | Scope driven, time driven (driving force)<br>Flexibility data on resources, Scope and Time<br>Capacity and Capability (TC)<br>Capability of writing stories / Training | Driving Force<br>Flexibility data<br>Team Capability<br>Training |
| 4 | 1. Iteration planning meeting, scrum meeting, retro spectate meetings<br>2. Velocity<br>3. Resource allocation data, capacity or teams | Meetings and meetings (C and C)<br>Velocity / Capacity (CBS)<br>Resource allocation data (commitment) | Communication and Collaboration<br>Team Commitments |
| 5 | 1. Stories and broke down to the nth level in the backlog, with burn down charts<br>2. Velocity<br>3. Resource availability, assignment | Stories, burndown, backlog, charts (VBS)<br>Velocity (CBS)<br>Resource availability, assignment (commitments) | Value Based Status<br>Capacity Based Status<br>Team Commitments |

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| 6 | 1. Feedback, retro details (actions and implementations) of previous similar projects<br>2. Technology information about the product and tools<br>3. Time and budget information, how much is used, how much is remaining and what we can do with this much time and money, change adoption is based on this information | Feedback, retro, corrections<br>Previous similar projects (historical)<br>Technology information<br>Time and budget, how much used, how much remaining (VBS) | Improvements<br>Historical Data<br>Product Technology<br>Value Based Status |
| 7 | 1. Backlog with priority<br>2. Time constraints of components and business value delivery<br>3. Quality attributes details and effectiveness | Backlog and priority (VBS)<br>Time constraints, business value delivery (VBS)<br>Quality attributes (VBS) | Value Based Status |
| 8 | 1. Velocity of the team, how much capacity and capability with (definition of done, most important)<br>2. Automation test results, success rates, acceptance criteria is met<br>3. Client feedback on the progress of the project<br>4. Quality indicators, how well is product is developed to meet the client requirements | Velocity, Capacity (CBS)<br>Capability (TC)<br>Automation testing results, success rates, acceptance criteria (VBS)<br>Client Feedback<br>Quality of Deliverables, Defects Report (VBS) | Capacity Based Status<br>Team Capability<br>Value Based Status<br>Feedback Loop |
| 9 | 1. Clarity of the requirements, what need to be delivered<br>2. Roles and responsibility in the agile environment | Clarity of requirements, need to be delivered (VBS) | Value Based Status<br>Roles Influence |

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| | 3. Velocity of the team and capability<br>4. Burndown charts and estimations to make decisions for the future release | Roles and responsibilities<br>Velocity, Capacity (CBS)<br>Capability (TC)<br>Burndown, Remaining Vs Delivered (VBS) | Capacity based Status<br>Team Capability |
| 10 | 1. Process – Process of assessing performance (How you are using data for the performance indicators, process is accurate to assess the data and performance, is indicator outcome from the process is accurate)<br>2. KPI clarity, purpose of the KPI and use of KPI for people, process and product<br>3. Data – usable and basic data which can help to rightly understand the current status,<br>4. Meaningful, measurable, understandable data rather lot of data only for data purpose | Process, assessing performance<br>Clearly identifying process indicators<br>Useable basic data<br>Meaningful, measureable and understandable data | Accurate units of Measurements<br>Actionable data |
| 11 | 1. Available resources assigned to the project, resource management<br>2. Technological complexities, risk management<br>3. How much each feature requires efforts from the team , estimation<br>4. Progress of the project, what is achieved and what is remaining, | Availability and resource assignment (commitments)<br>Technology complexity and risks (R and I)<br>Team efforts and estimation (VBS) | Team Commitments<br>Risks and Issues<br>Value based Status |

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| | backlog<br>5. Burndown charts, how much we are covering<br>6. CFT, Composite flow diagrams | Progress of project, what is achieved and what is remaining (VBS)<br>Burndown, backlog (VBS)<br>Composite flow diagram (VBS) | |
| 12 | 1. Velocity of the team, what they have achieved and what they can achieve<br>2. Burndown chart for release cycles, how much is delivered, how much is remaining and why it is remaining if committed | Velocity, Capacity (CBS)<br>Burndown, Remaining Vs Delivered (VBS) | Capacity Based Status<br>Value Based Status |
| 13 | 1. Schedule, actual delivery time and completed work, what is left<br>2. Budget, how much is used and how much is remaining<br>3. Communication indicators, how well teams are communicating, is communication plan is followed | Schedule, what is left / Remaining Vs Delivered (VBS)<br>Budget and remaining (VBS)<br>Communications, how well teams is communicating (C and C) | Value Based Status<br>Communication and Collaboration |

| | | | |
|---|---|---|---|
| 14 | 1. How we are performing against scope, How much we developed and delivered as per KPI<br>2. Budget, how much is used and how much is remaining<br>3. Resource availability to establish forecast (rolling wave approach analysis)<br>4. Visibility on the risks and managing them | How we are performing against scope (VBS)<br>Budget, used and remaining (VBS)<br>Resource availability (commitments)<br>Visibility on risks (R and I) | Value Based Status<br>Team Commitments<br>Risks and Issues |
| 15 | 1. Team roles and their influence on the project decision-making<br>2. Transparency and prioritization about the functionality delivery and dependency of company or other events<br>3. Cultural difference and details of influences of these factors to deal with the people issues to make better decision | Team roles and influence<br>Transparency, prioritization and functional delivery with dependencies<br>Cultural differences and influence | Roles Influence<br>Dependencies<br>Impact<br>Cultural Influence |
| 16 | 1. Time and cost performance<br>2. Risk indicator<br>3. Quality indicators of the developed product | Time and cost (VBS)<br>Risk Indicators (R and I)<br>Quality Indicators (VBS) | Value Based Status<br>Risks and Issues |

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| 17 | 1. Accountability, it needs to be defined who is doing what and accountable for what decisions in the project<br>2. Corrective actions, how and when we have to take corrective actions | Accountability to define who is doing what<br>Corrective Actions | Roles Influence<br>Improvements |
| 18 | 1. Overall progress of the project, what is completed, what is remaining and how much<br>2. Risk assessment and details of the risks and mitigations | Overall progress of the project, completed vs remaining (VBS)<br>Risk assessments and mitigations (R and I) | Value Based Status<br>Risks and Issues |
| 19 | 1. Compression of the actual and budgeted cost<br>2. Compression of the time<br>3. Risk and issues<br>4. Change requests<br>5. Any requirements from the top management to interventions for better decisions<br>6. Completed activities, next cycle activities, remaining activities | Actual and budgeted costs (VBS)<br>Compression of time (VBS)<br>Risks and Issues (R and I)<br>Change requests (VBS)<br>Top management interventions<br>Completed activities and remaining activities (VBS) | Value Based Status<br>Risks and Issues<br>Management Interventions |

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| 20 | 1. Resource capability and velocity of the team<br>2. Scope of the overall work, how much is completed and how much is remaining | Resource capability (TC)<br>Velocity (CBS)<br>Scope or the work, completed vs remaining (VBS) | Team Capability<br>Capacity Based Status<br>Value Based Status |
| 21 | 1. Timelines Estimations, what is required to be achieved when and how long it will take<br>2. Dependencies of different activities to each other to make a better decision | Timeline estimations, completed vs remaining (VBS)<br>Dependencies | Value Based Status<br>Dependencies<br>Impact |
| 22 | 1. Backlog should be defined and clear<br>2. Daily progress of achieved work | Backlog (VBS)<br>Achieve work (VBS) | Value Based Status |
| 23 | 1. Backlog, which will define all the required tasks and provide you picture of requirements<br>2. Burndown charts, Provides you the current status of the work and what is remaining<br>3. Dependencies, if any delays of one function, how it will impact on | Backlog (VBS)<br>Burndown (VBS)<br>Dependencies | Value Based Status<br>Dependencies<br>Impact |

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| | others. This will also help to prioritize functions based on dependencies | | |
| 24 | 1. Current progress of the activities<br>2. Major issues, obstructions<br>3. How much efforts is further required to finish the work | Current progress (VBS)<br>Major issues, obstructions (R and I)<br>Efforts required to finish (VBS) | Value Based Status<br>Risks and Issues |
| 25 | 1. EVM, earned value analyses for cost variance and schedule variance, milestone variance,<br>2. Requirements stability index, how often requirement is changed<br>3. Escaped defects, from the phase to the next phase or release | EVM, milestones, variance (VBS)<br>Requirements stability index, how often requirements are changed (VBS)<br>Escaped defects (VBS) | Value Based Status |
| 26 | 1. Clear roadmap, complete plan with detailed tasks wit milestones to achieve<br>2. Resource planning and utilization, how best are we using resources | Clear roadmap, completed and milestones (VBS)<br>Resource planning and utilization (CBS) | Value Based Status<br>Capacity Based Status |

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| 27 | 1. Current status of the project, how much time is used, how much work is completed, how much cost is used<br>2. Defect details, how many raised, how many are show stopper, how much rework is required | Current status of the project, completed vs remaining (VBS)<br>Defect details, show stoppers (R and I) | Value Based Status<br>Risks and Issues |
| 28 | 1. Time, cost, quality and scope matrix to see project health<br>2. Burnout charts to know what is done and how much is remaining | Time, cost, quality, scope (VBS)<br>Burnout, completed vs remaining (VBS) | Value Based Status |
| 29 | 1. Project scope (on task level including what and how), how much is completed and how much is remaining in terms of time and cost<br>2. Resources availability, all type of resources (computer, hard, soft and human) availability for the work<br>3. Human resource capability to complete the project task | Project scope, completed vs remaining (VBS)<br>Resource availability and type of resources (commitment)<br>Human resource capability (TC) | Value Based Status<br>Team Commitments<br>Team Capability |

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| 30 | 1. Quality of the product, how many defects, level of defects and how long it take to rectify<br>2. Resource utilization and availability for the project to be delivered | Quality, defects, remaining and completed (VBS)<br>Resource utilization and availability (CBS) | Value Based Status<br>Capacity Based Status |

## Appendix E – Stage-2 Data Analysis – Table - 2

Q-12: What is the most important data required by project steering committee (decision authority) about the business objectives from the product owner (business) for better decision-making?

| # | Data | Key Word / Alternative Words / Similar Concepts | Themes |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 1 | 1. Customer priority about their requirement<br>2. How it will fit in for customer needs (are they asking the right thing) | Customer priority (priority)<br>Customer Need (problem) | Customer Priorities<br>Problem to Solve |
| 2 | 1. Technical Acceptance criteria details (components, function etc)<br>2. Well defined business value, measurable and achievable, better to have a quantitative matrix | Technical (Acceptance Criteria)<br>Business (Value) | User Acceptance Criteria<br>Value to Achieve |
| 3 | 1. Market intelligence (what is market segment you are targeting, price and competition)<br>2. Comparative product information (non-functional requirements)<br>3. Product development is internally driven or externally driven (product requirements are coming from the product owners internally to the company or requirement is coming from the external end users) | Market Intelligence<br>Comparative Product Information<br>Internally driven vs externally driven (force)<br>External end user | Market Intelligence<br>Comparative Product Information<br>Driving Force<br>End User Details |
| 4 | 1. Target Audience, what problem you are trying to solve, who are the people (clients) will get benefit from it<br>2. Backlog grooming, clarity on the requirement<br>3. Competitive product information | Target Audience (user)<br>Problem to be solved (problem)<br>People / Client who will get the benefit (user)<br>Competitive product information | End User Details<br>Problem to Solve<br>Competitive Product Information |

| | | | |
|---|---|---|---|
| 5 | 1. Scope of the project, requirement should be clearly defined<br>2. Technical details should be clearly defined (metadata, non-functional data, functional data)<br>3. Expertise of the project team<br>4. Decision maker must know the problem, they should be domain experts (SMES) | Clear scope of project and requirements (problem)<br>Clearly define specifications (problem)<br>Expertise of team<br>Actual problem to solve (problem) | Problem to Solve<br>Team Expertise |
| 6 | 1. Domain vertical detailed data (in vertical industry like oil and gas, need detail domain information for better decision making)<br>2. Requirements should come from the end user, who will use the product<br>3. Non-functional requirements of the product to make a better solution | Domain's vertical details<br>Requirements from End Users (problem)<br>Non-functional requirements (problem) | Vertical Domain Data<br>Problem to Solve |
| 7 | 1. Scope of product to be delivered, it has to be clear<br>2. Outcome required from the product<br>3. Historical data from the business about the product or their functions to make better decision for the new product | Clear Scope of product (problem)<br>Required outcome (value)<br>Historical data of similar projects | Problem to Solve<br>Value to Achieve<br>Historical Data |
| 8 | 1. Business objectives, which kind of users, no of users, release plan (non-functional requirements)<br>2. First-hand user experience data<br>3. Priorities of functionality and why it is required first | Business Objectives (value)<br>Users, their needs and requirements (problem)<br>First-hand user experience (user)<br>Priorities of functions (priority) | Value to Achieve<br>Problem to Solve<br>End User Details<br>Customer Priority |

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| 9 | 1. User stories should be very accurate<br>2. Product owner ability to visualize what they really need<br>3. KPIs for product development, acceptance criteria, exit criteria | Accurate user stories (problem)<br>Skills of Product Owner<br>Acceptance Criteria (acceptance) | Problem to Solve<br>Team Expertise<br>User Acceptance Criteria |
| 10 | 1. Key priorities with clarity with the strategy (long term and short term to make a decision for the functions priority, which can help for the backlog of various iterations, can help to improve the commitment to getting the value rather just completing the work) | Key Priorities (priorities)<br>Business Value to be achieved (value) | Customer Priorities<br>Value to Achieve |
| 11 | 1. Objectives of the project (KPIs), what is required to deliver the project<br>2. Requirements, functional and non-functional<br>3. Time duration, when different features are required by the business | Objective of the project (problem)<br>Requirements (value)<br>Priority of required features (priorities) | Problem to Solve<br>Value to Achieve<br>Customer Priorities |
| 12 | 1. Value of each component to be achieved<br>2. Consumer perspective, of each component and the overall project<br>3. Purpose of the story and projects function | Value of each Component (value)<br>Consumer perspective<br>Purpose of required function (problem) | Value to Achieve<br>Customer Perspective<br>Problem to Solve |

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| | 4. Functional requirement and Non-Functional Requirements<br>5. Required quality of each deliverable | Functional and non-functional requirements (value)<br>Required Quality (value) | |
| 13 | 1. Understanding the objective, understanding the actual problem to be solved<br>2. Regulations and constraints which are impacting the deliverables and output of the deliverables<br>3. Priority of the functions in order to deliver business value<br>4. Knowing the strategy of the business and consumer perspective and reason of the project<br>5. Dependencies of items, functions and other factors | Understating the objective (problem)<br>Actual Problem (problem)<br>Regulations and constraints<br>Priority of the functions (priority)<br>Consumer perspective<br>Reason of the project (problem)<br>Dependencies | Problem to Solve<br>Regulations and Constraints<br>Customer Priority<br>Dependencies |
| 14 | 1. Long term purpose of the project or functionality required,<br>2. Acceptance criteria<br>3. Time to complete and budget to be used for compilation (time and cost expectations) | Long term purpose (problem)<br>Acceptance Criteria<br>Expectation from project in time and cost (value) | Problem to Solve<br>User Acceptance Criteria<br>Value to Achieve |
| 15 | 1. Business objective, what business want from this software, why they need it, what is objective to be achieved from this software<br>2. How business comes up with the objectives and acceptance criteria, | Business Objective (problem)<br>Why it is required (problem)<br>Acceptance criteria | Problem to Solve<br>User Acceptance Criteria |

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| | how they reach to this conclusion (it will help to understand behind the Seen actual story)<br>3. Clarity in the objectives, requirements and acceptance criteria to deliver what is exactly required and will be used by the business<br>4. Dedicated person from the business to software development project with the best knowledge of the business and requirements | Clarity in the objectives (problem)<br>Skills set of person providing business requirements | Team Expertise |
| 16 | 1. Business objectives<br>2. Success Criteria<br>3. Key Deliverables<br>4. KPI and Target | Business Objective (problem)<br>Success Criteria<br>Deliverables (value)<br>Targets (objectives) / (value) | Problem to Solve<br>User Acceptance Criteria<br>Value to Achieve |
| 17 | 1. Acceptance criteria, What exactly is the minimum achieving required from the software<br>2. Roles and accountabilities from the end users to know what and how they will use the software, if this is known to the project, it will make better decision for the software development project | Acceptance criteria<br>What is exactly required (problem)<br>Roles and accountabilities<br>End User trainings needs | User Acceptance Criteria<br>Problem to Solve<br>Roles and Accountabilities<br>Training Needs |
| 18 | 1. Business understanding, how business works should be very well aware by the decision-making authority<br>2. Requirement should be from the actual users who will use it | Business understating<br>What is required for business (problem)<br>Actual user requirements (problem) | Business Process<br>Problem to Solve |

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| | 3. Know the needs not the requirements, it will help to make a batter decision | Know the needs (problem) | |
| 19 | 1. Project required outcomes, clearly communicated<br>2. Acceptance criteria, clearly defined | Project required outcomes (value)<br>Acceptance criteria | Value to Achieve<br>User Acceptance Criteria |
| 20 | 1. Acceptance criteria are the most important to deliver business objective<br>2. Priority of the items to be delivered | Acceptance criteria<br>Priority of function | User Acceptance Criteria<br>Customer Priorities |
| 21 | 1. ROI, Return on investment, will help to make better decision for software development and achieving business objective<br>2. Process changes in the business, will help to make better software<br>3. Human resources requirement for business execution will help to build a better software | Return on investment (value)<br>Process changes<br>Henman resource requirements | Value to Achieve<br>Business Process<br>Team Expertise |
| 22 | 1. Acceptance criteria<br>2. Timeline and budget in which they want to achieve it<br>3. Quality requirements | Acceptance criteria<br>Timeline and budget (value)<br>Quality requirements (value) | User Acceptance Criteria<br>Value to Achieve |

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| 23 | 1. Priority of the deliverables or functionality<br>2. Customer perspective of each item, why and how they need it for what purpose | Priority of deliverables<br>Customer perspective | Customer Priorities<br>Customer Perspective |
| 24 | 1. Non-functional requirements of the software and functions<br>2. Return on the investment, how much you will save if you will have this product and how much you will lose if you do not have this product | Non-functional requirements (problem)<br>Return on the investments (value) | Problem to Solve<br>Value to Achieve |
| 25 | 1. Relative priority, relative value for the customers, end users, business and so on<br>2. Alignment to the organization's objectives | Relative priority<br>Organization's Objectives (problem) | Customer Priorities<br>Problem to Solve |
| 26 | 1. Business priority should be clearly defined for each functionality<br>2. Long term vision of the business to develop better software and better decision | Business Priority<br>Long term vision of the business (value) | Customer Priorities<br>Value to Achieve |
| 27 | 1. Goal of each functionality by the business to make better decision<br>2. Priority of functionally | Goal of each functions (value)<br>Priority of functionality | Customer Priorities<br>Value to Achieve |
| 28 | 1. Budget (money), how much money can business spent for this project, who is approving authority, if scope increases who will | Budget details (value)<br>Business process data | Value to Achieve<br>Business Process |

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| | provide further funds<br>2. Business process data, how business is running their shop, how their process is tailored or have the ability of tailoring. It required to understand the business function to make better decision | Felicity of the process to be changed (problem) | Problem to Solve |
| 29 | 1. Goal of each functionality<br>2. What is Acceptance criteria to consider this goals completed | Goal of the function (value)<br>Acceptance criteria | Value to Achieve<br>Customer Acceptance Criteria |
| 30 | 1. Priority of each functionality to be delivered<br>2. Acceptance criteria of each function to be delivered<br>3. Dependency of function on other systems or people to understand what is required to deliver | Priority of each functionality<br>Acceptance criteria | Customer Priority<br>Customer Acceptance Criteria |

# Appendix F – Stage-2 Data Analysis – Table - 3

Q-13: What are the 3 major problems faced in the agile software development project? (Any type of problem related to agile software development project)

| # | Data | Key Word / Alternative Words / Similar Concepts | Themes |
|---|---|---|---|
| 1 | 1. Shared resources is the top most issue in agile software development project<br>2. Self-disciplined teams cannot be formed due to pressure, resource constraints and multiple project assignment<br>3. Fail to deliver particular iteration objectives (making objectives first) because of particular deadline mindset | Share resources (team)<br>Formation of self-discipline teams (cultural)<br>Resource constraints and multiple assignments (team)<br>Making objective first (priority) | Team Assignment<br>Culture Adoption<br>Defined Priority |

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| 2 | 1. Quality of code is compromised<br>2. No guidelines, no indicators of qualities are set, more focus is on MVP (which is not clear as said in no.2 of Q.27)<br>3. Lot of rework due to changes of the scope | Quality of code (quality)<br>No guideline, no direction (quality)<br>Change of scope, rework (quality) | Quality Standards |
| 3 | 1. Cross-functional team is a problem (one person do multiple types of tasks (tech writing, dev or test by the same person)<br>2. Commitment by the product manager to take the responsibility of the backlog and groom stories for the iteration<br>3. Supporting functions need to understand agile and support, collaborate and communicate with agile teams | Cross-functional team (team)<br>Commitment by product manager (team)<br>Understand agile and support (training)<br>(Collaborate and communicate) | Team Assignment<br>Training<br>Communication and Collaboration |
| 4 | 1. Product owner skills of product requirement communication and delivery<br>2. Inflexibility of the process is causing problem, Agile do not need to be implemented as per book but requires tailoring as per the situation<br>3. Scope flexibility is not given which makes it water fall | Product Owner skills (training)<br>Communication and delivery (C and C)<br>Tailoring as per situation (training)<br>Scope inflexibility/waterfall (culture) | Training<br>Communication and Collaboration<br>Culture Adoption |

