APM / INCOSE UK

Systems Thinking Specific Interest Group

Fusion Point Guidance – Governance

Issue 1.3 Dec 2016

1. Who Is This Guidance Aimed At

This guide is primarily aimed at Project Managers and Systems Engineers who will be producing their respective plans for project and technical governance.

This guide will also provide useful governance information about the benefits of SE and PM to Project Sponsors[1] in terms of how their project will be executed and to other PM and SE professionals who work in projects to understand why governance activities are being carried out in a certain way.

Target Audience

Primarily aimed at:

- *Project Managers*
- *Systems Engineers.*

Also provides useful information to:

- *Project Sponsors*
- *Other PM and SE professionals.*

2. What Is Governance?

There are multiple definitions for Governance that also relate to the context to which it is applied, for example, public, private, global, corporate (Wikipedia). Essentially in the context of programme, project and technical, it has four core strategic functions throughout the life cycle:

1. Ensuring clarity of vision, ethos, strategic direction, authority, responsibilities and roles;
2. Holding those being governed to account for their performance and the quality of their outputs/outcomes;
3. Ensuring that good practice (due process) is being followed; and
4. Reporting and disclosing.

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Project Governance are those aspects of governance related to ensuring the effectiveness of projects, i.e. helping to ensure that the right projects are carried out correctly (HM Treasury, 2007). The main activities of project governance relate to:

- Project direction;
- Project ownership and sponsorship;
- Ensuring effectiveness of project management functions; and

[1] The role of Project Sponsor is defined in the SEPM Roles and Responsibilities document Issue 1, May 2016.

- Reporting and disclosure (including with stakeholders).

Technical Governance is considered to be an activity which is undertaken to ensure a design remains Fit for Purpose and Safe throughout is operational life (Cowper et al, 2014):

- Result in a system that is fit-for-purpose. This is primarily an assurance and approval that the system meets the allocated requirements in a way that can be operated and maintained through life, and that does not expose the project to unacceptable levels of technical risk.
- Maintain control of design. This is primarily an assurance that engineering activities have been undertaken in accordance with customer, regulator and best practice expectations. These expectations are normally set out in policy documents and cover many of the standard systems engineering life cycle processes.

3. Why Is Governance Important?

In "*Systems engineering to improve the governance in complex project environments*", Locatelli, Mancini and Romano (2014) discuss why projects fail (cost and schedule overruns and poor delivery of benefits) in complex project environments. They identify, based on the work of Flyvbjerg and Van Marrewijk, that projects fail due to organisation and governance. The INCOSE UK and APM SEPM Joint Working Group Thameslink case study (SEPM JWG, 2015) also provides an example of where organisation and governance were introduced to address issues raised by a lack of strategy for systems integration. A systems integration team was established along with the appropriate governance that resulted in positive outcomes for the programme. The Thameslink organisation had clear direction and decision-making boundaries, identified priorities and strategic issues that needed to be considered and addressed, and clear oversight of the programme (including configuration and change control).

Governance provides the framework for:

- *Leading & Directing;*
- *Monitoring & Controlling;*
- *Managing Risk*

Governance is important as it provides the framework for: leading and directing; monitoring and controlling; and managing the risk of a programme, project or technical activity, which are three of the four key aspects of project management as suggested by Fairley (2009) and Forsberg (2005). Governance relies on a complex interaction of organisation, activities and documentation. The organisational construct in support of governance needs to include the extended enterprise in order to identify the boundaries and interfaces and the roles and responsibilities of the different organisations (Cowper et al, 2014). It also needs to identify what governance assurance evidence needs to be passed across those boundaries and identify the consumers of