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| 5 | 1. Co-location is a problem because we cannot col locate all teams spread across the globe<br>2. Daily stand up – daily stand up is not practical in a globally distributed project teams<br>3. Team size has to be flexible, not all projects can take smaller teams especially enterprise projects | Co-location (team)<br>Daily stand-up (C and C)<br>Team size flexibility (team) | Team Assignment<br>Communication and Collaboration |
| 6 | 1. Scope is not clear while budget and time are fixed with many change requests throughout the project<br>2. Teams are not well trained, have limited knowledge and lack of internal coaching cause problem<br>3. Limited documentation, vague and not clearly defined components for customer | Clarity of scope (scope)<br>Teams are not well trained (training)<br>Limited Documentation | Clarity of Scope<br>Training |
| 7 | 1. Agile is lenient, it is not rigid which is a problem, Agile has to be clearly defined steps, roles and accountabilities<br>2. Estimation is vague and creates problem, it is based in individuals experience and knowledge | Agile clearly defined roles, accountability (Roles)<br>Vague estimations (scope)<br>Individual experience and knowledge (training)<br>Agile performance | Defined Accountability<br>Clarity of Scope |

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| | 3. Agile is not meticulous, it is varied for team to team and we cannot compare performance | | |
| 8 | 1. Automation is most critical and without it agile development project is not successful (CD/CI)<br>2. Business need to understand the agile concepts, without that agile development projects faces problems<br>3. Team need to be trained, without well agile trained teams and agile development mindset (self-managed teams) agile development project face problems | Automation<br>Business needs to understand the agile concepts (training)<br>Team need to be trained (training) | Training |
| 9 | 1. Underestimating the amount of efforts for the project<br>2. People who are making the estimation are not the people who are delivering it<br>3. Lack of discipline is making agile delivery difficult | Underestimation<br>Different people, different work type (team)<br>Lack of discipline (training) | Team Assignment<br>Training |
| 10 | 1. Roles in the team are not workable (culturally difficult to deploy flat organization in the agile software development projects) | Roles in the team are not workable (team)<br>Working expectations by the business | Team Assignment |

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| | 2. Wrong expectations by the business, if it is agile, it will reduce the overall time to deliver the entire product and will improve the productivity<br>3. Multiple layers of the management are creating problems for the quick decision making and delivery of agile projects | Multiple layers of management (team) | |
| 11 | 1. Automation, must have as much automation<br>2. Mindset changes to change culture for agile<br>3. Common terminology for entire team, groups and enterprise | Automation<br>Mindset changes (culture)<br>Common terminology for entire team (training) | Culture adoption<br>Training |
| 12 | 1. Breaking down into the iterations, what should be first in the iteration to get business value<br>2. Prioritization of each story and function<br>3. Director visibility of entire project and program as holistic view to ensure the direction and deliverables | Breaking down into the iteration (scope)<br>Prioritization<br>Director visibility of entire project (C and C)<br>Holistic view | Communication and Collaboration<br>Clarity of Scope |
| 13 | 1. People issues (communications, capabilities, personal egos)<br>2. Documentation, poor documentation leads failure, must be clear and to the point documentation | People communication (C and C)<br>Documentation<br>Budget, impact on quality and delivery (scope) | Communication and Collaboration<br>Clarity of Scope |

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| | 3. Budget, need to me managed very carefully, this can impact the quality and deliverables of the project in a big time | | |
| 14 | 1. No clear acceptance criteria make it difficult to deliver what is required<br>2. Adopting the technology in software development may cause limitation in future if it is not a right decision in the beginning<br>3. Skilled resources, compatible resources to be aligned with development style and coding | Acceptance criteria<br>Adoption of the technology<br>Skilled resources (training) | Training |
| 15 | 1. Client and developer are not aligned in terms of requirement, what is required by the business is not transferred, translated to the developer to deliver a code what can do what business really needs<br>2. People differences and insecurities in the team can cause a huge problem in the project teams and especially in the agile teams where teams are small and deliver quickly in a short time<br>3. Behaviours and changes in the culture to develop agile teams, dominants and perfectionist can cause problem for the agile software development projects | Client and developer are not align (scope)<br>What is required from the business is not clear (scope)<br>People differences and insecurities (team)<br>Behaviour and changes in the culture (culture) | Team Assignment<br>Culture adoption<br>Clarity of Scope |

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| 16 | 1. Clarity of the requirements<br>2. Business user maturity to understand the business and requirements and needs from the software<br>3. Technology limitations to develop and deliver what business need | Clarity of the requirements (scope)<br>Business user maturity to understand<br>Technology limitations | Clarity of Scope |
| 17 | 1. Requirements changes are too often<br>2. Changes in technologies<br>3. Organizational changes, impacting people and changes in the team dynamics | Requirement changes (scope)<br>Changes in technology<br>Organizational changes, people impact (team) | Clarity of Scope<br>Team Assignment |
| 18 | 1. Time estimation, it is poor or not accurate for the software development<br>2. Resource skills and right attitudes for the project<br>3. Project Planning, project schedules and times are not consulted with the development teams with a good project manager | Time estimation<br>Resources skills and right attitude (team)<br>Project planning, schedule and time | Team Assignment |

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| 19 | 1. Business requirement (gathering and documentation) are not well defined for the software development projects<br>2. Bypassing the established IT system and infrastructure / acquisitions (bypassing the procurement processes)<br>3. Not proving the appropriate human resource (skilled and trained for the job) | Business requirements (scope)<br>Bypass the established IT systems and infrastructure<br>Not providing the appropriate resources (team) | Clarity of Scope<br>Team Assignment |
| 20 | 1. Scope creep, causing lot of problems to deliver better solution<br>2. Unskilled resources causing most of the issues<br>3. Poor project management practices | Scope creep (scope)<br>Unskilled resources (training)<br>Poor project management (training) | Clarity of Scope<br>Training |
| 21 | 1. Meeting the timelines, always missed what we commit, which goes back to estimations<br>2. Quality of the product, could not deliver what customer want, goes back acceptance criteria<br>3. End user happiness, customer is not happy, goes back to customer involvements in the project from the start | Meeting timeline, estimations<br>Quality of the product (scope)<br>End user happiness | Clarity of Scope |

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| 22 | 1. Customer does not know about business and may not be clear about their requirements<br>2. Project Management do not consider all the factors for the software development, gap of understanding between project management and software development teams about the development project<br>3. Team creation with all skilled resources | Customer does not know about business<br>Project management do not consider all the facts<br>Team creation with all skilled resources (team) | Team Assignment |
| 23 | 1. Reparative work, because of unclear requirements and more changes when customer is more knowledgeable<br>2. Integrity of the code based on requirement may lose due to multiple changes, more changes are making product complex, unreliable and difficult to change and upgrade | Reparative Work<br>Customer is more knowledgeable<br>Integrity of the code based environment | Clarity of Scope |
| 24 | 1. Estimation is not correct<br>2. Resource availability for the agile software development project<br>3. Continuous requirement changes | Estimation<br>Resource availability<br>Continuous requirement change | Clarity of Scope<br>Team Assignment |

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| 25 | 1. Lack of understanding related to mutual interest of Business and Project organization<br>2. Lack of clarity in the requirements from the business<br>3. Lack of effective use of project management practices | Lack of understanding of business and project<br>Lack of clarity in the requirements (Scope)<br>Lack of effective use of project management | Clarity of Scope |
| 26 | 1. Business requirement is not clear to develop a workable functionality what business need<br>2. Delay in the solution or architectural decisions is causing problems which lead for rework<br>3. Project management processes and knowledge are not sufficient about the development processes and cause issues in the project progress and performance | Business requirements (scope)<br>Delay in solution and architect decision<br>Project management process and knowledge are not sufficient (training) | Clarity of Scope<br>Training |
| 27 | 1. Gap between the business requirement specification (business analyst) and Software requirement specifications (system Analyst)<br>2. Change requests on the existing developed, delivered code cause more problems<br>3. Lack of skilled and experienced resource cause most of the problem | Business requirement specification gap (scope)<br>Change request on the existing development (scope)<br>Lack of skilled and experienced resources (training) | Clarity of Scope<br>Training |

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| 28 | 1. Unavailability of key business resource (business sponsor) when required<br>2. Unclear requirements from the business<br>3. Lack of high Skills of the project resources including developers and testers | Unavailability of the key business resources (team)<br>Unclear requirements from business (scope)<br>Lack of high skills of the project resources (training) | Team Assignment<br>Clarity of Scope<br>Training |
| 29 | 1. In Agile software development project, problem on the time and cost of the project, which is not controllable due to continuous changes from business | Continuous changes from business | |
| 30 | 1. Requirement is not clear from business to develop a software of their need<br>2. Estimation is not accurate due to unclear requirements and resource capabilities<br>3. Conflict of interest from different entities in the company is a problem to make a better software | Requirement is not clear (scope)<br>Estimation is not accurate<br>Conflict of interest | Clarity of Scope |

# Appendix G – Stage-2 Data Analysis – Table - 4

Q-14: What are the 3 most important changes in project governance that can help the agile software development project?

| # | Data | Key Word / Alternative Words / Similar Concepts | Themes |
|---|---|---|---|
| 1 | 1. Agile Software Development Project tools need to be used by the team and the governance body on a regular bases<br>2. Stop adding/altering scope of the iteration | Project tools to be used (tools)<br>Stop altering Scope (scope) | Define Tools<br>Stop Scope Change |
| 2 | 1. Measure of success has to be clearly defined and agreed<br>2. Gap analysis of scope, performance, acceptance criteria, to create a matrices to measure it | Measurement of success (success)<br>Scope, performance, acceptance criteria (success)<br>Tailored Agile practise (tailoring) | Define Success<br>Tailoring Practices |

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| | 3. Agile current practice needs to be changed and MVP concept needs to be tailored | | |
| 3 | 1. Decision should be made by the assigning authorities in time<br>2. More frequent review meeting, more product demonstration and more corrective actions<br>3. Involving all supporting function including marketing, sales, legal, finance, operation, customer support | Decision-making authority in place (process)<br>Frequent review meetings and corrective actions (process)<br>Involve supporting functions | Define Process<br>Involve All Required |
| 4 | 1. Spend more time to understand the problem to get our MVP right, more spikes are better to make the solution clear<br>2. Flexibility in the process, team selection, iteration length, release cycle and all aspects of agile<br>3. Specialized roles for particular work, more roles by one person is causing problem | Understating of the problem<br>Flexibility of the process<br>Skilled roles for particular jobs | Define Problem<br>Tailoring Practices<br>Skilled Team |
| 5 | 1. Release cycle has to be flexible, no more MVP per iteration<br>2. Testing cycle has to be increased as per proportion to the development cycle<br>3. Functionality has to be well documented and in detail | Flexibility in delivery<br>Testing cycle proportionally increase<br>Well Documentation | Tailoring Practices<br>Define Process<br>Documentation |

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| 6 | 1. Training and coaching of agile methods<br>2. Top management engagement, become part of the project and take ownership of the project<br>3. Client awareness about agile | Training<br>Engagement from Top management<br>Client Awareness | Training<br>Define Ownership<br>Customer Awareness |
| 7 | 1. Regular assessment of performance (other than planning session and retro) more debate on the agile project progress with all possible aspects, capacity, capability and deliverables<br>2. End user (Customer/Client) should be brought into the agile process<br>3. Need to educate more, team training, agile need to be matured and teams need to learn what is agile rather implement their own thinking | Regular assessment of performance<br>End user involvement<br>Need to educate teams | Define Process<br>Customer Involvement<br>Training |
| 8 | 1. Training and education of the customer | End user training | Training |
| 9 | 1. Product owner knowledge and skills are keys to success, they must be trained for agile and product requirements<br>2. More roles and individual are creating problem, if a single person is making scrum master and project manager roles would improve the delivery | Product owner training<br>More roles and individuals are creating problems | Training<br>Reduce Management Layers |

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| 10 | 1. Adoption in the roles and responsibilities based on the culture<br>2. Agile does not really tell you or provides a standard for the performance and there is no scale to access the performance across the project and projects<br>3. Team will tell the performance and velocity and there is no mechanism to know what is really capability of the team | Adoption in the roles and responsibilities<br>Standard for the performance<br>Measurement and mechanism of the performance | Reduce Management Layers<br>Define Success |
| 11 | 1. Decentralization of decision-making<br>2. Experts should be from each area to help support the agile software development project decision-making<br>3. Availability of required tools to help supports the decision-making | Decentralization of decision making<br>Experts should be from each area<br>Required tools for the decision making | Reduce Management Layers<br>Skilled Team<br>Define Tools |
| 12 | 1. Common vision to be clear across the team and must be same<br>2. Structured delegation of the decision-making among the teams<br>3. Shared responsibility and accountability across the teams | Clear common vision<br>Structured delegation<br>Responsibilities and accountabilities | Define Problem<br>Define Process<br>Define Ownership |
| 13 | 1. Clearly define and implement roles and responsibilities and distribute decision making with accountability of each role | Clearly defined roles and responsibilities<br>Distribution decision making | Define Ownership |

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| | 2. Building enriched and enlighten team learning and education environment to groom people to make informed decisions<br>3. Establish a body to define standards for the software development per domain | Clear accountability<br>Learning and training<br>Defined standards | Reduce Management Layers<br>Training<br>Define Process |
| 14 | 1. Shorter phases (iterations) can minimize problem<br>2. Passive interactions among teams and business (product owners)<br>3. Starting phases early and parallel to minimize the problem and reduce the gap between requirement and delivery (starting UAT early) | Shorter iterations<br>Passive interaction<br>Starting testing early by end user | Define Process<br>Passive Team Interactions<br>Customer Involvement |
| 15 | 1. Culture of holding power to exercise on the team (by managers, executives, business and leads) it is not what agile teams are about, need to change this culture to be flat, no one is boss of anyone<br>2. The Same message has to be delivered across, transparency will improve a lot, it also needs to be ensured that message is received as it is intended to<br>3. Trust within team, it improves a lot in the decision-making space and supports deliver with better quality | No one is boss of anyone culture<br>Transparency and communication<br>Build trust in the teams | Define Ownership<br>Communication<br>Build Trust |

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| 16 | 1. PMO board meeting regularly to assess and action for standardization<br>2. Daily project stands up meetings<br>3. End user review and meeting to identify and act to make better decision | Regular meetings at all levels<br>Standardization<br>End user involvement | Communication<br>Define Process<br>Customer Involvement |
| 17 | 1. Distribution of the decision making among the teams and levels<br>2. Clear identification of the accountabilities in the organization which makes its clear for decision-making<br>3. Adaptability of organizational governance process with regards to the project objectives (tailoring of the governance for the project, based on the project needs) | Distribution of decision making<br>Clearly defined accountabilities<br>Adaptability of organizational governance | Reduce Management Layers<br>Define Ownership<br>Tailoring Practices |
| 18 | 1. Involving all stakeholders in the decision making, all opinions must be considered<br>2. Estimations must be consulted by all the relevant teams before finalizing to ensure nothing is missed or exaggerated | Involving all stakeholders<br>Estimations by all relevant teams<br>Regular team meetings | Involve All Required Communications |

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| | 3. Regular team meetings, involving all the team members, to discuss and make decision (remove silos) | | |
| 19 | 1. Business case preparation, which helps to justify that project is required for the company, All aspects to be covered to ensure that this business demand will be profited for the company<br>2. Requirement gathering and definition should be clear to make a better decision<br>3. Project team should be mixed of all type of skills to make better decisions | Business case and objective justification<br>Clearly defined requirements<br>Multi skilled team | Define Problem<br>Skilled Team |
| 20 | 1. Requirements and Contracts should be clearly defined to make a right decision<br>2. Signed off acceptance criteria, unless you cannot reach to any point<br>3. Bringing the project stakeholder on board from day one | Clearly defined requirements<br>Acceptance criteria<br>Stakeholder involvement | Define Problem<br>Customer Involvement |
| 21 | 1. Requirement should be frozen, (as a customized agile methodology for the company) tailoring of the methodology for the organization<br>2. Quality Improvement, the following process, more automation, with | Defined and stable requirements<br>Quality improvements, process and automation<br>Non-functional requirements | Define Problem<br>Define Process |

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| | right tools<br>3. Focus on non-functional requirements as much function requirements | | |
| 22 | 1. Tailoring of the agile methodology as per the need of the company<br>2. Roles and responsibilities in the team should be defined as per the need of the project rather as per the process, should have a regular check and balance for the roles and responsibilities<br>3. Risk measurement and management has to be defined and regularly reviewed | Tailoring of the agile methodology<br>Roles and responsibilities<br>Risk management<br>Defined and regular reviews | Tailoring Practices<br>Define Ownership<br>Define Process |
| 23 | 1. Agile should be adopted in the entire organization to change the culture rather just implementing the development process<br>2. Everyone should know what they and others are doing, clear communication and transparency to reduce misunderstanding and increase productivity<br>3. Agile process tailoring as per the need of the project rather implementing the process as it is | Agile culture adoption across the organization<br>Clear and transparent communication<br>Agile process tailoring as per needs | Culture Adoption<br>Communication<br>Tailoring Practices |

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| 24 | 1. Consider all the option with pros and cons to make batter decision<br>2. Historical reference of decision making in the similar state or problems with their results can help to make better decision and not repeat the same mistake<br>3. Continuous training and upgrading skills of resource | Consider pros and cons of options<br>Historical reference of similar projects<br>Continuous training | Define Success<br>Historical Reference<br>Training |
| 25 | 1. Measurement analysis, to have a careful and pragmatic analysis of the measurements to be accurate for making better decision<br>2. Collecting historical data of the relevant size and complexity of the project to understand previous situations and decision to make better decision<br>3. Business involvement in the project should be in early stages to make better decision | Accurate measurements for pragmatic analysis<br>Collecting historical data<br>Business involvement in the project | Define Success<br>Historical Reference<br>Customer Involvement |
| 26 | 1. External dependencies and project decision turnaround time to be reduced by continuous feedback<br>2. All required skilled resources should be part of the business requirement gathering from the start, including system analysis, business end users, designer and architect<br>3. Real-time study should be included in the requirement phase, | External dependencies<br>Skilled team need to be involved in all phases<br>End user involvement from the beginning | Define Dependencies<br>Skilled Team<br>Customer Involvement |

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| | including visit of end user stations by the business analysts and system analyst to define software parameters and also end user education on the software | | |
| 27 | 1. Previous similar project historical data about the decision making and the results of those decisions<br>2. Business resources should be involved from the start of the project, to be educated to make right decision<br>3. Automation of testing and approval process can reduce problems and improve timeline and decision-making | Previous similar project historical data<br>Business users should be involved in the project<br>Automation of testing and approval process | Historical Reference<br>Customer Involvement<br>Define Process |
| 28 | 1. Presence of multiple methodologies is causing problem, project delivery methodology should be tailored as per the organization's need<br>2. Gap between project management process understanding and software development process understanding among the team members and working together need to be improved<br>3. Requirement gathering process needs to be improved, as a structured way to collect business needs where business analysts with business key resource work together to develop the software requirements | Avoid using multiple methodologies<br>Reduce gap between project management and software development methodologies<br>Business users to be involved earlier | Tailoring Practices<br>Customer Involvement |
| 29 | 1. Involving all key stakeholder in the decision-making process of the project from the beginning | Involve all key stakeholders from business<br>Adopt agile required decision support | Customer Involvement |

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| | 2. To improve the performance of the agile software development project, steering committee, has to adopt the agile required decision support to make faster decisions | | Tailoring Practices |
| 30 | 1. Technical team should work within business premises to understand the requirements from the actual end user to make a clear problem statement and requirement to deliver a better software<br>2. Resource assignment to the project is full-time to ensure delivery of the project and better decision-making from all the people involved<br>3. Dedicated customer representative for the project to make decision on behalf of business which will reduce rework and increase better product delivery | Technical team should work within business premises<br>Full time resources assignment to project<br>Dedicated customer representation | Development in Business Premises<br>Team Commitments |

# Appendix H – Stage-2 Data Analysis – Table - 5

| Project Management | Business | Issues to Solve | Solution |
|---|---|---|---|
| Value Based Status | Problem to Solve | Clarity of Scope | Define Process |
| Risks and Issues | Value to Achieve | Training | Customer Involvement |
| Capacity Based Status | Customer Priorities | Team Assignment | Tailoring Practices |
| Team Capability | User Acceptance Criteria | Communication and Collaboration | Define Ownership |
| Team Commitments | Team Expertise | Culture Adoption | Training |
| Dependencies Impact | Business Process | Defined Priority | Define Problem |
| Roles Influence | End User Details | Defined Accountability | Reduce Management Layers |
| Communication and Collaboration | Customer Acceptance Criteria | Quality Standards | Communication |
| Improvements | Customer Perspective | | Define Success |
| Accurate units of Measurements | Comparative Product Information | | Skilled Team |
| Actionable data | Competitive Product Information | | Historical Reference |
| Cultural Influence | Dependencies | | Define Tools |
| Driving Force | Driving Force | | Involve All Required |
| Execution method | Historical Data | | Build Trust |
| Feedback Loop | Market Intelligence | | Culture Adoption |
| Flexibility data | Regulations and Constraints | | Customer Awareness |
| Historical Data | Roles and Accountabilities | | Define Dependencies |
| Management Interventions | Training Needs | | Development in Business Premises |
| Objective Deviations | Vertical Domain Data | | Documentation |
| Product Technology | | | Passive Team Interactions |
| Training | | | Stop Scope Change |
| | | | Team Commitments |

# Appendix I – Stage-2 Data Analysis – Table - 6

| Project Management | Business | Issues to Solve | Solution |
|---|---|---|---|
| Value Based Status | Problem to Solve | Clarity of Scope | Define Process |
| Risks and Issues | Value to Achieve | Training | Customer Involvement |
| Capacity Based Status | Customer Priorities | Team Assignment | Tailoring Practices |
| Team Capability | User Acceptance Criteria | Communication and Collaboration | Define Ownership |
| Team Commitments | Team Expertise | Culture Adoption | Training |
| Dependencies Impact | Business Process | Defined Priority | Define Problem |
| Roles Influence | End User Details | Defined Accountability | Reduce Management Layers |
| Communication and Collaboration | Customer Acceptance Criteria | Quality Standards | Communication |
| Improvements | Customer Perspective | | Define Success |
| Accurate units of Measurements | Comparative Product Information | | Skilled Team |
| Actionable data | Competitive Product Information | | Historical Reference |
| Cultural Influence | Dependencies | | Define Tools |
| Driving Force | Driving Force | | Involve All Required |
| Execution method | Historical Data | | Build Trust |
| Feedback Loop | Market Intelligence | | Culture Adoption |
| Flexibility data | Regulations and Constraints | | Customer Awareness |
| Historical Data | Roles and Accountabilities | | Define Dependencies |
| Management Interventions | Training Needs | | Development in Business Premises |
| Objective Deviations | Vertical Domain Data | | Documentation |
| Product Technology | | | Passive Team Interactions |
| Training | | | Stop Scope Change |
| | | | Team Commitments |

# Appendix J – Stage-3 Phenomenological Interview Questions

Record #:

## Enterprise IT Governance of Innovative Software Development Projects

**HRE16-0270**

### Research work Introduction

In this section, I will introduce the research project as well as definitions of various terms we will use in this interview.
*(All text in Italic and within parentheses is for researcher as a hint or helping note)*

"**ASD**" stands for Agile Software Development, "**Team**" stands for Agile Software Development Team, "**Company**" stands for enterprise level company where agile method is used for majority of the software development projects.
*(Selected sample of this research is from industry experts who are working in agile domain and with companies where agile is considered for majority of the projects for at least 2 or more years.)*

The research focus is Enterprise IT (EIT) Governance of Agile Software Development (ASD) projects and the impact of the team composition change.

**Team Dimensions:** In ASD projects, a well performing team is developed and composed over the time. Various aspects or dimensions of the team may include: team purpose (the problem to be solved), arrangement (place of work, location etc), demography (male/female etc), composition (people, skills, roles etc) and time-scale (dates, time, duration etc).

**Team Composition:** Team composition consists of the members of the team (size), each individual itself (persona), individual's skills, past experience, knowledge, role and assigned responsibilities in the team.

**Team Composition Change**: For this research, the only dimension considered is team composition. A change in the team, either by adding, removing or replacing a person, is considered as team composition change.

**The impact:** For this research, impact is related changes in the team performance when team composition is changed.

**The purpose of this interview** is to understand and find the impact of the team composition change on the team performance.

### Consent

Are you willing to participate in this interview voluntarily, and do I have answered your questions?

○ Yes ○ No

**The first set of questions** is the classification to establish the project background.

### Classification

#### Industry

Q-1. **Industry:** Choose an item.

#### Organization

Q-2. **Company Size:** Choose an item.

Q-3. **Project Size:** ○ Small ○ Medium ○ Large

#### Demographic

Q-4. **Enterprise Level Role:** ○ Executive ○ Manager ○ Technical

### Company Size

| | AUS | US | EU |
|---|---|---|---|
| Small | <15 | <250 | <50 |
| Medium | <200 | <500 | <250 |
| Large | <500 | <1000 | <1000 |
| Enterprise | >500 | >1000 | >1000 |

### Project Size

Small: 3 to 5 months
Medium: 6 to 9 months
Large: Over 10 months

**The next set of questions** is about the organization

#### Project Governance

Q-5. Could you please tell me about the governance process and structure in place?
*(formal, informal, guidelines, written processes or established structure like PMO etc)*

Q-6. Can you tell me about the agile trainings or formal courses offered in the organization?
*(for individuals or for teams)*

I would like you to select one of your agile software development project, in your mind, you do not need to tell me the name of the project. The selected project could be from your current organization or any past organization. Please answer questions in perspective of that project.

**Substantive Research Questions**

**Now,** I would like to discuss the team development, team composition and changes **in this set of questions**

Q-7. How do you describe the process of agile team development in your organization?
*(formal or informal process e.g. team bonding, workshops, team work courses etc)*
*(Do the company follow any team development models?)*
*(forming, storming, norming and performing of Tuckman)*

Q-8. Can you describe the team composition in the ASD project?
*(composition (people, skills, roles etc), team purpose (the problem to be solved), arrangement (place of work, location etc), demography (male/female etc) and time-scale (dates, time, duration etc) )*

Q-9. How often does the team composition change throughout the ASD project?
*(team composition change when expanded, contracted, replaced)*
*(per iteration and in the overall project)?*

Q-10. Would you be able to share the common reason(s) of the team composition changes?
*(reason may be same or different for each change expanded, contracted, replaced)*

*(When we use team composition change, please consider three scenarios to give answer, Expanding, Contracting and Replacing)*

**In this set of questions**, I would like to discuss the team composition change and its impacts
(need stories and examples with elaboration)

Q-11. Would you be able to share the impact of agile team composition change, with example?
*(discuss scenario like expansion, contraction and replacement)*
*(what about change of 1, 2, 3 or more people change in above scenarios)*
*(change in skills and change in the team)*

**In the last set of questions,** I would like to cover one specific area of impact when team composition is changed

Q-12. How team composition change influence ASD project team's ability in decision-making?
*(discuss different scenarios like expansion, contraction and replacement)*

# Appendix K – Stage-3 Project by Project Analysis

This sections is to provide project by project details of each project with their organization details covered during this research at stage 3 data gathering.

**Project 1**

Project-1 is a large-scale project from a small size organization in the construction industry. The development is in house and participating team was from internal staff, contractors and consultants from other companies. Interviewee had project manager role in this project.

Governance and execution of the project have weak structure. There is no established PMO. Organization is not offering agile trainings. Organization is not encouraging personal growth by any formal or informal steps.

Organization has no formal or informal processes for team building and team binding activities. Personal and team level informal events are conducted for team gatherings. Organization is not supporting or encouraging personal and team level gatherings. Organization does not recognize any formal or informal team development stages and unaware about team development stages (FSNP).

Project team size is 4 people. Team members are from various groups and work from multiple locations.

Team composition in changed 3 times, 1 replacement and 2 addition. Common reasons of team composition change are resignation, scope and requirements changes. Only single change occurred in the team composition at a time. Two or more team composition changes including expansion, contraction and replacement did not occur at any time.

When a person leaves the project, team performance is negatively impacted. It is because team members are engaged to re-evaluate project work, re-adjust tasks and re-set expectations. When a new person joins the project, team performance is negatively

impacted. It is because team members are engaged to upskill new member and update project team structure. When a person leaves the project, it negatively impacts the team's decision-making ability.

**Project 2**

A small-scale project from an enterprise size organization in the financial industry. Interviewee role in the project is technical level.

Governance and execution of programs/projects have weak structure. There is no established PMO.

Organization is offering optional agile trainings. Organization is not encouraging personal growth by any formal or informal steps.

Organization has no formal or informal processes for team building and team binding. Personal and team level informal events are conducted for team gatherings. Organization is not supporting or encouraging personal and team level gatherings.
FSNP: Organization does not recognize any formal or informal team development stages.

Project team size is 4 people. Team members are from various groups.

Team composition finds replacement change in the project. Common reasons of team composition change are resignation, priority change and internal mobility. Only single change occurred in the team composition at any time. Two or more team composition changes including expansion, contraction and replacement did not occur at any time.

Team composition changes do impact the agile project team performance, however, this impact is less if same happened in the traditional project. When a team member left the team, balance of the team (skilled non-skilled ratio, experience non-experience ratio etc) disturbs which impacts team's ability to make decisions. When someone with higher position or authority is joined in the team, it negatively impacts the team performance where people do not feel comfortable and open to discuss and share ideas.

As long as team composition change does not impact/disturb the balance in the team, performance impact is minimal. Team composition change impact on the team ability of decision making has potential to change the entire project direction.

People in the team with right and required skills positively impact the team ability of decision making.

**Project 3**

The agile project is a large-scale project from an enterprise size organization in the financial industry. Interviewee role in the project is technical level.
Governance and execution of programs/projects have weak structure. There is no established PMO.
Organization is offering optional agile trainings. Organization is not encouraging personal growth by any formal or informal steps.
Organization has no formal or informal processes for team building and team binding. Personal and team level informal events are conducted for team gatherings. Organization is not supporting or encouraging personal and team level gatherings.
FSNP: Organization does not recognize any formal or informal team development stages.
Project team size is 10 people. Team members are from various groups.
Team composition finds 2 replacement changes in the project
Common reasons of team composition change are resignation.
Only single change occurred in the team composition at any time. Two or more team composition changes including expansion, contraction and replacement did not occur at any time.

When a new person joins the team, other members of the team engaged in activities to upskill the new comer, and project team structure is changed which impacts the delivery and performance of the team
Over 10 people in any agile project causes chaos and impacts negatively to the team performance
When a person left the team, its role and position determine the impact on the team ability of decision making. A person with scrum role who runs day to day acuities, when left,

cause more negative impact, because this role is driving the decision making process in the team

When a new person joins the team, it takes time to understand the team culture and be understood by the team. This impacts the team ability of decision making where they have to include the opinion of the new person.

**Project 4**

The agile project is a large-scale project from an enterprise size organization in the construction industry. Interviewee role in the project is manager level.

Governance and execution of programs/projects have weak structure. There is no established PMO.

Organization is not offering agile trainings. Organization is not encouraging personal growth by any formal or informal steps.

No one in the team has agile formal training

Organization has no formal or informal processes for team building and team binding. Personal and team level informal events are conducted for team gatherings. Organization is not supporting or encouraging personal and team level gatherings.

FSNP: Organization does not recognize any formal or informal team development stages.

Project team size is 7 people. Team members are from various groups, works from multiple locations, have different language and cultural backgrounds.

Team composition finds 4 replacement changes in the project

Common reasons of team composition change are resignation, global situation changes and people are assigned on multiple projects.

Only single change occurred in the team composition at any time. Two or more team composition changes including expansion, contraction and replacement did not occur at any time.

When a new person joins the team from within the company, impact on the team performance is less. However, if a person joins the team, as new to the team and the company, it impacts team performance more, because, the new person has to understand the company, culture, business and other norms as well as team, project and deliverables. When team members are kept changing from project to project, within the company, it negatively impacts the team performance.

When a person left the team, the magnitude of the impact on the team performance depends on the **level of experience** of the leaving person. If a well experienced person left the team, its negative impact on the team performance is more and it take more time to the team to recover from that loss.

The magnitude of the impact on the team performance also depends **at what stage** a team composition occurs. If team composition change is at early stages of the project, its negative impact on the team performance is less. However, if team composition change occurs at late stages or later stages of the project, its negative impact on the team performance is more.

When a team member left the team, its **role and position** determines the impact on the team ability of decision making. A person with day to day activities and facilitating the decision making process in the team, when lefts the team, its negative impact on the team ability of decision making is high.

When a person left the team, **the time of** the team composition change determines the impact on the team ability of decision making. If team composition change is at critical stages (iteration delivery or release delivery time) of the project, its negative impact on the team ability of decision making high.

**Project 5**

The agile project is a large-scale project from an enterprise size organization in the health industry. Interviewee role in the project is manager level.

Governance and execution of programs/projects have a proper structure in place. There is an established PMO and functional. Strategic decisions are made at high level and projects are independent to take their day-to-day decisions.

More flexibility is given to the agile projects.

Organization is offering optional agile trainings. Organization encourages personal growth by any formal or informal steps. Team members have specific agile trainings as well as certifications.

Organization has no formal processes for team building and team binding. However, company do organize events to help team building activities and support such events by the teams.

FSNP: Organization does not recognize any formal or informal team development stages.

Project team size is 9 people. Team members are from various groups, works from multiple locations, have different levels of seniority in the team.
Team composition finds 2 replacement changes in the project
Common reasons of team composition change are resignation, priority changes, workload and skill balancing among the projects and performance issues.
Only single change occurred in the team composition at any time. Two or more team composition changes including expansion, contraction and replacement did not occur at any time.

When a new person joins the team, members of the team engages in activities to upskill the new member as well as team structure changes impacts negatively the team performance.
When a person with a particular skill level, lefts the team, its negative impact on the team performance is more. Because it directly impacts the delivery of the project.
When project is lagging behind, adding more people into the team helps to deliver the project in time.
When a team member left the team, its role and position determines the impact on the team ability of decision making. A person with day to day activities and facilitating the decision making process in the team, when lefts the team, its negative impact on the team ability of decision making is high.
When decision making and decision support roles are shifted from one person to the other, within the agile project team, it can have positive or negative impact on the overall team ability to make decision. If shift is from a less experienced and less skilled person to the high experience and high skilled person, impact is positive.

**Project 6**

The agile project is a large-scale project from an enterprise size organization in the financial industry. Interviewee role in the project is technical level.
Governance and execution of programs/projects have a proper structure in place. There is an established PMO and functional.
Organization is offering mandatory agile trainings with exam.
Organization has formal processes for team building and team development.
FSNP: Organization does recognize team development stages.

Project team size is 9 people. Team members are from various groups and are collocated.
Team composition finds 1 replacement changes in the project
Common reasons of team composition change are priority changes, split-work assignment, multi-project assignment and leaves (sick and annual).
Only single change occurred in the team composition at any time. Two or more team composition changes including expansion, contraction and replacement did not occur at any time.

When work related requirements and changes cause a team composition change, where a person is added into the team for a required skill or specific work task, it positively impacts the team performance.
When a person is assigned to two or more projects due to split workload arrangement, and such arrangement is well planned with proper time distribution and cushion for task switching, impact on the team performance is minimum.
Team composition changes are well managed and such change only allowed when assigned tasks are complete. Hence, limited impact of any team member change on the team ability of decision making.
People in the team with right and required skills impacts positively to the team ability of decision making.

**Project 7**

The agile project is a large-scale project from an enterprise size organization in the multinational industry. Interviewee role in the project is executive level.
Governance and execution of programs/projects have a proper structure in place. There is an established PMO and functional.
Organization is not offering agile trainings.
Most of the agile team members does have formal training and certification.
Organization has formal processes for hiring highly skilled people through HR to avoid team development activities. For better teams, team members are shuffled in the projects based on commonalities and cultural similarities to build a team.
FSNP: Organization does recognize team development stages.
Project team size is 6 people. Team members are from various groups, works from multiple locations.
Team composition finds no changes throughout the project

No common reasons of team composition changes are found.
Team composition change is not found of any kind in the project.

Project found no team composition changes, hence, can not discuss the impacts of changes to the team performance.

However, as a general observation in the organization and other projects, it is described that when a person is replaced in a project, where new joiner is more experienced, it will impact the team performance positively.

This project has no changes in the entire project.

On a general discussion, interviewee commented on the agile project as:
In Agile projects, focus is more on the people, rather on the process, to achieve success.

**Project 8**

The agile project is a medium-scale project from an medium size organization in the health industry. Interviewee role in the project is technical level.
Governance and execution of programs/projects have a proper structure in place. There is an established PMO and functional.
Organization is offering mandatory agile trainings for IT teams. Organization encourages personal growth of team members.
Organization has no formal processes for team building. However, company do organize events to help team building activities and support such events by the team members.
FSNP: Organization does recognize formal team development stages.
Project team size is 16 people. Team members are from various groups, collocated to work from one place and have various skill and experience levels.
Team composition finds 2 replacement changes and 1 addition in the project
Common reasons of team composition change are resignation, priority changes and employee leaves (sick and annual).
Only single change occurred in the team composition at any time. Two or more team composition changes including expansion, contraction and replacement did not occur at any time.

When a new person joins the team, members of the team engages in activities to upskill the new member as well as team structure changes impacts negatively the team performance.
When a team member is replaced, and new joiner is more experienced, it positively impacts the team performance, It is also true for vice versa (new joiner less experienced, cause more negative impact to the team performance)
When a team member left the team, its role and position determines the impact on the team ability of decision making. A person with day to day activities and facilitating the decision making process in the team, when lefts the team, its negative impact on the team ability of decision making is high.
Whenever there is a change in the team composition, it impacts the team ability of decision making and slow down the process. There is no case found where a team composition change improves the pace of the decision making process.
People in the team with right and required skills positively impact the team ability of decision making

**Project 9**

The agile project is a lage-scale project from an enterprise size organization in the multinational industry. Interviewee role in the project is technical level.
Governance and execution of programs/projects have a weak structure in place. There is no established PMO.
Organization is offering agile trainings for IT teams only.
Organization has no formal processes for team building.
FSNP: Organization does not recognize formal team development stages.
Project team size is 6 people. Team members are from various groups and collocated to work from one place.
Team composition finds 1 replacement changes and 1 removal from the project
Common reasons of team composition change are resignation and priority changes.
Only single change occurred in the team composition at any time. Two or more team composition changes including expansion, contraction and replacement did not occur at any time.

When a new person joins the team, members of the team engages in activities to upskill the new member as well as team structure changes impacts negatively the team performance.
When a new person joins the team, it impacts the team ability of decision making by slowing the process.

**Project 10**

The agile project is a medium-scale project from an enterprise size organization in the telecom industry. Interviewee role in the project is manager level.
Governance and execution of programs/projects have a weak structure in place. There is no established PMO.
There is no formal documentation available to execute the projects.
Organization is offering no agile trainings.
Organization has no formal processes for team building.
FSNP: Organization does recognize formal team development stages.
Project team size is 10 people. Team members are from various groups and collocated to work from one place as well as consist various skill levels in the team.
Team composition finds 2 replacement changes in the project
Common reasons of team composition change are resignation, priority changes and individual's performance issues.
Only single change occurred in the team composition at any time. Two or more team composition changes including expansion, contraction and replacement did not occur at any time.

When a team member is replaced due to the individual's performance issues, new joiner with more experience positively impacted the team performance.
When a person left the team, its role and position determine the impact on the team ability of decision making. A person with scrum role who runs day to day acuities, when left, cause more negative impact, because this role is driving the decision making process in the team
When a team member left the team, balance of the team (skilled non-skilled ratio, experience non-experience ratio etc) disturbs which impacts teams ability to make decisions.

People in the team with right and required skills positively impact the team ability of decision making

**Project 11**

The agile project is a medium-scale project from an enterprise size organization in the telecom industry. Interviewee role in the project is manager level.
Governance and execution of programs/projects have a weak structure in place. There is established PMO and functional.
Organization is offering specific agile trainings for IT and Business. however, it is optional.
Organization has no formal processes for team building. At team level, team members do organize team building events.
FSNP: Organization does not recognize formal team development stages.
Project team size is 9 people. Team members are from various groups and collocated to work from one place as well as consist various skill levels in the team.
Team composition finds 1 replacement changes in the project
Common reasons of team composition change are resignation and priority changes.
Only single change occurred in the team composition at any time. Two or more team composition changes including expansion, contraction and replacement did not occur at any time.

Project is considering any team composition changes only when the assigned tasks are complete. No changes are allowed during the running phase (iteration). The impact of team composition change minimize be this arrangement.
When a new person joins the team, other members of the team engaged in activities to upskill the new comer, and project team structure is changed which impacts the delivery and performance of the team
Whenever there is a team composition change occurs, it impacts the team ability of decision making. People go defensive and do not take initiative, which makes their work engagement minimal and slow down the decision making process.
People in the team with right and required skills positively impact the team ability of decision making

Impact of the team composition changes on the team ability of decision making also depends on the company's employee base and their employment age. A company with more senior level people or people who are in the company for a very long time, resist the change. However, a new company or employees who are young and new in the company are accepting change more willingly. Hence, the impact of team composition changes on the team ability of decision making is high and negative when people resist the change.

**Project 12**

The agile project is a medium-scale project from an enterprise size organization in the financial industry. Interviewee role in the project is technical level.
Governance and execution of programs/projects have a weak structure in place. There is established PMO and functional.
Organization is offering specific agile trainings as optional.
Organization has no formal processes for team building. Company do organize events for team building.
FSNP: Organization does not recognize formal team development stages.
Project team size is 7 people. Team members are from various groups and collocated to work from one place as well as consist various skill levels in the team.
Team composition finds 2 replacement changes in the project
Common reasons of team composition change are resignation, rotation of people, priority changes, individual's performance issues and scope/requirement changes.
Only single change occurred in the team composition at any time. Two or more team composition changes including expansion, contraction and replacement did not occur at any time.

When a new person joins the team, other members of the team engaged in activities to upskill the new comer, and project team structure is changed which impacts the delivery and performance of the team.
When a person left the team, its role and position determine the impact on the team ability of decision making. A person with scrum role who runs day to day acuities, when left, cause more negative impact, because this role is driving the decision making process in the team

When a team member is replaced, and new joiner is more experienced, it positively impacts the team performance.

When a team member left the team, its role and position determines the impact on the team ability of decision making. A person with day to day activities and facilitating the decision making process in the team, when lefts the team, its negative impact on the team ability of decision making is high.

People in the team with right and required skills positively impact the team ability of decision making

# Appendix L – Stage-3 Data Analysis – Common Ideas

In this section, question responses are provided in the table with first level of analysis and findings.

**Question 5:** Could you please tell me about the governance process and structure in place?

| ID | Answer | Common Ideas |
|---|---|---|
| 20170819201 | In the organization, multiple projects are running parallel, where outside companies are also involve. Hence, governance procedure are in place, however, may be implemented for different projects defiantly.<br>Various processes and procedure are used for internal jobs including new request generation, managing internal decision making process and applications. Regular meetings are in place for status update, progress reporting and issues management.<br>Company is small in size, do not have an establish PMO or structured procedure for managing and running of the projects. Client does have established PMO. | Governance and execution vary from project to project without any single project structure<br><br>No established PMO |

| | | |
|---|---|---|
| 20170909202 | Projects are under the Programs and governance structure is at program levels covers deliverables of all the projects where numbers of groups are involved. Program governance structure comprises senior management from IT, business and other stakeholders.<br>Project manager is responsible for the project and its deliverables.<br>PMO: There is no evidence of an established PMO<br>There is an established structure with documented guidelines and process at Program level. | Governance and execution vary from project to project with a weak program structure for uniformity<br><br>No established PMO |
| 20170917203 | Governance structure is in place at organization level. The components are stakeholder engagement, defined expectations, defined timelines with enforced regulatory requirements, and an establish structure to execute, report and control the project.<br>PMO: Project to project base governance, no established PMO<br>Director level management layer looking after the project to ensure customer satisfactions and there is no hierarchy in between the business and the project teams. | Governance and execution vary from project to project without any single project structure<br><br>No established PMO<br><br>No hierarchy structure between project and business |

| | | |
|---|---|---|
| 20171013204 | Organization commences a project after the contract with client is signed-off. A kick-off meeting is held with a project charter. Team formation, roles and responsibilities of project team, business and other stakeholder are defined in the project charter.<br>Milestones and deliverables are also part of the project charter.<br>Project manager is directly reporting to GM. We had a steering committee is looking after the projects. Reports are biweekly. After two months client is visited for reports, updates and feedback.<br>PMO: There is no established PMO. People are performing their job as per their assigned roles. | Governance and execution vary from project to project with a weak program structure for uniformity<br><br>No established PMO |
| 20171017205 | Scrum is standard method used and scrum ceremonies are performed. Tools including scrum board and JIRA are used for project execution.<br>An established PMO is in place. Project manager is assigned to each project through PMO. PMO has set rules and established documents and process. PMO manages at a high level and detail level plans are made by the project teams. Agile project have its own documentation.<br>PMO is more on the strategic level and detail level planning and execution is at the project level. | Governance and execution vary from project to project under a defined structure<br><br>PMO is established and functional<br><br>PMO is at strategic level and planning execution is at project level |

| | | |
|---|---|---|
| | Agile project is not having hard guidelines or not strictly under the PMO, more flexibility in terms of project governance is given to the agile projects. | More flexibility in project governance for Agile projects |
| 20171019206 | Agile team is reporting to PM who is reporting to PO. Funding comes from PO. Each PM reports to project director.<br>Strong PMO is in place, providing explicit responsibility to each role assignment and procedural documents.<br>General broadcast to all agile teams to ensure alignment of all teams to their projects and deliverables without any overlapping.<br>First is the kick-off meeting and after that is collaboration meetings to keep everyone up to date. | Governance and execution vary from project to project under a defined structure<br><br>PMO is established and functional |
| 20171020207 | Development guideline, processes, procedures are established by the contribution of various stakeholders to form the governance structure in the organization. As teams are distributed in the geographical regions, such structure is flexible.<br>PMO: PMO does exist in the enterprise level, but is not effective for the candidate project. PMO was managing projects in the rest of the organization, however, the structure is flexible enough only the areas | Governance and execution vary from project to project under a defined structure<br><br>PMO is established with selective execution |

| | | |
|---|---|---|
| | where strict governance is required, it is followed. In the particular area where the candidate project in this research is executed, such structure was not used. | |
| 20171025208 | Development teams have members from with various departments, skills, experience levels and technical backgrounds.<br>JIRA is used for all project level details, including requirements, team and work assignments.<br>Software development life cycle is followed, requirement, design, development, testing, deployment in agile fashion.<br>PMO is making the decision of projects and their prioritization. They also assign project managers to each project. PMO also prioritize the activities and team is delivering as per direction with documentation.<br>Business is providing details level tasks and their requirements and PMO do the prioritization.<br>PMO is balance and prioritize the work based on the projects, task types, business needs and available resources. Teams commence their work, if they have any issues or gaps, teams provide feedback to PMO, who makes | Governance and execution vary from project to project under a defined structure<br><br>PMO is established and functional |

| | | |
|---|---|---|
| | priority calls. It also depends on the bandwidth of individuals and teams to make the priority calls. | |
| 20171101209 | The organization does have the defined processes to run the projects. There are approval processes for the project and changes and projects have to follow it.<br>Process are used based on the changes, major changes need to be documented in a pre defined processed.<br>No structured PMO is in place, an ad hoc process in place to monitor the project performance. | Governance and execution vary from project to project under a defined structure<br><br>No established PMO |
| 20171105210 | In the organization, there are no written formal processes for running the project. Informal processes are used to split the project into phases and release. It was more in the minds of the people who were running the projects to use various rules and steps to run the project.<br>No documentation is available for any kind to execute the projects. | Governance and execution vary from project to project without any single project structure<br><br>No established PMO<br><br>No documentation is available for any kind to execute the projects |

| | | |
|---|---|---|
| | Company does have a PMO. An appointed project director, who was also assuming the CTO role, responsible for reviewing the weekly and monthly project reports or all the project, including waterfall and agile project.<br>There is no steering committee, no structure, or formal process in place. Project director was managing the governance responsibilities, single-handed.<br>Project managers provide the project updates (time, cost, quality), their tasks and assignments, iteration reports and requirement changes where they may need to stop the iteration. More ad hoc based meetings and updates. | |
| 20171111211 | The organization has a PPMO that governs the projects. In the enterprise organization, using legacy systems like mainframe systems, some projects are discretionary projects, which are not agile. Other projects like CRM projects, AEM projects are agile, and other are hybrid. So in the organization, waterfall, agile and hybrid approaches are used. From governance point of view, it is different and from technical delivery point of view projects are agile. | Governance and execution vary from project to project under a defined structure<br><br>PMO is established and functional |

| | | |
|---|---|---|
| | PPMO is using a very structured environment. From the inception to delivery, formal processes exist to categorize the project, rating the project and taking decision for design and delivery. All processes are documented, communicated and all projects are directed to use the formal process. All projects knows to follow these steps/ processes.<br>Kick-off, acceptance and approvals of the project is different, once it is approved, a project manager is assigned, then it is agile and executed as agile. Before the project commence, everything is formal and directed to use certain steps to perform by all projects. | |
| 20171112212 | The company has a big team, specialized IT department, everything is formally processed, and business has information of what is going on.<br>The company has different departments and these departments may have different work and different requirements, and the each department is responsible to get their approvals from their management and get the budget for those projects and had a large release meeting where these departments were presenting their requirements and projects for approvals. | Governance and execution vary from project to project under a defined structure<br><br>PMO is established and functional |

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| | There is an IT team looking after complete agile train in different releases in different cycles.<br>PMO office is established.<br>The company is using vendor, half are local vendors and half are offshore vendors. A release planning meeting, after every release is scheduled and performed where planned piece of software (work) is presenting and each team was able to pick up the module (work) for the next release. It is governed from the top; however, teams are able to take (chose) the work for next release. | |

**Question 6:** Can you tell me about the agile trainings or formal courses offered in the organization?

| ID | Answer | Common Ideas |
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| 20170819201 | No, Company is not providing any formal or informal training for Agile development.<br>Company do encourage personal efforts and capabilities building by the individuals, no monitory benefits are offered. | No agile training provided by the organization<br><br>No encouragement for personal growth |
| 20170909202 | Organization offers one week hands on agile developer course.<br>Course was provided to all the employees but it was not a mandatory course<br>Course was run by independent division in the organization and it was for all the teams and groups. It was hands on where project bases learning and training is provided which is highly regarded by the employees. | Organization provided specific agile training but it is optional |
| 20170917203 | Organization does offer multiple courses including Scrum, Kanban and SAFE<br>At the team level, everyone took the courses, and team also took other courses from third party trainings. | Organization provided specific agile training but it is optional |

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| 20171013204 | There was no agile training offered from the company.<br>Team members also did not have any formal training for agile, their knowledge is based on their course work.<br>Few other course offered by the company are not mandatory for the teams. | No agile training provided by the organization<br><br>On one in the team have formal agile training |
| 20171017205 | Company does provide one off training through 3rd party organization. Training was for all the IT staff but not mandatory. Training is not ongoing for the agile teams.<br>Members of agile team took trainings and certification by their own, no support for the certifications are provided from the company. | Organization provided specific agile training but it is optional<br><br>Members of the agile team took trainings and certification by their own |
| 20171019206 | SAFE (Saleable Agile Framework) training provided to all the employees with an exam to ensure everyone is qualified.<br>Training is provided to all the employees<br>2 to 4 days extensive training | Organization provided specific agile training, mandatory with exam |
| 20171020207 | Organization does offer training through in house training department. The training department is providing training as product to customers, at the same time, these courses are offered to the internal resources. Teams does have agile | No agile training provided by the organization |

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| | / scrum certified members. Team members have trainings and certifications from various organizations and different part of the world.<br>Trainings are delivered as per need, and there is no career building plan for employees. People may choose trainings from different areas and organization as they feel appropriate.<br>No targeted oriented and specific trainings offer for agile.<br>As people in agile team are experienced and most of them have the trainings or certifications, there was no pressing need for a training regime. | Most of the agile team does have formal trainings and certifications |
| 20171025208 | Company organized a workshop, where teams got the agile exposure. Prior to that all teams were working as waterfall.<br>Workshop was for all employees, permanent and contractors in the IT.<br>It was ongoing training, where follow-up sessions were conducted where teams agile adoptions assesses and provided further coaching.<br>In the training program, people from various areas are combined in one groups and assigned hands on tasks for agile experience.<br>In the beginning of the agile journey, training is provided.<br>People got certifications by their own which helped individuals as well as project teams. | Organization provided specific agile training, mandatory for IT teams<br><br>Organization also encourage team members for personal growth |

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| | Company did not offer any training or coaching for the certifications, however, company reimbursed the cost of certifications to individuals to promote this trend. | |
| 20171101209 | There are various trainings offered in the organization, agile training is also part of offered trainings in the organization<br>Agile training is provided to the people who have role to participate in the agile project<br>Particular agile training is provided time to time and keep updating the trainings | Organization provided specific agile training to agile teams only |
| 20171105210 | The organization does not offer any trainings for agile or any other training.<br>Company hired experienced managers who does have knowledge and have experience in the project management<br>Agile team members help each other, no formal trainings for agile<br>Employees did their own training, technical trainings (Microsoft or cloud training) | No agile training provided by the organization<br><br>Agile team members help each other |

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| 20171111211 | At organization level, in house trainings are delivered through approved practitioners. Members from various areas attended those trainings. Before the agile concept introduced in the company, agile trainings are delivered and rolled out in a phased manner.<br>Training was available for all the staff, however, only the people in the large projects and agile impacts took the trainings.<br>Training was particular agile training and whole project team attended. From IT point of view, most of the people took that training. From business point of view, it was important for them and business was also trained. It was to provide enough understanding to a non-technical person or businessperson about agile and how it works.<br>Company provided enough training to the people in the company to get them ready for agile shift | Organization provided specific agile training to IT and business but it is optional |
| 20171112212 | The company provided training, SAFE training (saleable agile framework training)<br>Training is for all the people in the project including project manager, scrum master, developers, business analyst, tester, product owner<br>The training was one off for the project team<br>Company does not offer any other training for agile or team building | Organization provided specific agile training, mandatory for project team |

**Question 7:** How do you describe the process of agile team development in your organization?

| ID | Answer | Common Ideas |
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| 20170819201 | The team is established based on the project requirements and required skills. People are nominated in the team with the assigned roles, based on required skills and business requirements. Roles and responsibilities of individuals are further defined / clarified in the kick-off meeting. These assigned roles and responsibilities are regularly assessed through weekly meetings as per the communication strategy.<br>Teams are frequently going out for social gathering. These gatherings could be personal or professional. Tams are working from multiple locations, hence not possible for the entire team to gather for social events. Company support for such gathering is limited.<br>There is no team building structure, company is not providing any formal or informal setup for team building. Rather it is a rigid assignment of tasks/roles to the people.<br>FNSP: Team development staged are not recognized at company level. On a personal level, project managers does have the understanding of team development stages, however, they are not using it for team building. | No formal or informal process of team building<br><br>Personal and team level informal events helps team bonding and team building<br><br>FNSP: Team development stages are not recognized in the organization |

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| | Business model is product development where everyone is working on a single product, hence, teams are not changing or formed for new projects.<br>Team building happened gradually as company have only one product. As requirements increased, more skilled people are required and added into the team. It is not dynamic where teams are formed and dissolved frequently based on project needs. | |
| 20170909202 | There is no formal process of team development in place.<br>It's a top down approach where existing experienced people are providing coaching to the new joiners<br>It is all developer centric organization and it is a long journey for the developers to learn and adjust in the projects and work.<br>There are team run activities for bonding and team building. These activities helped the members of the team to overcome any negative behaviours.<br>FSNP: Team development stages are not observed.<br>Agile adoption was different at different projects. Few project had clear roles and tasks assigned as per roles, while other have removed the boundaries of role based task assignment and team become one unit where any one can take any task and help each other. | No formal or informal process of team building<br><br>Personal and team level informal events helps team bonding and team building<br><br>FNSP: Team development stages are not recognized in the organization |

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| 20170917203 | To have the people together, and share the vision of working model. This helps team to commence work together. Keeping the expectation clear is helping for team building; it also covers expectation from each other. How you would like to be treated, what you like, how you will be happy and how it can be improved.<br>Enforce the culture of mutual respect, pear programing, working and helping each other, openly communicate, and acts of motivation.<br>Informal structure to help teams to adopt the agile practices. Might be few members are more independent and can help others.<br>There are sessions where they self-discover what is required and what changes they need. It helps them more to be working with each other.<br>FSNP: Such stages are not considered for team development. | No formal or informal process of team building<br><br>Enforced and rigid culture to help team members communicate and respect each other<br><br>FNSP: Team development stages are not recognized in the organization |
| 20171013204 | Open communication among the team members, one manager and everyone is at the same level. Even senior level people are working in the team like a team member.<br>Team is regularly going out for lunch and outside office meetups. Teams are frank with each other. | No formal or informal process of team building<br><br>Personal and team level informal events helps team bonding and team building |

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| | Project team size varies from 2 to 5 people. Team size changes as well based on the availability.<br>Project are categorize in three areas, normal, semi-complex and complex. Each project type have different number of people.<br>FSNP: There is no team development stages are observed.<br>People are assigned roles, teams are rigidly assigned to the work and they are working accordingly.<br>Overall team culture is very open and helping to each other, there are no boundaries which can stop people to help each other. | FNSP: Team development stages are not recognized in the organization |
| 20171017205 | Company does not have formal process of team development<br>Managers are assuming this responsibility and do schedule team bonding activities like team lunch and gathering outside the office.<br>Company do organize sessions of team bonding meetings / events / town hall gatherings. Some events are half day events for team building activities.<br>FSNP: There is no recognition of team development stages.<br>Individual team leads manager conduct team development events and may be aware and using development stages. | No formal or informal process of team building<br><br>Organization do organize events to help team bonding and team building<br><br>FNSP: Team development stages are not recognized in the organization |

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| | Managers are guiding the team members for processes, procedures, norms and how to perform in the teams. No formal structure or stages are followed. | |
| 20171019206 | A formal process is used for team building.<br>Once project is fully funded and approved, people are assigned the particular roles in the project. All team up to commence the work. At the beginning, Scrum master or project manager organizes a formal gathering and later is informal get to gathers. Team also go out for lunches to mingle with each other<br>FSNP: An understanding of the team development stages does exist at personal level<br>Different people have different styles and personality. Team collaboration happens naturally within the team members.<br>Team may have leaning curve in the SAFE structure. Otherwise, they smoothly work together | Formal process of team development exist<br><br>FNSP: At person level, team development stages are understood and recognized |
| 20171020207 | Soft skills are more focused to have team motivated and up for taking challenges. Improved communication helps team bonding and reduces the gap among the people. Team building even started from the hiring, the culture, background and purpose of the team is considered to find the | Team building process is managed through hiring people who can fit in the organizational culture and team members are shuffled to make a balance in the team |

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| | commonalities among the candidates for potential members. It helps to reduce the gaps among the team members where they have more commonalties rather differences. Bonding and tolerance is more in he members in such cases.<br>Also teams are observed and people may have shuffled to make a balanced team which can be more productive.<br>Once right combinations are developed, team members works very well in the team and performed the desired results.<br>Also teams are motivated by rewards where team achievement attracts overseas trips.<br>FSNP: Team development stages are recognized.<br>When team went through these stages, teams are working well. Those teams who have gone through the process, they have developed interpersonal understating and focus more on the problem solving rather then their personal differences.<br>If team went through these stages, it also helps individual team members to find courage to accept the mistakes, as they feel comfortable in the team. | FNSP: Organization and team level, team development stages are recognized |

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| 20171025208 | Each Team is a combination of senior and junior level people. It is expected that whoever joins the team is able to adopt and perform. It is very important to have team bonding, and a healthy relationship within team members. Especially in agile, it is not only the developers; each individual in the team has to be work closely with each other.<br>Technical teams are working with business, BA, Operations, QA and other areas in the company. Positive environment where teams are communicating, helping and supporting each other is actually making a difference in the project.<br>Every two weeks, team are going for lunch together, outside the office. Company also sponsor and arrange project parties.<br>Company also facilitated team bonding sessions/trainings. Where different methods are used including situation based learning, feedback based learning.<br>FSNF: Team also observed the forming, storming, norming and performing stages. Each team goes into such cycles in the project. | Organization recognize and support team building activities<br><br>Organization do organize events to help team bonding and team building<br><br>FNSP: Organization and team level, team development stages are recognized |

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| 20171101209 | Company follows the skill sets and experience of the team and nature of the project for the assignment to the projects.<br>Organization does have events for team to know each other in informal sessions.<br>To build a strong team, team-building activities are performed.<br>When we discussed with each other, we get to know who want to work on which part. Based on these attentions, people are assigned the roles.<br>FSNF: team building stages are not recognized | Team building process is managed through hiring people who can fit in the organizational culture/project and informal team development activities are recognized<br><br>FSNP: Team development stages are not recognized in the organization |
| 20171105210 | Two type of teams, one is waterfall model, one is agile model. At the time of the hiring, it is decided where the person will go to the various type of teams, based on their skills and abilities. One model is where clients requirments are gathered and saved, while development could start in months as per clients requirements. The other model is more agile. People are assigned to these models as per their background. Informal training by the manager (at person level) provide the guidance and update to the team members. No formal team development happens.<br>Scrum is very fast passed, understating of the team | Team building process is managed through hiring people who can fit in the organizational culture/project and informal team development activities are recognized<br><br>FSNP: Organization and team level, team development stages are recognized |

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| | Team gathering is very important as Scrum is very fast passed, understating of the team is important to deliver the work. There could be personality clashes. To avoid any negative aspects, it is important that team is comfortable with each other.<br>After every three days, team lunch, outside the office, personal experience sharing and be comfortable with each other<br>Stand-up meeting also used for engaging team member for collaboration and working together. Managers does mention team members to mingle with each other.<br>Company does know, however is not encouraging in terms of finances. Team managers do such team building activities.<br>FSNF: Team development stages are observed within the team. When you get a new person in the team from a different background. It takes time to adjust with the team; it may have some personal adjustment issues among the team members. Where manages has to deal with these personal team issues. Manager uses major is authority to use the team building and social contract among the teams.<br>First two sprints are norming, (sprint size is 20 to 35 days), sprint size is based on the company requirement. | |

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| 20171111211 | From team development point of view, there was no change, it was like any other project for agile team. People who are required, SMEs, dev, experts, who are required for the project are requested assigned in a same way to the agile project.<br>No formal team engagements or team building activities in place from the organization.<br>When external teams are involved, the process of team collaboration and team building activities are performed to know each other.<br>Team development phases, as a normal process does happen, especially when someone new comes into the team.<br>FSNF: No process was in place to facilitate the team building phases. There are formal induction process is in place for new joiners in the company but no such process is in place where team building is focus, either in the company or for a project. | No formal or informal process of team building<br><br>Personal and team level informal events helps team bonding and team building<br><br>FNSP: Team development stages are not recognized in the organization |

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| 20171112212 | There was no formal process for team development and team building, teams are shuffled after two three cycles. Cases are where developers are from offshore teams and they are on a rotation schedule for two to three months. Due to these rotations, teams were shuffled.<br>Teams are having onshore-offshore model where teams are changed over the time<br>Management informing the people who is working in which team. From 6 to 7 teams, each one is informed by the management in which team they are.<br>Organization did have budget to spend for team building activities. Scrum master takes the team for lunch and team get to gathers, while it is paid by the organization. Frequency of such event is once in a quarter.<br>Mostly such events are paid by the organization. Other events like some is leaving or joining the team, events are managed and paid by the team members itself.<br>FSNF: Team development stages are not observed. | No formal or informal process of team building<br><br>Organization do organize events to help team bonding and team building<br><br>FNSP: Team development stages are not recognized in the organization |

**Question 11:** Would you be able to share the impact of agile team composition change, with example?

| ID | Answer | Common Ideas |
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| 20170819201 | When a person is left in the middle of the project, it pose the risk for the entire project of delivery and running of the business. It is a direct impact on the team to deliver the agreed goals.<br><br>When a person left with a particular skills set, which is required in the team for delivery, it affects the delivery. Such situations are mitigated and risks are managed by having multiple roles with similar skills.<br><br>Such changes also impact if a new person joins, people have to provide help and support and may not be able to deliver their assigned work. Team has to refresh the responsibilities and sharing the accountability and distribute it to the new member.<br><br>No scenarios found where two or more people are changed simultaneously (add, removed, replaced). | When a person with a particular skill leaves, it directly impact on the team to deliver the project work<br><br>When a new person joins, team is engaged in activities to upskill new member and update project structure which impacts the delivery of assigned work<br><br>Not found 2 or more changes of any type (expansion, contraction and replacement ) occurred at once |

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| 20170909202 | If a person is replaced in a project, where person who is leaving, is skilled and playing a key role in the development. New person who is joining will take time to adjust. In agile such changes have less impact than the traditional projects because agile is using various methods like peer program and working closing with other team members. Though any such change has an impact, still it is less if compared to the other traditional methods.<br><br>Other scenario may be when a new person is added into the team. Its impact is less negative and person can pickup while team velocity is not impacted or team reduce the capacity<br><br>No scenarios found where two or more people are changed simultaneously (add, removed, replaced). | Team composition changes do impact agile team performance, however, this impact is less if same happens in the traditional project<br><br>Not found 2 or more changes of any type (expansion, contraction and replacement ) occurred at once |
| 20170917203 | It impacts initially when a person is changed from the team, because new person takes time to establish the place in the team. Who is who and how it is working and it takes time. | When a new person joins, team is engaged in activities to upskill new member and update project structure which impacts the delivery of assigned work |

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| | Informal session with incoming members and listing their expectations. More open discussion, what and how we do and what are the expectations form the team and how it is to be part of the team. Transparency , cultural awareness, mutual respect evolve the performing team. This helps to minimize the impact on the overall team performance through that change.<br><br>When more people changes happen, It impacts on the velocity and delivery may be late. However, team cultural transparency, short delivery, no scope of negotiation on standards helps to minimize the impact on the team performance.<br><br>When more than 1 person leave the team, it impacts the team. Re-plan the project, forecast changed and delivery velocity is changed. It helps to keep the expectation right and impact to minimize to the performance of the team. No scenarios found where two or more people are changed simultaneously (add, removed, replaced). | Over 10 people in an agile project causes chaos and impacts negatively<br><br>Not found 2 or more changes of any type (expansion, contraction and replacement ) occurred at once |

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| | When adding more people in the team, it generally helps the team to improve the performance, however, in agile if it is over 10 people it become chaos and instead of any good it negatively impacts. When more people added, it is initially taking time to ramp up the team and velocity scale down. | |
| 20171013204 | When a new developer joins in the running project, 95% of the times developer is not new to the organization, its only new in the project and does have background and knowledge of the technical area as he may belong to another pool or project. Hence, impact on the technical area is minimal for any type of change in the case of developer.<br>If a new developer joins the company, it may take 3 to 5 months only to understand the overall background of the work. It means that new person to the company will not be productive for some time.<br>If a person leaves in the middle of the project, it impacts the project. If a project manager or team lead leaves, impact is mild. | A new person in the company and project will take longer time to be productive then a new person in the project from within the company.<br><br>When team members are keep shifted from project to project, within the company, It impacts the delivery of all those projects.<br><br>When a person left the team, magnitude of the impact depends on the level of |

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| | When teams members are keep shifting from project to project, it does affect the project performance.<br>One team was working on one module, which was a dependent component for upcoming modules. When changed occurred, it affected the running development areas.<br>When a person is changed, it depends on the experience and ability of the person. In case of more experienced person left the team will have high impact than the less experienced person, who lefts the team.<br>It will not change the work effort required, it will impact the delivery time.<br>It also maters at what stage they left. If that is a critical stage, than impact is much more.<br>Earlier is better, it means if team changes are in the early stages of the project, its impact is less. As more time passes, magnitude of the impact increases for the same change in the team.<br>If more than 1 person left together, impact may be more than double, | experience that person had. If a well experienced person left the team, impact is more.<br><br>The project stage when team composition change happens matters on the magnitude of the impact. If team composition change is at early stage of the project, impact is less, if it is at later stages of the project impact is more.<br><br>Not found 2 or more changes of any type (expansion, contraction and replacement ) occurred at once |
| 20171017205 | Delivery lead in the mid of the phase, was added into the project, which impacted the project negatively. It was due to establishing the place of new person in the team based on the role and responsibility. | When a new person joins, team is engaged in activities to upskill new member and update project structure which impacts the delivery of assigned work |

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| | Involvement of the management into the team day to day work, including the daily stand-ups, boost the teams commitment and delivery.<br>When a person resigned, it was considered negative. It was because we were losing a person who was skills and involved with the team for some time.<br>Due to priority change, a tester was changed, it was a negative impact on the team. It reduce the velocity of the team. Team has to share the tasks of testing among themselves.<br>There are times in other project, when teams were lagging behind, more people are added to increase the velocity, which is a positive change. | When a person with a particular skill leaves, it directly impact on the team to deliver the project work<br><br>When project is lagging behind, adding more people helps to deliver the project in time.<br><br>Not found 2 or more changes of any type (expansion, contraction and replacement ) occurred at once |
| 20171019206 | A person is removed from the team, it is a rare scenario. Organization has a stringent process for any such change. Due to the process in place which includes discussion, deliberation and exploring all options before making this change, it is little impact to the team's performance.<br>More likely scenario is workload driven changes, where person has to be added to the project to cover the work. It is positively impacting the team performance. | When team is changed based on workload driven changes, where a person is added into the team for a required skill or work, it positively impacts the team performance.<br><br>When a person is assigned to two or more project due to split workload and time, team |

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| | Partially removed from the team means split the time/workload of person for two or more project teams, with agreements of teams and manager. Which also discussed and minimize the impact. It is minimum impact as far as it is properly planned and if additional time is provide to the team member to perform the job at multiple teams. | performance impact only can be minimized if such change is plan well with additional time to the team member in multiple teams.<br><br>Not found 2 or more changes of any type (expansion, contraction and replacement ) occurred at once |
| 20171020207 | This project had no changes, hence no impact.<br><br>In another project, a person chose to leave the company due to his higher studies. Same person is asked to provide a new resource. He also provided handover and knowledge transfer.<br><br>In a team composition change, when a replacement occurs, where one person left the team and a new person joins the team, if new person is more experienced, team performance has positive impact, If a new person is less | Project found no changes, hence no impact can be discussed for the project<br><br>When a team member is replaced, if the new person joining the team has more experience, it positively impacts the team performance. Vice versa is true as well. |

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| | experienced and junior in the team, it has negative impact on the team performance. | Not found 2 or more changes of any type (expansion, contraction and replacement ) occurred at once |
| 20171025208 | The impact on team performance is negative when a person is replaced because new person need to adopt the new situation. However, if it is planned well a head, the team performance impact can be minimize.<br><br>When an experience person is added into the team, that impacts the team performance positively. It is because experienced person helps in areas for quick delivery. | When a new person joins, team is engaged in activities to upskill new member and update project structure which impacts the delivery of assigned work<br><br>When a team member is replaced, if the new person joining the team has more experience, it positively impacts the team performance. Vice versa is true as well.<br><br>Not found 2 or more changes of any type (expansion, contraction and replacement ) occurred at once |

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| 20171101209 | It was a long project for 10 months, when a person is resigned, a new person has to be hired and this change affected team performance. Many issues are faced due to this change including understating of the problem, understating of the role etc. it impacted for couple of month to get back to the speed.<br><br>Team performance was impacted, quality of the work was impacted and time of delivery was impacted.<br>New person took time as well as team took time to understand and to reach back to the precious performance.<br><br>When a developer is moved from this team to the other project, work is distributed in the remaining people and work load got increased. Which impacted the performance of the team. | When a new person joins, team is engaged in activities to upskill new member and update project structure which impacts the delivery of assigned work<br><br>Not found 2 or more changes of any type (expansion, contraction and replacement ) occurred at once |
| 20171105210 | When a team composition change happened, it creates<br>demotivation,<br>affects project time line<br>creates confusion and worry in the team.<br>This may cause issues in the project, technical and management. | When a team member is replaced due to performance issue, the new person joining the team is expected to be more experienced; it positively impacts the team performance. |

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| | When a person was not performing as per the testing requirement, it starts impacting the overall project delivery. When the person is replaced, such issues got resolved. New person with brings a change with a positive improvement in the team performance. If the replacement is due to performance, replaced person is considered to be more experienced to resolve the issue. | Not found 2 or more changes of any type (expansion, contraction and replacement ) occurred at once |
| 20171111211 | From phase to phase changes there is no impact on the performance due to the change of the team (within that phase).<br><br>The composition change within the phase, an impact is on team performance by going into the defensive mode due to the change. In one phase a tech lead is reprioritise is to another project. New person is in defensive mode as not clear in the scope and work as well as not being part of the team and journey from the beginning, it is difficult to take the lead.<br>Defensive mode is not due to technical difficulty, it is because of being new, and starting in the middle. New person is not taking any risks and trying to be defensive to work only what is assigned. | When project is considering changes only when a new task is delivered as a phase, and no change is during the running phase, change impact is minimized.<br><br>When a new person joins, team is engaged in activities to upskill new member and update project structure which impacts the delivery of assigned workNot found 2 or more changes of any type (expansion, contraction and replacement ) occurred at once |

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| 20171112212 | In case of software tester change (replace), the new person who joined did not have any background of the work, software module and project working style and need to spend time to understand and familiarize with the environed. It took more time for the new person as well as in the project tasks.<br><br>It is more because of the technical knowhow of the work which takes more time for a new person to understand and be producing in the team.<br><br>More effort required in understanding the technical area rather the team. 80% time spend for technical understanding and 20% for mingling with the team and understating the team.<br>Even person who was working in the same area, even moved from one module (piece of work) to another module (another piece of work) it impacts the performance of the person. Scrum master is considered one of the most important role in the agile project. Scrum master is running the day to day work, conducting the daily meeting, communicate to various levels and ensures smooth running of the project. When a scrum master is changed (replaced due to resignation), it impacted the team performance. Also the performance impact depends on the skills of the new person (scrum master) joining the team, how | When a new person joins, team is engaged in activities to upskill new member and update project structure which impacts the delivery of assigned work<br><br>The role of the person who is replaced does matters on the magnitude of the impact. If the person replaced is playing a key role like scrum master, impact on the team performance is more. When a team member is replaced, if the new person joining the team has more experience, it positively impacts the team performance. Vice versa is true as well. |

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| | much he knows agile, experience in similar projects, and capability to understand the team, it can improve the performance. Otherwise, it would be damaging to the performance of the team.<br><br>Once a scrum master went on leave, a new scrum master is assigned temporally but continued as permanent in the team. The new scrum master know the agile and how to run the project, he made life easy for the entire team and made significant contribution in the teams performance.<br><br>After 6 months, scrum master left the company, and the replacement could not help the team much. There could be communication problem or technical understanding problem. It impacted the team.<br><br>It is clear that when a person is changed in the team, it impacts the team performance. | Not found 2 or more changes of any type (expansion, contraction and replacement ) occurred at once |

**Question 12:** How team composition change influence ASD project team's ability in decision-making?

| ID | Answer | Common Ideas |
|---|---|---|
| 20170819201 | When a team member left the team, team has to re-evaluate the existing work and get more help and re-adjust the tasks, work deliverables and expectations.<br><br>When team members joined, it affected the team's ability to take decision. At the same time, it affected the outcome of the decisions itself, as now point of view of new people are also added in these decisions.<br><br>Business representative are part of the agile team in the form of Product Owner. There could be multiple people in this role under one team. When we have right people, with right knowledge of the business and requirements, it impacts positively in the team and project can deliver more and better quality products. Hence, the right skilled people in the team impacts the ability of the team to make better decisions. | When a team member left the team, work re-evaluation, task re-adjustment and expectation re-setting happens. These factors impact team's ability in decision-making.<br><br>When a new person joins the team, it impacts the team's ability in decision-making where point of view of new person has to be added.<br><br>People in the team with the right and required skills impacts positively the team's ability in decision-making. |
| 20170909202 | Team composition change is key factor which can impact consensus making and direction of the team. | When a team member left the team, and team balance (skilled non-skilled ratio, |

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| | A person with critical knowledge and skills who helps in making the direction of the team, even though team decision is consensus based, such person does have a strong input and influence. If composition is changed and that influencer is replaced, it impacts the overall decision making ability of the team.<br><br>Teams are made balance with senior and junior level members.<br>When a new person is added into the team, if new person is senior level or manager level, it will not help the team as it become one direction and team is not comfortable in front of managerial positions.<br><br>If a person is removed from the team, and balance of the team is disturbed, then it impacts the teams ability. As long balance in the team is not disturbed, impact of changes are limited.<br><br>Team composition is key factor where changes in the team composition can impact the entire direction of the team. | experienced, non-experienced ratio etc) is disturbed, it negatively impacts the team's ability in decision-making.<br><br>When a new person joins the team, with a senior/managerial position, it creates one direction decision-making where team's ability in decision-making is impacted and team members do not feel comfortable to take initiatives.<br><br>As long as team balance (skilled non-skilled ratio, experienced, non-experienced ratio etc) is not disturbed, impact of the team composition change on the team's ability in decision-making is limited.<br><br>Impact of Team composition change on the team's ability in decision-making has the |

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| | | potential to change the entire direction of the project.<br><br>People in the team with the right and required skills impacts positively the team's ability in decision-making. |
| 20170917203 | When a person added into the team, first is to make them acquainted to the culture. Those people may not be able to help or add any value in the team decision making in the beginning. It does impact the capacity of team ability to make such decisions.<br><br>When someone is removed from the team, it largely depend on the person who is removed. If it is scrum master, it is hard to get the same level of decision-making how to move next and what we can do next. It is directly impacting the ability of the team decision making. | When a team member left the team, its role and position in the team determines the impact on the team's ability in decision-making. A person with Scrum Master role can impact high because this role is driving the decision making process in the team.<br><br>When a new person joins the team, it impacts the team's ability in decision-making where the new member take time to be acquainted to the culture and norms. |

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| | Team composition change does impact the team ability of decision making. Replacement and new member adding is similar where it is required to give them time to adopt and be part of the team. Until the added persons are mingled and become part of the team, overall ability is impacted, where decisions are delayed or take longer time to make. It is also important to stay away from the conflicts. | It slow down the team decision-making process. |
| 20171013204 | Yes changes are impacting the team decision making.<br><br>The impact is depending on the person and the role. If a project manager or product owner changed it impacts on the quality and level of the decisions.<br><br>A more experienced person when leaves the project, it impacts the decision ability where teams does not have much options and insight of decision impacts. | When a team member left the team, its role and position in the team determines the impact on the team's ability in decision-making. A person with Scrum Master role can impact high because this role is driving the decision making process in the team.<br><br>When a team member left the team, the time of this change in the team determines the impact on the team's ability in decision-making. A person changed at the critical |

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| | Also time of the change is important, of some one leaves when project is in critical stage, the impact can be more. | stage of the project has high impact on the team's ability in decision-making.<br><br>People in the team with the right and required skills impacts positively the team's ability in decision-making. |
| 20171017205 | Whenever a core team member is changed/replaced or prioritize for other work, Team itself cannot make the decisions in the absence of that person and affect the ability of decision making significantly.<br><br>When manager level person is available and involved with the team, it is positive impact on the team decision making ability as decision accountable person is part of the team.<br>When a person was on leave, manager of the person was replaced, however, manager does not have enough bandwidth to work with the team. Which impact the ability of the team to make decision which affected the project deliverables. | When a team member left the team, its role and position in the team determines the impact on the team's ability in decision-making. A person with Scrum Master role can impact high because this role is driving the decision making process in the team.<br><br>When decision-making and decision-support roles are shifted from one person to the other, within the project team, it can |

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| | When decision making is shifted from one person to the other person in the team, it can have positive or negative impact in the overall ability of the team to make the decisions.<br><br>Personal ego is one of the issue which impacts the decision making process in the team. When decision making is shifted from the person who was writing the requirements to the person who do not have the ego attached to the requirements, team can make better decisions. | have positive or negative impact on the overall team's ability in decision-making. |
| 20171019206 | A typical way is in the implementation stage, after each iteration, we analyse the burn down chart. We take decision based on the past data how team performed, velocity and workload. If more work is assigned and unable to deliver, we make adjustments to have a better performance.<br><br>If you add people with good domain and technical knowledge, it benefits the team ability to make the decisions. | Team composition changes are managed when one set of tasks are completed. Hence limited impact of any team member change on the ability of the decision-making<br><br>People in the team with the right and required skills impacts positively the team's ability in decision-making. |

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| | Team needs to adjust as per the new situation to have a batter team decision making.<br><br>Standard sprint is two weeks, and a team performance is normally assessed in two sprints to adjust the speed.<br><br>Communication is the key in the team. Miscommunication is challenge and created collaboration issues as well.<br><br>Agile is an ongoing improvement process. | |
| 20171020207 | This project had no changes, hence no impact.<br><br>If people are together in the beginning they go together in the team development stages and they have understating and bonding. A new person joining later, will not be able to the same level and have to take his place in the team. It will impact the team. | This project has seen no changes in the entire project.<br><br>People have more focus than the process in agile projects. |

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| | One way is to have the interview of new person with the entire team where he/she can spend considerable time with the team. , which can help to reduce the impact of change. Team become the part of hiring decision and make themselves ready to take a new person on-board and helps to minimize any issues.<br><br>People have more focus than the process. | |
| 20171025208 | Impact on the team decision making is negative when a replacement of a team member happens.<br><br>When a senior person left the team, it impacts the overall team decision making where senior person was able to provide more options, suggestions to consider more factors before taking a decision. In absence of key, senior person have a significant impact on the ability of the team to take the decisions.<br><br>Decision making process slows when there is a change in the team.<br>These is no case seen where decision making process time is improved due the change in the team composition | When a team member left the team, its role and position in the team determines the impact on the team's ability in decision-making. A person with a senior position/role can impact high because this senior position/role provides options and insight details to help team making the decision.<br><br>Whenever there is a change in the team composition, it slows down the Decision |

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| | Leaving good and experienced people form the team and from the company are costing revenue generating projects and impacts direct company profits. | making process. There is no case found where a change improves the decision making process pace.<br><br>People in the team with the right and required skills impacts positively the team's ability in decision-making. |
| 20171101209 | When we had a situation of a priority change, team called a meeting and discussed the situation. Possible options were discussed and executed. Based on the decision of all the team members were to assign one person from this project to the requested project and do not have a replacement.<br>It was due to the fact that developer who will be assigned to the other project does have sound skills and knowledge, he can come back after couple of months. | When a new person joins the team, it impacts the team's ability in decision-making where decision-making process slows down. |

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| | Adding a new person in this project cause team performance issues. | |
| 20171105210 | Teams ability to make the decision, when a main contributor is leaving, it is impacting the team ability of decision making, team is depending heavily on the person. Team was demotivated and could not take the decision independently, or felt, they cannot take the decision independently.<br>Balance in the team is disturbed, new person, even is as good take some time to adjust in the team<br><br>QA team person change had a negative impact on the ability of team decision making, afraid that a team member is replaced due to the performance and team members got defensive and slowed in the ability of making the calls<br><br>New person shared his experience and gave more to the team in terms of a different perspective, which helped team to able improved. | When a team member left the team, its role and position in the team determines the impact on the team's ability in decision-making. A person with a senior position/role can impact high because this senior position/role provides options and insight details to help team making the decision.<br><br>As long as team balance (skilled non-skilled ratio, experienced, non-experienced ratio etc) is not disturbed, impact of the team composition change on the team's ability in decision-making is limited. |

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| | | People in the team with the right and required skills impacts positively the team's ability in decision-making. |
| 20171111211 | Individuals feel autonomy, feel they are responsible, but when between the phase changes, and team is changed, they go for a defensive mode and that applies to their decision making. They just want to do the minimal and not taking broader decisions.<br>When team is changed, defensive mode is observed.<br><br>If someone joins who is more open-minded agile practitioner and more experienced can help the team to be more open and being more agile. That | Whenever there is a change in the team composition, it slows down the Decision making process. People go defensive and do the minimal engagement in the decision-making without taking any broader decisions. |

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| | situation can help to improve the team decision making. However, pressure of delivery and responsibility in the project, people will inclined to go defensive.<br><br>When team composition change in any project, it takes team into a defensive mode which directly impacts the ability of team decision making<br><br>Age of the company is a vital role in the agile methodology implementation. More aged (experienced in the field) company would have senior and experienced employees and young company would have young employees. Young people have tendency of adopting change rather than old people. | People in the team with the right and required skills impacts positively the team's ability in decision-making.<br><br>When a team member changed in the team, company age (field experience and time in the market) determines the impact on the team's ability in decision-making. A company with a long history has senior level employees. Those employees do resist the change. A relatively new company has young employees, who are ready to change. Hence, impact on the ability of decision-making is high for the first type of companies. |
| 20171112212 | Task distribution is responsibility of team lead, if team lead is capable of team management, can make team life easy. Which eventually impacts their ability to make decisions and performance. | When a team member left the team, its role and position in the team determines the impact on the team's ability in decision-making. A person with Scrum Master role |

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| | When the scrum master changed, there was a communication gap with the team and the management. It took time to understand and project is depending on other projects and tasks. The change impacts the ability of the team to work in that fashion.<br><br>If a developer, a good experienced developer leaves, the ability of the decision making of the team impacts as new person can not take the decision on the areas which he/she needs to understand first.<br><br>Agile projects are good when project is short in duration, however, when agile projects run for 2 years or so, it can not produce the required outcome. | can impact high because this role is driving the decision making process in the team.<br><br>People in the team with the right and required skills impacts positively the team's ability in decision-making. |

# Appendix M – Stage-3 Data Analysis – Findings

In this section, responses to the questions are further analysed for statements and finalizing the patterns and variations.

**Question 5:** Could you please tell me about the governance process and structure in place?

<table>
<tr><th>ID</th><th>Answer</th><th>Statements</th><th>Findings</th></tr>
<tr><td rowspan="2">20170819201</td><td rowspan="2">In the organization, multiple projects are running parallel, where outside companies are also involve. Hence, governance procedure are in place, however, may be implemented for different projects defiantly.<br>Various processes and procedure are used for internal jobs including new request generation, managing internal decision making process and applications. Regular</td><td>Governance procedures are in place and vary from project to project.<br><br>No established PMO</td><td>
<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Governance process and procedures are in-place</td><td>Governance procedures are in place and vary from project to project.</td></tr>
<tr><td>No established PMO</td><td>No established PMO</td></tr>
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<table>
<tr><td></td><td>meetings are in place for status update, progress reporting and issues management.<br>Company is small in size, do not have an establish PMO or structured procedure for managing and running of the projects. Client does have established PMO.</td><td></td><td></td></tr>
<tr><td>20170909202</td><td>Projects are under the Programs and governance structure is at program levels covers deliverables of all the projects where numbers of groups are involved. Program governance structure comprises senior management from IT, business and other stakeholders.<br>Project manager is responsible for the project and its deliverables.<br>PMO: There is no established PMO</td><td>Governance structure is at program level<br><br>No established PMO</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Governance process and procedures are in-place</td><td>Governance structure is at Program level</td></tr><tr><td>No established PMO</td><td>No established PMO</td></tr></table></td></tr>
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<tr><td></td><td>There is an established structure with documented guidelines and process at Program level.</td><td></td><td></td></tr>
<tr><td>20170917203</td><td>Governance structure is in place at organization level. The components are stakeholder engagement, defined expectations, defined timelines with enforced regulatory requirements, and an establish structure to execute, report and control the project.<br>PMO: Project to project base governance, no established PMO<br>Director level management layer looking after the project to ensure customer satisfactions and there is no hierarchy in between the business and the project teams.</td><td>Governance structure is in place at organization level<br><br>No established PMO<br><br>No hierarchy structure between project and business</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Governance process and procedures are in-place</td><td>Governance structure is in place at organization level<br><br>No hierarchy structure between project and business</td></tr><tr><td>No established PMO</td><td>No established PMO</td></tr></table></td></tr>
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<tr>
<td>20171013204</td>
<td>Organization commences a project after the contract with client is signed-off. A kick-off meeting is held with a project charter. Team formation, roles and responsibilities of project team, business and other stakeholder are defined in the project charter.<br>Milestones and deliverables are also part of the project charter.<br>Project manager is directly reporting to GM. We had a steering committee looking after the projects. Reports are biweekly. After two months client is visited for reports, updates and feedback.<br>PMO: There is no established PMO. People are performing their job as per their assigned roles.</td>
<td>Governance structure is in place at project level<br><br>No established PMO</td>
<td>
<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Governance process and procedures are in-place</td><td>Governance structure is in place at project level</td></tr>
<tr><td>No established PMO</td><td>No established PMO</td></tr>
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<tr>
<td>20171017205</td>
<td>Scrum is standard method used and scrum ceremonies are performed. Tools including scrum board and JIRA are used for project execution.<br>An established PMO is in place. Project manager is assigned to each project through PMO. PMO has set rules and established documents and process. PMO manages at a high level and detail level plans are made by the project teams. Agile project have its own documentation.<br>PMO is more on the strategic level and detail level planning and execution is at the project level.<br>Agile project is not having hard guidelines or not strictly under the PMO, more flexibility in terms of project governance is given to the agile projects.</td>
<td>Governance structure is in place for the projects<br><br>PMO is established and functional<br><br>PMO is at strategic level and planning execution is at project level<br><br>More flexibility in project governance for Agile projects</td>
<td>
<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Governance process and procedures are in-place</td><td>Governance structure is in place for the projects<br><br>More flexibility in project governance for Agile projects</td></tr>
<tr><td>An established PMO</td><td>An established PMO is in place<br><br>PMO is at strategic level and planning execution is at project level</td></tr>
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<tr>
<td>20171019206</td>
<td>Agile team is reporting to PM who is reporting to PO. Funding comes from PO. Each PM reports to project director.<br>Strong PMO is in place, providing explicit responsibility to each role assignment and procedural documents.<br>General broadcast to all agile teams to ensure alignment of all teams to their projects and deliverables without any overlapping.<br>First is the kick-off meeting and after that is collaboration meetings to keep everyone up to date.</td>
<td>Governance structure is in place for the projects<br><br>A strong PMO is in place</td>
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<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Governance process and procedures are in-place</td><td>Governance structure is in place for the projects</td></tr>
<tr><td>An established PMO</td><td>A strong PMO is in place</td></tr>
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<tr>
<td>20171020207</td>
<td>Development guideline, processes, procedures are established by the contribution of various stakeholders to form the governance structure in the organization. As teams are distributed in</td>
<td>Governance structure is in place at organization level<br><br>Governance structure is flexible due to</td>
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<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Governance process and procedures are in-place</td><td>Governance structure is in place at organization level</td></tr>
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<td>the geographical regions, such structure is flexible.<br>PMO: PMO does exist in the enterprise level, but is not effective for the candidate project. PMO was managing projects in the rest of the organization, however, the structure is flexible enough only the areas where strict governance is required, it is followed. In the particular area where the candidate project in this research is executed, such structure was not used.</td>
<td>geographical distributed teams<br>PMO is established with selective execution</td>
<td>
<table>
<tr><td></td><td>Governance structure is flexible due to geographical distributed teams</td></tr>
<tr><td>An established PMO</td><td>PMO is established with selective execution</td></tr>
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</tr>
<tr>
<td>20171025208</td>
<td>Development teams have members from with various departments, skills, experience levels and technical backgrounds.<br>JIRA is used for all project level details, including requirements, team and work assignments.</td>
<td>Governance processes exists at project level<br><br>PMO is making the decision of projects and their prioritization.</td>
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<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Governance process and procedures are in-place</td><td>Governance processes exists at project level</td></tr>
<tr><td>An established PMO</td><td>PMO is making the decision of projects</td></tr>
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| | Software development life cycle is followed, requirement, design, development, testing, deployment in agile fashion.<br>PMO is making the decision of projects and their prioritization. They also assign project managers to each project. PMO also prioritize the activities and team is delivering as per direction with documentation.<br>Business is providing details level tasks and their requirements and PMO do the prioritization.<br>PMO is balance and prioritize the work based on the projects, task types, business needs and available resources. Teams commence their work, if they have any issues or gaps, teams provide feedback to PMO, who makes priority calls. It also | | and their prioritization. |

<table>
<tr><td></td><td>depends on the bandwidth of individuals and teams to make the priority calls.</td><td></td><td></td></tr>
<tr><td>20171101209</td><td>The organization does have the defined processes to run the projects. There are approval processes for the project and changes and projects have to follow it.<br>Process are used based on the changes, major changes need to be documented in a pre defined processed.<br>No structured PMO is in place, an ad hoc process in place to monitor the project performance.</td><td>Governance and execution vary from project to project under a defined structure<br><br>No established PMO</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Governance process and procedures are in-place</td><td>Governance structure is in place at organization level<br><br>No hierarchy structure between project and business</td></tr><tr><td>No established PMO</td><td>No established PMO</td></tr></table></td></tr>
<tr><td>20171105210</td><td>In the organization, there are no written formal processes for running the project.</td><td>No written form processes for running the projects</td><td><table><tr><th>Pattern</th><th>Variation</th></tr></table></td></tr>
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| | Informal processes are used to split the project into phases and release. It was more in the minds of the people who were running the projects to use various rules and steps to run the project.<br>No documentation is available for any kind to execute the projects.<br>Company does have a PMO. An appointed project director, who was also assuming the CTO role, responsible for reviewing the weekly and monthly project reports or all the project, including waterfall and agile project.<br>There is no steering committee, no structure, or formal process in place. Project director was managing the governance responsibilities, single-handed. | Company does have a PMO<br><br>No steering committee, no structure or formal process in place. | Governance process and procedures are not established | No written form processes for running the projects<br><br>No documentation is available for any kind to execute the projects |
| | | | PMO exist but not functional | Company does have a PMO<br><br>No steering committee, no structure or formal process in place. |

<table>
<tr><td></td><td>Project managers provide the project updates (time, cost, quality), their tasks and assignments, iteration reports and requirement changes where they may need to stop the iteration. More ad hoc based meetings and updates.</td><td></td><td></td></tr>
<tr><td>20171111211</td><td>The organization has a PPMO that governs the projects. In the enterprise organization, using legacy systems like mainframe systems, some projects are discretionary projects, which are not agile. Other projects like CRM projects, AEM projects are agile, and other are hybrid. So in the organization, waterfall, agile and hybrid approaches are used. From governance point of view, it is different and from</td><td>Governance processes does exist and implemented differently for technical and agile projects.<br><br>PMO is established and using a structured environment.</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Governance process and procedures are in-place</td><td>Governance processes does exist and implemented differently for technical and agile projects.</td></tr><tr><td>An established PMO</td><td>PMO is established and using a structured environment.</td></tr></table></td></tr>
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| | technical delivery point of view projects are agile.<br><br>PPMO is using a very structured environment. From the inception to delivery, formal processes exist to categorize the project, rating the project and taking decision for design and delivery. All processes are documented, communicated and all projects are directed to use the formal process. All projects knows to follow these steps/ processes.<br>Kick-off, acceptance and approvals of the project is different, once it is approved, a project manager is assigned, then it is agile and executed as agile. Before the project commence, everything is formal and directed to use certain steps to perform by all projects. | | |

<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>20171112212</td><td>The company has a big team, specialized IT department, everything is formally processed, and business has information of what is going on.<br>The company has different departments and these departments may have different work and different requirements, and the each department is responsible to get their approvals from their management and get the budget for those projects and had a large release meeting where these departments were presenting their requirements and projects for approvals.<br>There is an IT team looking after complete agile train in different releases in different cycles.<br>PMO office is established.</td><td>Governance processes are formally implemented according to department needs.<br><br>PMO is established</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Governance process and procedures are in-place</td><td>Governance processes are formally implemented according to department needs.</td></tr><tr><td>An established PMO</td><td>PMO is established</td></tr></table></td></tr>
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| | The company is using vendor, half are local vendors and half are offshore vendors. A release planning meeting, after every release is scheduled and performed where planned piece of software (work) is presenting and each team was able to pick up the module (work) for the next release. It is governed from the top; however, teams are able to take (chose) the work for next release. | | |
| | | | |

**Question 6:** Can you tell me about the agile trainings or formal courses offered in the organization?

<table>
<tr><th>ID</th><th>Answer</th><th>Common Ideas</th><th colspan="2">Findings</th></tr>
<tr><td rowspan="3">20170819201</td><td rowspan="3">No, Company is not providing any formal or informal training for Agile development.<br>Company do encourage personal efforts and capabilities building by the individuals, no monitory benefits are offered.</td><td rowspan="3">No agile training provided by the organization<br><br>Company do encourage personal efforts and capabilities building, however, no monitory benefits are offered</td><td>Pattern</td><td>Variation</td></tr>
<tr><td>Agile training is not provided</td><td>No agile training is provided by the organization</td></tr>
<tr><td>Personal and individual growth is encouraged</td><td>Company do encourage personal efforts and capabilities building, however, no monitory benefits are offered</td></tr>
</table>

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<tr>
<td>20170909202</td>
<td>Organization offers one week hands on agile developer course.<br>Course was provided to all the employees but it was not a mandatory course<br>Course was run by independent division in the organization and it was for all the teams and groups. It was hands on where project bases learning and training is provided which is highly regarded by the employees.</td>
<td>Organization is providing specific agile training, however, it is not mandatory</td>
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<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Agile training is provided</td><td>Organization is providing specific agile training, however, it is not mandatory</td></tr>
<tr><td></td><td></td></tr>
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<tr>
<td>20170917203</td>
<td>Organization does offer multiple courses including Scrum, Kanban and SAFE<br>At the team level, everyone took the courses, and team also took other courses from third party trainings.</td>
<td>Organization provided specific agile training</td>
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<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Agile training is provided</td><td>Organization is providing specific agile training</td></tr>
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<tr>
<td>20171013204</td>
<td>There was no agile training offered from the company.</td>
<td>No agile training is provided by the organization</td>
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<tr><th>Pattern</th><th>Variation</th></tr>
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<td>Team members also did not have any formal training for agile, their knowledge is based on their course work.<br>Few other course offered by the company are not mandatory for the teams.</td>
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<tr><td>Agile training is not provided</td><td>No agile training is provided by the organization</td></tr>
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<tr>
<td>20171017205</td>
<td>Company does provide one off training through 3rd party organization. Training was for all the IT staff but not mandatory. Training is not ongoing for the agile teams.<br>Members of agile team took trainings and certification by their own, no support for the certifications are provided from the company.</td>
<td>Organization is providing specific agile training, however, it is not mandatory<br><br>Members of the agile team took trainings and certification by their own, no support is provided by the company</td>
<td>
<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Agile training is provided</td><td>Organization is providing specific agile training, however, it is not mandatory</td></tr>
<tr><td>Personal and individual growth is not encouraged</td><td>Members of the agile team took trainings and certification by their own, no support is provided by the company</td></tr>
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<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>20171019206</td><td>SAFE (Saleable Agile Framework) training provided to all the employees with an exam to ensure everyone is qualified.<br>Training is provided to all the employees<br>2 to 4 days extensive training</td><td>Organization provides specific agile training, mandatory with exam</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Agile training is provided</td><td>Organization provides specific agile training, mandatory with exam</td></tr><tr><td></td><td></td></tr></table></td></tr>
<tr><td>20171020207</td><td>Organization does offer training through in house training department. The training department is providing training as product to customers, at the same time, these courses are offered to the internal resources. Teams does have agile / scrum certified members. Team members have trainings and certifications from various organizations and different part of the world.</td><td>No agile training is provided by the organization<br><br>Most of the agile team does have formal trainings and certifications. Company does not have a career building plan for employees.</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Agile training is not provided</td><td>No agile training is provided by the organization</td></tr><tr><td>Personal and individual growth is not encouraged</td><td>Most of the agile team does have formal trainings and certifications.<br>Company does not</td></tr></table></td></tr>
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<td>Trainings are delivered as per need, and there is no career building plan for employees. People may choose trainings from different areas and organization as they feel appropriate.<br>No targeted oriented and specific trainings offer for agile.<br>As people in agile team are experienced and most of them have the trainings or certifications, there was no pressing need for a training regime.</td>
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<tr><td></td><td>have a career building plan for employees.</td></tr>
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<td>20171025208</td>
<td>Company organized a workshop, where teams got the agile exposure. Prior to that all teams were working as waterfall.<br>Workshop was for all employees, permanent and contractors in the IT.<br>It was ongoing training, where follow-up sessions were conducted where teams agile</td>
<td>Organization provided specific agile training, mandatory for IT teams<br><br>Organization also encourage team members for personal growth</td>
<td>
<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Agile training is provided</td><td>Organization provided specific agile training, mandatory for IT teams</td></tr>
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| | adoptions assesses and provided further coaching.<br>In the training program, people from various areas are combined in one groups and assigned hands on tasks for agile experience.<br>In the beginning of the agile journey, training is provided.<br>People got certifications by their own which helped individuals as well as project teams.<br>Company did not offer any training or coaching for the certifications, however, company reimbursed the cost of certifications to individuals to promote this trend. | | Personal and individual growth is encouraged | Organization also encourage team members for personal growth |

<table>
<tr>
<td>20171101209</td>
<td>There are various trainings offered in the organization, agile training is also part of offered trainings in the organization<br>Agile training is provided to the people who have role to participate in the agile project<br>Particular agile training is provided time to time and keep updating the trainings</td>
<td>Organization provided specific agile training to agile project teams only</td>
<td>
<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Agile training is provided</td><td>Organization provided specific agile training to agile project teams only</td></tr>
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<tr>
<td>20171105210</td>
<td>The organization does not offer any trainings for agile or any other training.<br>Company hired experienced managers who does have knowledge and have experience in the project management<br>Agile team members help each other, no formal trainings for agile<br>Employees did their own training, technical trainings (Microsoft or cloud training), no support is provided by the company</td>
<td>No agile training is provided by the organization<br><br>Agile team members help each other, no support is provided by the company</td>
<td>
<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Agile training is not provided</td><td>No agile training is provided by the organization</td></tr>
<tr><td>Personal and individual growth is not encouraged</td><td>Agile team members help each other, no support is provided by the company</td></tr>
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<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>20171111211</td><td>At organization level, in house trainings are delivered through approved practitioners. Members from various areas attended those trainings. Before the agile concept introduced in the company, agile trainings are delivered and rolled out in a phased manner.<br>Training was available for all the staff, however, only the people in the large projects and agile impacts took the trainings.<br>Training was particular agile training and whole project team attended. From IT point of view, most of the people took that training. From business point of view, it was important for them and business was also trained. It was to provide enough</td><td>Organization provided specific agile training to IT and business, however, only people in the large projects and agile impacts took the training.</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Agile training is provided</td><td>Organization provided specific agile training to IT and business, however, only people in the large projects and agile impacts took the training.</td></tr><tr><td></td><td></td></tr></table></td></tr>
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<tr><td></td><td>understanding to a non-technical person or businessperson about agile and how it works.<br>Company provided enough training to the people in the company to get them ready for agile shift</td><td></td><td></td></tr>
<tr><td>20171112212</td><td>The company provided training, SAFE training (saleable agile framework training)<br>Training is for all the people in the agile project including project manager, scrum master, developers, business analyst, tester, product owner<br>The training was one off for the project team<br>Company does not offer any other training for agile or team building</td><td>Organization provides specific agile training for agile project team only</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Agile training is provided</td><td>Organization provides specific agile training for agile project team only</td></tr><tr><td></td><td></td></tr></table></td></tr>
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**Question 7:** How do you describe the process of agile team development in your organization?

<table>
<tr><th>ID</th><th>Answer</th><th>Common Ideas</th><th>Findings</th></tr>
<tr>
<td>20170819201</td>
<td>The team is established based on the project requirements and required skills. People are nominated in the team with the assigned roles, based on required skills and business requirements. Roles and responsibilities of individuals are further defined / clarified in the kick-off meeting. These assigned roles and responsibilities are regularly assessed through weekly meetings as per the communication strategy.<br>Teams are frequently going out for social gathering. These gatherings could be personal or professional. Tams are working from multiple locations, hence not possible for the entire team to gather for social</td>
<td>Company does not provide any formal or informal setup for team building<br><br>Personal and team level informal events and social gathering does exist<br><br>FSNP: Team development stages are not recognized at the organization level.</td>
<td>
<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Team building process does not exist</td><td>Company does not provide any formal or informal setup for team building</td></tr>
<tr><td>At organization level, team development stages (FSNP) are not recognized</td><td>Team development stages are not recognized at the organization level.</td></tr>
<tr><td>Individual team level bonding does exist</td><td>Personal and team level informal events and social gathering does exist</td></tr>
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| | events. Company support for such gathering is limited.<br>There is no team building structure, company is not providing any formal or informal setup for team building. Rather it is a rigid assignment of tasks/roles to the people.<br>FSNP: Team development staged are not recognized at company level. On a personal level, project managers does have the understanding of team development stages, however, they are not using it for team building. Business model is product development where everyone is working on a single product, hence, teams are not changing or formed for new projects.<br>Team building happened gradually as company have only one product. As requirements increased, more skilled | | |

<table>
<tr><td></td><td>people are required and added into the team. It is not dynamic where teams are formed and dissolved frequently based on project needs.</td><td></td><td></td></tr>
<tr><td>20170909202</td><td>There is no formal process of team development in place.<br>It’s a top down approach where existing experienced people are providing coaching to the new joiners<br>It is all developer centric organization and it is a long journey for the developers to learn and adjust in the projects and work.<br>There are team run activities for bonding and team building. These activities helped the members of the team to overcome any negative behaviours.<br>FSNP: Team development stages are not observed.</td><td>No formal process of team development is in place<br><br>Team level activities does exist for bonding and team building<br><br>FSNP: Team development stages are not recognized at the organization level.</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Team building process does not exist</td><td>No formal process of team development is in place</td></tr><tr><td>At organization level, team development stages (FSNP) are not recognized</td><td>Team development stages are not recognized at the organization level.</td></tr><tr><td>Individual team level bonding does exist</td><td>Team level activities does exist for bonding and team building</td></tr></table></td></tr>
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<tr><td></td><td>Agile adoption was different at different projects. Few project had clear roles and tasks assigned as per roles, while other have removed the boundaries of role based task assignment and team become one unit where any one can take any task and help each other.</td><td></td><td colspan="2"></td></tr>
<tr><td>20170917203</td><td>To have the people together, and share the vision of working model. This helps team to commence work together. Keeping the expectation clear is helping for team building; it also covers expectation from each other. How you would like to be treated, what you like, how you will be happy and how it can be improved.<br>Enforce the culture of mutual respect, pear programing, working and helping each</td><td>Team development process or structure is missing in the organization<br><br>Enforced culture of mutual respect to help team members communicate and respect each other</td><td>
<table>
<tr><td>Pattern</td><td>Variation</td></tr>
<tr><td>Team building process does not exist</td><td>Team development process or structure is missing in the organization</td></tr>
<tr><td>At organization level, team development stages (FSNP) are not recognized</td><td>Team development stages are not recognized at the organization level.</td></tr>
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<td>other, openly communicate, and acts of motivation.<br>Informal structure to help teams to adopt the agile practices. Might be few members are more independent and can help others.<br>There are sessions where they self-discover what is required and what changes they need. It helps them more to be working with each other.<br>FSNP: Such stages are not considered for team development.</td>
<td>FSNP: Team development stages are not recognized at the organization level.</td>
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<tr><td>Individual team level bonding does exist</td><td>Team level activities does exist for bonding and team building</td></tr>
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<tr>
<td>20171013204</td>
<td>Open communication among the team members, one manager and everyone is at the same level. Even senior level people are working in the team like a team member.<br>Team is regularly going out for lunch and outside office meetups. Teams are frank with each other.</td>
<td>No formal or informal process of team building<br><br>Personal and team level informal events exist</td>
<td>
<table>
<tr><td>Pattern</td><td>Variation</td></tr>
<tr><td>Team building process does not exist</td><td>No formal or informal process of team building</td></tr>
<tr><td>At organization level, team development</td><td>Team development stages are not</td></tr>
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<td>Project team size varies from 2 to 5 people. Team size changes as well based on the availability.<br>Project are categorize in three areas, normal, semi-complex and complex. Each project type have different number of people.<br>FSNP: There is no team development stages are observed.<br>People are assigned roles, teams are rigidly assigned to the work and they are working accordingly.<br>Overall team culture is very open and helping to each other, there are no boundaries which can stop people to help each other.</td>
<td>FSNP: Team development stages are not recognized at the organization level.</td>
<td>
<table>
<tr><td>stages (FSNP) are not recognized</td><td>recognized at the organization level.</td></tr>
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<tr>
<td>20171017205</td>
<td>Company does not have formal process of team development</td>
<td>No formal or informal process of team building</td>
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| | Managers are assuming this responsibility and do schedule team bonding activities like team lunch and gathering outside the office.<br>Company do organize sessions of team bonding meetings / events / town hall gatherings. Some events are half day events for team building activities.<br>FSNP: There is no recognition of team development stages.<br>Individual team leads manager conduct team development events and may be aware and using development stages.<br>Managers are guiding the team members for processes, procedures, norms and how to perform in the teams. No formal structure or stages are followed. | Organization do organize events to help team bonding<br><br>FSNP: Team development stages are not recognized in the organization | Team building process does not exist | No formal or informal process of team building |
| | | | Company organize events for team bonding | Organization do organize events to help team bonding |
| | | | At organization level, team development stages (FSNP) are not recognized | Team development stages are not recognized at the organization level. |

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<tr>
<td>20171019206</td>
<td>A formal process is used for team building.<br>Once project is fully funded and approved, people are assigned the particular roles in the project. All team up to commence the work. At the beginning, Scrum master or project manager organizes a formal gathering and later is informal get to gathers. Team also go out for lunches to mingle with each other<br>FSNP: An understanding of the team development stages does exist at personal level<br>Different people have different styles and personality. Team collaboration happens naturally within the team members.<br>Team may have leaning curve in the SAFE structure. Otherwise, they smoothly work together</td>
<td>Formal process of team development exist<br><br>FSNP: At person level, team development stages are understood and recognized</td>
<td>
<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Team building process does exist</td><td>Formal process of team development exist</td></tr>
<tr><td>Team development stages (FSNP) are recognized at personal level</td><td>At person level, team development stages are understood and recognized</td></tr>
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<tr>
<td>20171020207</td>
<td>Soft skills are more focused to have team motivated and up for taking challenges. Improved communication helps team bonding and reduces the gap among the people. Team building even started from the hiring, the culture, background and purpose of the team is considered to find the commonalities among the candidates for potential members. It helps to reduce the gaps among the team members where they have more commonalties rather differences. Bonding and tolerance is more in he members in such cases.<br>Also teams are observed and people may have shuffled to make a balanced team which can be more productive.<br>Once right combinations are developed, team members works very well in the team and performed the desired results.</td>
<td>Team building process is managed through hiring people who can fit in the organizational culture and later balanced as per there best fit.<br><br>FSNP: Team development stages are recognized</td>
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<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Team building process does exist</td><td>Team building process is managed through hiring people who can fit in the organizational culture and later balanced as per there best fit.</td></tr>
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<tr><td></td><td>Also teams are motivated by rewards where team achievement attracts overseas trips.<br>FSNP: Team development stages are recognized.<br>When team went through these stages, teams are working well. Those teams who have gone through the process, they have developed interpersonal understating and focus more on the problem solving rather then their personal differences.<br>If team went through these stages, it also helps individual team members to find courage to accept the mistakes, as they feel comfortable in the team.</td><td></td><td></td></tr>
<tr><td>20171025208</td><td>Each Team is a combination of senior and junior level people. It is expected that whoever joins the team is able to adopt and</td><td>Organization recognizes and support team building activities</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Team building process does exist</td><td>Organization recognizes and</td></tr></table></td></tr>
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| | perform. It is very important to have team bonding, and a healthy relationship within team members. Especially in agile, it is not only the developers; each individual in the team has to be work closely with each other.<br>Technical teams are working with business, BA, Operations, QA and other areas in the company. Positive environment where teams are communicating, helping and supporting each other is actually making a difference in the project.<br>Every two weeks, team are going for lunch together, outside the office. Company also sponsor and arrange project parties.<br>Company also facilitated team bonding sessions/trainings. Where different methods are used including situation based learning, feedback based learning. | FSNP: Team development stages are recognized | | support team building activities |
| | | | At organization level, team development stages (FSNP) are recognized | Team development stages are recognized |

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<tr><td></td><td>FSNF: Team also observed the forming, storming, norming and performing stages. Each team goes into such cycles in the project.</td><td></td><td></td></tr>
<tr><td>20171101209</td><td>Company follows the skill sets and experience of the team and nature of the project for the assignment to the projects.<br>Organization does have events for team to know each other in informal sessions.<br>To build a strong team, team-building activities are performed.<br>When we discussed with each other, we get to know who want to work on which part. Based on these attentions, people are assigned the roles.<br>FSNF: team building stages are not recognized</td><td>Organization recognizes and support team building activities<br><br>FSNP: Team development stages are not recognized at the organization level.</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Team building process does exist</td><td>Organization recognizes and support team building activities</td></tr><tr><td>At organization level, team development stages (FSNP) are not recognized</td><td>Team development stages are not recognized at the organization level.</td></tr></table></td></tr>
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<tr><td>20171105210</td><td>Two type of teams, one is waterfall model, one is agile model. At the time of the hiring, it is decided where the person will go to the various type of teams, based on their skills and abilities. One model is where client requirements are gathered and saved, while development could start in months as per client requirements. The other model is more agile. People are assigned to these models as per their background. Informal training by the manager (at person level) provide the guidance and update to the team members. No formal team development happens.<br>Scrum is very fast passed, understating of the team<br>Team gathering is very important as Scrum is very fast passed, understating of the team</td><td>Organization recognizes and support team building activities<br><br>FSNP: Team development stages are recognized</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Team building process does exist</td><td>Organization recognizes and support team building activities</td></tr><tr><td>At organization level, team development stages (FSNP) are recognized</td><td>Team development stages are recognized</td></tr></table></td></tr>
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| | is important to deliver the work. There could be personality clashes. To avoid any negative aspects, it is important that team is comfortable with each other.<br>After every three days, team lunch, outside the office, personal experience sharing and be comfortable with each other<br>Stand-up meeting also used for engaging team member for collaboration and working together. Managers does mention team members to mingle with each other.<br>Company does know, however is not encouraging in terms of finances. Team managers do such team building activities.<br>FSNF: Team development stages are observed within the team. When you get a new person in the team from a different background. It takes time to adjust with the team; it may have some personal | | |

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<tr><td></td><td>adjustment issues among the team members. Where manages has to deal with these personal team issues. Manager uses major is authority to use the team building and social contract among the teams.<br>First two sprints are norming, (sprint size is 20 to 35 days), sprint size is based on the company requirement.</td><td></td><td></td></tr>
<tr><td>20171111211</td><td>From team development point of view, there was no change, it was like any other project for agile team. People who are required, SMEs, dev, experts, who are required for the project are requested assigned in a same way to the agile project.</td><td>No formal or informal process of team building<br><br>FSNP: Team development stages are not recognized at the organization level.</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Team building process does not exist</td><td>No formal or informal process of team building</td></tr><tr><td>At organization level, team development</td><td>Team development stages are not</td></tr></table></td></tr>
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| | No formal team engagements or team building activities in place from the organization.<br>When external teams are involved, the process of team collaboration and team building activities are performed to know each other.<br>Team development phases, as a normal process does happen, especially when someone new comes into the team.<br>FSNF: No process was in place to facilitate the team building phases. There are formal induction process is in place for new joiners in the company but no such process is in place where team building is focus, either in the company or for a project. | | stages (FSNP) are not recognized / recognized at the organization level. |
| 20171112212 | There was no formal process for team development and team building, teams are | No formal or informal process of team building | **Pattern** / **Variation** |

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| | shuffled after two three cycles. Cases are where developers are from offshore teams and they are on a rotation schedule for two to three months. Due to these rotations, teams were shuffled.<br>Teams are having onshore-offshore model where teams are changed over the time<br>Management informing the people who is working in which team. From 6 to 7 teams, each one is informed by the management in which team they are.<br>Organization did have budget to spend for team building activities. Scrum master takes the team for lunch and team get to gathers, while it is paid by the organization. Frequency of such event is once in a quarter.<br>Mostly such events are paid by the organization. Other events like some is | Organization supports events for team building<br><br>FSNP: Team development stages are not recognized at the organization level. | Team building process does not exist / No formal or informal process of team building<br>Company organize events for team bonding / Organization supports events for team building<br>At organization level, team development stages (FSNP) are not recognized / Team development stages are not recognized at the organization level. |

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| | leaving or joining the team, events are managed and paid by the team members itself.<br>FSNF: Team development stages are not observed. | | |
| | | | |

**Question 11:** Would you be able to share the impact of agile team composition change, with example?

| ID | Responses | Statements | Findings | |
|---|---|---|---|---|
| | | | **Pattern** | **Variation** |
| 20170819201 | When a person is left in the middle of the project, it pose the risk for the entire project of delivery and running of the business. It is a direct impact on the team to deliver the agreed goals. | When a person is left in the middle of the project, it pose the risk for the entire project<br><br>When a person left with a particular skills set, which | Project is negatively impacted when someone leaves the team | When a person leaves the team, in the middle of an in-flight project, it negatively impacts the project. |

| | | | | |
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| | When a person left with a particular skills set, which is required in the team for delivery, it affects the delivery. Such situations are mitigated and risks are managed by having multiple roles with similar skills.<br><br>Such changes also impact if a new person joins, people have to provide help and support and may not be able to deliver their assigned work. Team has to refresh the responsibilities and sharing the accountability and distribute it to the new member.<br><br>No scenarios found where two or more people are changed simultaneously (add, removed, replaced). | is required in the team for delivery, it affects the delivery<br><br>A new person joins, people have to provide help and support and may not be able to deliver their assigned work. | | When a person with a particular skill leaves the team, it negatively impacts the project. |
| | | | Project is negatively impacted when someone joins the team | When a new person joins the project team, members of the team have to provide support and cannot deliver their own work timely. |

<table>
<tr>
<td>20170909202</td>
<td>If a person is replaced in a project, where person who is leaving, is skilled and playing a key role in the development. New person who is joining will take time to adjust. In agile such changes have less impact than the traditional projects because agile is using various methods like peer program and working closing with other team members. Though any such change has an impact, still it is less if compared to the other traditional methods.<br><br>Other scenario may be when a new person is added into the team. Its impact is less negative and person can pick up while team velocity is not impacted or team reduce the capacity</td>
<td>New person who is joining will take time to adjust<br><br>In agile such changes have less impact than the traditional projects because agile is using various methods like peer program and working closing with other team members.</td>
<td>
<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Project is negatively impacted when someone joins the team</td><td>When a new person joins the team, will take time to adjust and learn.</td></tr>
<tr><td>Team composition change impacts both traditional and agile projects.</td><td>Team composition change negatively impacts both traditional and agile projects, however, the impact is more to the traditional projects.</td></tr>
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<tr><td></td><td>No scenarios found where two or more people are changed simultaneously (add, removed, replaced).</td><td></td><td></td></tr>
<tr><td>20170917203</td><td>It impacts initially when a person is changed from the team, because new person takes time to establish the place in the team. Who is who and how it is working and it takes time.<br>Informal session with incoming members and listing their expectations. More open discussion, what and how we do and what are the expectations form the team and how it is to be part of the team. Transparency, cultural awareness, mutual respect evolve the performing team. This helps to minimize the impact on the</td><td>new person takes time to establish the place in the team.<br><br>Transparency, cultural awareness, mutual respect evolve the performing team<br><br>When more people changes happen, It impacts on the velocity and delivery may be late.</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Project is negatively impacted when someone joins the team</td><td>When a new person joins the team, will take time to establish the place in the team.</td></tr><tr><td>More than one team composition changes impact negatively.</td><td>When more than one team composition changes occur in a project, it impacts the velocity of the team and delays the overall project delivery.</td></tr></table></td></tr>
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| | overall team performance through that change.<br><br>When more people changes happen, It impacts on the velocity and delivery may be late. However, team cultural transparency, short delivery, no scope of negotiation on standards helps to minimize the impact on the team performance.<br><br>When more than 1 person leave the team, it impacts the team. Re-plan the project, forecast changed and delivery velocity is changed. It helps to keep the expectation right and impact to minimize to the performance of the team. No scenarios found where two or more people are | When adding more people in the team, it generally helps the team to improve the performance, however, in agile if it is over 10 people it become chaos and instead of any good it negatively impacts. | In Agile, large size team is counter performance | Generally, more people in the project means more performance. In agile, the team over 10 members is counterproductive. |
| | | | Teak composition change impact can be minimized if it is managed well. | Better transparency, cultural awareness and mutual respect help team performance. |

<table>
<tr><td></td><td>changed simultaneously (add, removed, replaced).<br><br>When adding more people in the team, it generally helps the team to improve the performance, however, in agile if it is over 10 people it become chaos and instead of any good it negatively impacts. When more people added, it is initially taking time to ramp up the team and velocity scale down.</td><td></td><td></td></tr>
<tr><td>20171013204</td><td>When a new developer joins in the running project, 95% of the times developer is not new to the organization, its only new in the project and does have background and knowledge of the technical area as he may belong to another pool or project. Hence,</td><td>new person to the company will not be productive for some time.<br><br>If a person leaves in the middle of the project, it impacts the project. If a</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Project is negatively impacted when someone leaves the team</td><td>When a person leaves the team, in the middle of an in-flight project, it negatively impacts the project. However, if the person leaving had</td></tr></table></td></tr>
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| | impact on the technical area is minimal for any type of change in the case of developer. If a new developer joins the company, it may take 3 to 5 months only to understand the overall background of the work. It means that new person to the company will not be productive for some time.<br>If a person leaves in the middle of the project, it impacts the project. If a project manager or team lead leaves, impact is mild.<br><br>When teams members are keep shifting from project to project, it does affect the project performance.<br>One team was working on one module, which was a dependent component for upcoming modules. When changed | project manager or team lead leaves, impact is mild.<br><br>When teams members are keep shifting from project to project, it does affect the project performance<br><br>In case of more experienced person left the team will have high impact than the less experienced person, who lefts the team<br><br>It will not change the work effort required, it will impact the delivery time | | management role (project manager, team lead) only a mild impact on the team performance.<br><br>When a person left the team, it does matter what is project stage. If the project is in a critical stage, the change has a high negative impact. If change is at the beginning of the project, the impact is less. |

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| | occurred, it affected the running development areas.<br>When a person is changed, it depends on the experience and ability of the person. In case of more experienced person left the team will have high impact than the less experienced person, who lefts the team.<br>It will not change the work effort required, it will impact the delivery time.<br>It also maters at what stage they left. If that is a critical stage, then the impact is much more.<br>Earlier is better, it means if team changes are in the early stages of the project, its impact is less. As more time passes, magnitude of the impact increases for the same change in the team.<br>If more than 1 person left together, impact may be more than double. | It also maters at what stage they left. If that is a critical stage, then impact is much more. Earlier is better, it means if team changes are in the early stages of the project, its impact is less.<br><br>If more than 1 person left together, impact may be more than double | Project is negatively impacted when someone joins the team | When a new person joins the team, will not be productive for some time. |
| | | | More than one team composition changes impact negatively. | When team members are shifted from project to project, it does impact on the project performance for all projects involved.<br><br>If more than 1 persons leave the team together, the impact is more than double. |
| | | | Team composition changes are not impacting the required | Team composition changes are not impacting the required |

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<tr><td></td><td></td><td></td><td><table>
<tr><td>work effort to finish the work, these changes impact the team's ability to deliver the work in time.</td><td>work effort to finish the work, these changes impact the team's ability to deliver the work in time.</td></tr>
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<tr><td>20171017205</td><td>Delivery lead in the mid of the phase, was added into the project, which impacted the project negatively. It was due to establishing the place of new person in the team based on the role and responsibility.<br>Involvement of the management into the team day to day work, including the daily stand-ups, boost the teams commitment and delivery.<br>When a person resigned, it was considered negative. It was because we were losing a person who was skills and involved with the team for some time.</td><td>Involvement of the management into the team day to day work, including the daily stand-ups, boost the teams commitment and delivery.<br><br>Due to priority change, a tester was changed, it was a negative impact on the team.</td><td><table>
<tr><td>Pattern</td><td>Variation</td></tr>
<tr><td>Project is negatively impacted when someone leaves the team</td><td>Due to the work priority changes, if the team is changed, it impacts negatively to the team.</td></tr>
<tr><td>Project is positively impacted when someone joins the team</td><td>Involvement of the management as part of the agile team positively impact the team performance and delivery.</td></tr>
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<tr><td></td><td>Due to priority change, a tester was changed, it was a negative impact on the team. It reduce the velocity of the team. Team has to share the tasks of testing among themselves.<br>There are times in other project, when teams were lagging behind, more people are added to increase the velocity, which is a positive change.</td><td></td><td></td></tr>
<tr><td>20171019206</td><td>A person is removed from the team, it is a rare scenario. Organization has a stringent process for any such change. Due to the process in place which includes discussion, deliberation and exploring all options before making this change, it is little impact to the team’s performance.<br>More likely scenario is workload driven changes, where person has to be added to</td><td>workload driven changes, where person has to be added to the project to cover the work. It is positively impacting the team performance.<br><br>Partially removed from the team means split the</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Project is positively impacted when someone joins the team</td><td>Work driven changes in the team to cover a specific work item, positively impacts the team performance.</td></tr><tr><td>Teak composition change impact can be</td><td>If workload is shared from multiple projects and properly managed,</td></tr></table></td></tr>
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| | the project to cover the work. It is positively impacting the team performance.<br><br>Partially removed from the team means split the time/workload of person for two or more project teams, with agreements of teams and management. Which also discussed and minimize the impact. It is minimum impact as far as it is properly planned and if additional time is provide to the team member to perform the job at multiple teams. | time/workload of person for two or more project teams, It is minimum impact as far as it is properly planned | minimized if it is managed well. | it minimizes the impact of change. |
| 20171020207 | This project had no changes, hence no impact.<br><br>In another project, a person chose to leave the company due to his higher studies. | if new person is more experienced, team performance has positive impact, If a new person is less experienced and | **Pattern**<br>Project is positively impacted when someone joins the team | **Variation**<br>A new person added with more experience has a positive impact |

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<td>Same person is asked to provide a new resource. He also provided handover and knowledge transfer.<br><br>In a team composition change, when a replacement occurs, where one person left the team and a new person joins the team, if new person is more experienced, team performance has positive impact, If a new person is less experienced and junior in the team, it has negative impact on the team performance.</td>
<td>junior in the team, it has negative impact on the team performance.</td>
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<tr><td></td><td>on the team performance.</td></tr>
<tr><td>Project is negatively impacted when someone joins the team</td><td>A person added with less experience has a negative impact on the team performance.</td></tr>
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<tr>
<td>20171025208</td>
<td>The impact on team performance is negative when a person is replaced because new person need to adopt the new situation. However, if it is planned well ahead, the team performance impact can be minimize.</td>
<td>The impact on team performance is negative when a person is replaced because new person need to adopt the new situation</td>
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<table>
<tr><td>Pattern</td><td>Variation</td></tr>
<tr><td>Project is positively impacted when someone joins the team</td><td>A new person added with more experience has a positive impact on the team performance.</td></tr>
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<td>When an experience person is added into the team, that impacts the team performance positively. It is because experienced person helps in areas for quick delivery.</td>
<td>When an experience person is added into the team, that impacts the team performance positively.</td>
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<table>
<tr><td>Project is negatively impacted when someone joins the team</td><td>When a new person joins the team, will not be productive for some time.</td></tr>
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<td>20171101209</td>
<td>It was a long project for 10 months, when a person is resigned, a new person has to be hired and this change affected team performance. Many issues are faced due to this change including understating of the problem, understating of the role etc. it impacted for couple of month to get back to the speed.</td>
<td>when a person is resigned, a new person has to be hired and this change affected team performance<br><br>New person took time as well as team took time to understand and to reach back to the previous performance.</td>
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<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Project is negatively impacted when someone leaves the team</td><td>When a person leaves the team, the remaining work is readjusted and individuals workload increases. This impact negatively to the project delivery.</td></tr>
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| | Team performance was impacted, quality of the work was impacted and time of delivery was impacted.<br>New person took time as well as team took time to understand and to reach back to the previous performance.<br><br>When a developer is moved from this team to the other project, work is distributed in the remaining people and workload got increased. Which impacted the performance of the team. | When a developer is moved from this team to the other project, work is distributed in the remaining people and workload got increased. | Project is negatively impacted when someone joins the team | When a person is replaced, the new person joins the team, will take time to adopt the new situation and adjust with the team.<br><br>When a person joins the team, it takes time to adjust for the new person as well as the existing team members. It takes time to regain the same performance level after the change. |
| 20171105210 | When a team composition change happened, it creates demotivation, | When a team composition change happened, it creates demotivation, | **Pattern**<br>A team composition change creates | **Variation**<br>A team composition change creates |

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<td>affects project timeline<br>creates confusion and worries in the team. This may cause issues in the project, technical and management.<br><br>When a person was not performing as per the testing requirement, it starts impacting the overall project delivery. When the person is replaced, such issues got resolved. New person brings a change with a positive improvement in the team performance. If the replacement is due to performance, replaced person is considered to be more experienced to resolve the issue.</td>
<td>affects project timeline, creates confusion and worries in the team.<br><br>If the replacement is due to performance, replaced person is considered to be more experienced to resolve the issue.</td>
<td colspan="2"><table>
<tr><td>demotivation, confusion and worries among the team members.</td><td>demotivation, confusion and worries among the team members.</td></tr>
<tr><td>Teak composition change impact can be minimized if it is managed well.</td><td>If a replacement of a person is triggered due to the performance issues, it is expected that the new join will have more experience.</td></tr>
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<tr>
<td>20171111211</td>
<td>From phase to phase changes there is no impact on the performance due to the change of the team (within that phase).</td>
<td>From phase to phase changes there is no impact on the performance due to</td>
<td colspan="2"><table>
<tr><td>Pattern</td><td>Variation</td></tr>
<tr><td>Teak composition change impact can be</td><td>If team composition changes occurred between the Phases or</td></tr>
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<td>The composition change within the phase, an impact is on team performance by going into the defensive mode due to the change.<br>In one phase a tech lead is reprioritise is to another project. New person is in defensive mode as not clear in the scope and work as well as not being part of the team and journey from the beginning, it is difficult to take the lead.<br>Defensive mode is not due to technical difficulty, it is because of being new, and starting in the middle. New person is not taking any risks and trying to be defensive to work only what is assigned.</td>
<td>the change of the team (within that phase).<br><br>The composition change within the phase, an impact is on team performance by going into the defensive mode due to the change.</td>
<td>
<table>
<tr><td>minimized if it is managed well.</td><td>Stages, it has minimum impact on the team performance.</td></tr>
<tr><td>A team composition change creates demotivation, confusion and worries among the team members.</td><td>During the team composition change, all team members become defensive and not take initiatives.</td></tr>
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<tr>
<td>20171112212</td>
<td>In case of software tester change (replace), the new person who joined did not have any background of the work, software module and project working style and</td>
<td>When a scrum master is changed (replaced due to resignation), it impacted the team performance.</td>
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<table>
<tr><td>Pattern</td><td>Variation</td></tr>
<tr><td>Teak composition change impact can be</td><td>The impact of the team composition change depends on the</td></tr>
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| | need to spend time to understand and familiarize with the environed. It took more time for the new person as well as in the project tasks.<br><br>It is more because of the technical know-how of the work which takes more time for a new person to understand and be productive in the team.<br><br>More effort required in understanding the technical area rather the team. 80% time spend for technical understanding and 20% for mingling with the team and understating the team.<br>Even person who was working in the same area, even moved from one module (piece of work) to another module (another piece | Also the performance impact depends on the skills of the new person (scrum master) joining the team, how much he knows agile, experience in similar projects, and capability to understand the team, it can improve the performance. Otherwise, it would be damaging to the performance of the team.<br><br>It is clear that when a person is changed in the team, it impacts the team performance. | minimized if it is managed well. | positions, skills and experience of the people involved in the change. |
| | | | Any team composition change would have an impact on the team performance either positive or negative. | Whenever a person is changed in the team, it impacts the team performance, positive or negative. |

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| | of work) it impacts the performance of the person.<br><br>Scrum master is considered one of the most important role in the agile project. Scrum master is running the day to day work, conducting the daily meeting, communicate to various levels and ensures smooth running of the project. When a scrum master is changed (replaced due to resignation), it impacted the team performance. Also the performance impact depends on the skills of the new person (scrum master) joining the team, how much he knows agile, experience in similar projects, and capability to understand the team, it can improve the performance. Otherwise, it | | |

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| | would be damaging to the performance of the team.<br><br>Once a scrum master went on leave, a new scrum master is assigned temporally but continued as permanent in the team. The new scrum master know the agile and how to run the project, he made life easy for the entire team and made significant contribution in the teams performance.<br><br>After 6 months, scrum master left the company, and the replacement could not help the team much. There could be communication problem or technical understanding problem. It impacted the team. | | |

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| | It is clear that when a person is changed in the team, it impacts the team performance. | | |
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**Question 12:** How team composition change influence ASD project team's ability in decision-making?

| ID | Answer | Common Ideas | Findings | |
|---|---|---|---|---|
| | | | **Pattern** | **Variation** |
| 20170819201 | When a team member left the team, team has to re-evaluate the existing work and get more help and re-adjust the tasks, work deliverables and expectations.<br><br>When team members joined, it affected the team's ability to take decision. At the same time, it affected the outcome of the decisions itself, as now point of view of | When a team member leaves the team, team has to re-evaluate and re-adjust the work which negatively impacts the team ability of decision making.<br><br>When a new person joins the team, it negatively | Decision-making ability of the team is negatively impacted when someone leaves the team. | When a team member leaves the team, team has to re-evaluate and re-adjust the work which negatively impacts the team ability of decision making. |

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<td>new people are also added in these decisions.<br><br>Business representative are part of the agile team in the form of Product Owner. There could be multiple people in this role under one team. When we have right people, with right knowledge of the business and requirements, it impacts positively in the team and project can deliver more and better quality products. Hence, the right skilled people in the team impacts the ability of the team to make better decisions.</td>
<td>impacts the team's ability in decision-making where point of view of the new person has to be added.</td>
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<table>
<tr><td>Decision-making ability of the team is negatively impacted when someone joins the team.</td><td>When a new person joins the team, it negatively impacts the team's ability in decision-making where point of view of the new person has to be added.</td></tr>
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<tr>
<td>20170909202</td>
<td>Team composition change is key factor which can impact consensus making and direction of the team.</td>
<td>When a team member left the team, and team balance (skilled non-skilled ratio,</td>
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<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Decision-making ability of the team is negatively</td><td>When a team member left the team, and team</td></tr>
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| | A person with critical knowledge and skills who helps in making the direction of the team, even though team decision is consensus based, such person does have a strong input and influence. If composition is changed and that influencer is replaced, it impacts the overall decision making ability of the team.<br><br>Teams are made balance with senior and junior level members.<br>When a new person is added into the team, if new person is senior level or manager level, it will not help the team as it become one direction and team is not comfortable in front of managerial positions. | experienced, non-experienced ratio etc) is disturbed, it negatively impacts the team's ability in decision-making.<br><br>When a new person joins the team, with a senior/managerial position, it creates discomfort within the team and it negatively impacts the ability of decision making.<br><br>If composition is changed and that influencer is replaced, it impacts the | impacted when someone leaves the team. | balance (skilled non-skilled ratio, experienced, non-experienced ratio etc) is disturbed, it negatively impacts the team's ability in decision-making. |
| | | | Decision-making ability of the team is negatively impacted when someone joins the team. | When a new person joins the team, with a senior/managerial position, it creates discomfort within the team and it negatively impacts the ability of decision making. |

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<td>If a person is removed from the team, and balance of the team is disturbed, then it impacts the teams ability. As long balance in the team is not disturbed, impact of changes are limited.<br><br>Team composition is key factor where changes in the team composition can impact the entire direction of the team.</td>
<td>overall decision making ability of the team.</td>
<td><table><tr><td>Decision-making ability of the team is negatively impacted when influencer/contributor is replaced.</td><td>If composition is changed and that influencer is replaced, it impacts the overall decision making ability of the team.</td></tr></table></td>
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<tr>
<td>20170917203</td>
<td>When a person added into the team, first is to make them acquainted to the culture. Those people may not be able to help or add any value in the team decision making in the beginning. It does impact the capacity of team ability to make such decisions.</td>
<td>When a team member left the team, its role and position in the team determines the impact on the team’s ability in decision-making. A person with Scrum Master role can</td>
<td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Decision-making ability of the team is negatively impacted when someone leaves the team.</td><td>When a team member left the team, its role and position in the team determines the impact on the team’s ability in decision-</td></tr></table></td>
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| | When someone is removed from the team, it largely depend on the person who is removed. If it is scrum master, it is hard to get the same level of decision-making how to move next and what we can do next. It is directly impacting the ability of the team decision making.<br><br>Team composition change does impact the team ability of decision making. Replacement and new member adding is similar where it is required to give them time to adopt and be part of the team. Until the added persons are mingled and become part of the team, overall ability is impacted, where decisions are delayed or take longer time to make. It is also important to stay away from the conflicts. | impact negative because this role is driving the decision making process in the team.<br><br>When a new person joins the team, it negatively impacts the team's ability in decision-making where the new member take time to be acquainted to the culture and norms. It slow down the team decision-making process.<br><br>Team composition change impacts the team ability of decision making, replacing and adding is similar where | | making. A person with Scrum Master role can impact negative because this role is driving the decision making process in the team. |
| | | | Decision-making ability of the team is negatively impacted when someone joins the team. | When a new person joins the team, it negatively impacts the team's ability in decision-making where the new member take time to be acquainted to the culture and norms. It slow down the team |

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<tr><td></td><td></td><td>time is required to adopt the change and decision are delayed or take longer time.</td><td><table><tr><td></td><td>decision-making process.</td></tr><tr><td>Decision-making ability of the team is negatively impacted, whenever a team composition change happens.</td><td>Team composition change impacts the team ability of decision making, replacing and adding is similar where time is required to adopt the change and decision are delayed or take longer time.</td></tr></table></td></tr>
<tr><td>20171013204</td><td>Yes changes are impacting the team decision making.</td><td>When a team member left the team, its experience determines the impact on</td><td><table><tr><td>Pattern</td><td>Variation</td></tr><tr><td>Decision-making ability of the team is</td><td>When a team member left the team, its</td></tr></table></td></tr>
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| | The impact is depending on the person and the role. If a project manager or product owner changed it impacts on the quality and level of the decisions.<br><br>A more experienced person when leaves the project, it impacts the decision ability where teams does not have much options and insight of decision impacts.<br><br>Also time of the change is important, of some one leaves when project is in critical stage, the impact can be more. | the team's ability in decision-making. A person leaving with more experience can impact negative because team lacks the options and ability to make right decisions without such experience.<br><br>When a team member left the team, the time of this change in the team determines the impact on the team's ability in decision-making. A person leaves at the critical stage of the project has negative impact on the team's ability in decision-making. | negatively impacted when someone leaves the team. | experience determines the impact on the team's ability in decision-making. A person leaving with more experience can impact negative because team lacks the options and ability to make right decisions without such experience.<br><br>When a team member left the team, the time of this change in the team determines the impact on the team's ability in decision- |

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| | | | | making. A person leaves at the critical stage of the project has negative impact on the team's ability in decision-making. |
| 20171017205 | Whenever a core team member is changed/replaced or prioritize for other work, Team itself cannot make the decisions in the absence of that person and affect the ability of decision making significantly.<br><br>When manager level person is available and involved with the team, it is positive impact on the team decision making | When a team member left the team, and is not replaced, the impact on the team's ability in decision-making is negative. It is because remaining member do not have bandwidth for it. | **Pattern**<br><br>Decision-making ability of the team is negatively impacted when someone leaves the team. | **Variation**<br><br>When a team member left the team, and is not replaced, the impact on the team's ability in decision-making is negative. It is because remaining member do not have bandwidth for it. |

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| | ability as decision accountable person is part of the team.<br>When a person was on leave, manager of the person was replaced, however, manager does not have enough bandwidth to work with the team. Which impact the ability of the team to make decision which affected the project deliverables.<br><br>When decision making is shifted from one person to the other person in the team, it can have positive or negative impact in the overall ability of the team to make the decisions.<br><br>Personal ego is one of the issue which impacts the decision making process in the team. When decision making is | | | |

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<tr><td></td><td>shifted from the person who was writing the requirements to the person who do not have the ego attached to the requirements, team can make better decisions.</td><td></td><td></td></tr>
<tr><td>20171019206</td><td>A typical way is in the implementation stage, after each iteration, we analyse the burn down chart. We take decision based on the past data how team performed, velocity and workload. If more work is assigned and unable to deliver, we make adjustments to have a better performance.<br><br>When added people with good domain and technical knowledge, it benefits the team ability to make the decisions.</td><td>When a person added with good domain or technical knowledge, it benefits the team ability to make decision.</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Decision-making ability of the team is positively impacted when someone joins the team.</td><td>When a person added with good domain or technical knowledge, it benefits the team ability to make decision.</td></tr></table></td></tr>
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| | Team needs to adjust as per the new situation to have a batter team decision making.<br><br>Standard sprint is two weeks, and a team performance is normally assessed in two sprints to adjust the speed.<br><br>Communication is the key in the team. Miscommunication is challenge and created collaboration issues as well.<br><br>Agile is an ongoing improvement process. | | |
| 20171020207 | This project had no changes, hence no impact. | This project has seen no changes in the entire project. | **Pattern** \| **Variation**<br><br><br> |

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| | If people are together in the beginning they go together in the team development stages and they have understating and bonding. A new person joining later, will not be able to the same level and have to take his place in the team. It will impact the team.<br><br>One way is to have the interview of new person with the entire team where he/she can spend considerable time with the team. , which can help to reduce the impact of change. Team become the part of hiring decision and make themselves ready to take a new person on-board and helps to minimize any issues.<br><br>People have more focus than the process. | | |

<table>
<tr>
<td>20171025208</td>
<td>Impact on the team decision making is negative when a replacement of a team member happens.<br><br>When a senior person left the team, it impacts the overall team decision making where senior person was able to provide more options, suggestions to consider more factors before taking a decision. In absence of key, senior person have a significant impact on the ability of the team to take the decisions.<br><br>Decision making process slows when there is a change in the team.<br>These is no case seen where decision making process time is improved due the change in the team composition</td>
<td>When a team member left the team, its experience determines the impact on the team’s ability in decision-making. A person leaving with more experience can impact negative because team lacks the options and ability to make right decisions without such experience.</td>
<td>
<table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Decision-making ability of the team is negatively impacted when someone leaves the team.</td><td>When a team member left the team, its experience determines the impact on the team’s ability in decision-making. A person leaving with more experience can impact negative because team lacks the options and ability to make right decisions without such experience.</td></tr>
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<table>
<tr><td></td><td>Leaving good and experienced people form the team and from the company are costing revenue generating projects and impacts direct company profits.</td><td></td><td></td></tr>
<tr><td>20171101209</td><td>When we had a situation of a priority change, team called a meeting and discussed the situation. Possible options were discussed and executed. Based on the decision of all the team members were to assign one person from this project to the requested project and do not have a replacement.<br>It was due to the fact that developer who will be assigned to the other project does have sound skills and knowledge, he can come back after couple of months.</td><td>When a new person joins the team, it creates performance issues.</td><td><table><tr><th>Pattern</th><th>Variation</th></tr><tr><td>Decision-making ability of the team is negatively impacted when someone joins the team.</td><td>When a new person joins the team, it creates performance issues.</td></tr><tr><td></td><td></td></tr></table></td></tr>
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<table>
<tr><td></td><td>Adding a new person in this project cause team performance issues.</td><td></td><td></td></tr>
<tr><td>20171105210</td><td>Team ability to make the decision, when a main contributor is replaced, it is impacting the team ability of decision making, team is depending heavily on the person. Team was demotivated and could not take the decision independently, or felt, they cannot take the decision independently.<br><br>Balance in the team is disturbed, new person, even is as good take some time to adjust in the team<br><br>Performance based change has a negative impact on the ability of team decision making. A fear that a team member is</td><td>When a contributor is replaced, it negatively impacts the team decision-making ability due to heavy dependency.<br><br>Performance based change has a negative impact on the ability of team decision making. A fear that a team member is replaced due to the performance makes team defensive and slow down their ability of making the decisions</td><td><table>
<tr><th>Pattern</th><th>Variation</th></tr>
<tr><td>Decision-making ability of the team is negatively impacted when influencer/contributor is replaced.</td><td>When a contributor is replaced, it negatively impacts the team decision-making ability due to heavy dependency.</td></tr>
<tr><td>Negative impact on the decision-making ability due to performance based team composition change</td><td>Performance based change has a negative impact on the ability of team decision making. A fear that a team member is replaced due to the performance makes</td></tr>
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<td></td>
<td>replaced due to the performance makes team defensive and slow down their ability of making the decisions<br><br>New person shared his experience and gave more to the team in terms of a different perspective, which helped team to able improved.</td>
<td></td>
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<table>
<tr><td></td><td>team defensive and slow down their ability of making the decisions</td></tr>
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<tr>
<td>20171111211</td>
<td>Individuals feel autonomy, feel they are responsible, but when between the phase changes, and team is changed, they go for a defensive mode and that applies to their decision making. They just want to do the minimal and not taking broader decisions.<br>When team is changed, defensive mode is observed.</td>
<td>Whenever there is a change in the team composition, it slows down the Decision making process. People go defensive and do the minimal engagement in the decision-making without taking any broader decisions.</td>
<td>
<table>
<tr><td>Pattern</td><td>Variation</td></tr>
<tr><td>Decision-making ability of the team is negatively impacted, whenever a team composition change happens.</td><td>Whenever there is a change in the team composition, it slows down the Decision making process. People go defensive and do the minimal engagement in the decision-making</td></tr>
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| | If someone joins who is more open-minded agile practitioner and more experienced can help the team to be more open and being more agile. That situation can help to improve the team decision making. However, pressure of delivery and responsibility in the project, people will inclined to go defensive.<br><br>When team composition change in any project, it takes team into a defensive mode which directly impacts the ability of team decision making<br><br>Age of the company is a vital role in the agile methodology implementation. More aged (experienced in the field) company would have senior and experienced employees and young company would | A new person joins who is more open-minded agile practitioner and more experienced, can help the team's ability to make decisions.<br><br>When a team member changed in the team, company age (field experience and time in the market) determines the impact on the team's ability in decision-making. A company with a long history has senior level | | |
| | | | | without taking any broader decisions. |
| | | | Decision-making ability of the team is positively impacted when someone joins the team. | A new person joins who is more open-minded agile practitioner and more experienced, can help the team's ability to make decisions. |

<table>
<tr><td></td><td>have young employees. Young people have tendency of adopting change rather than old people.</td><td>employees. Those employees do resist the change. A relatively new company has young employees, who are ready to change. Hence, impact on the ability of decision-making is high for the first type of companies.</td><td colspan="2"></td></tr>
<tr><td>20171112212</td><td>Task distribution is responsibility of team lead, if team lead is capable of team management, can make team life easy. Which eventually impacts their ability to make decisions and performance.<br><br>When the scrum master changed, there was a communication gap with the team and the management. It took time to</td><td>When a team member left the team, its role and position in the team determines the impact on the team’s ability in decision-making. A person with Scrum Master changes, it created a communication gap and tool time for the</td><td>Pattern<br><br>Decision-making ability of the team is negatively impacted when someone leaves the team.</td><td>Variation<br><br>When a team member left the team, its role and position in the team determines the impact on the team’s ability in decision-making. A person with Scrum Master changes,</td></tr>
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| | | | | |
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| | understand and project is depending on other projects and tasks. The change impacts the ability of the team to work in that fashion.<br><br>If a developer, a good experienced developer leaves, the ability of the decision making of the team impacts as new person cannot take the decision on the areas which he/she needs to understand first.<br><br>Agile projects are good when project is short in duration, however, when agile projects run for 2 years or so, it can not produce the required outcome. | team to adjust with negatively impacted the decision-making process in the team.<br><br>When a skilled and experienced developer leaves, a new person cannot take the decision for the already developed areas until understood completely. | | it created a communication gap and tool time for the team to adjust with negatively impacted the decision-making process in the team.<br><br>When a skilled and experienced developer leaves, a new person cannot take the decision for the already developed areas until understood completely. |

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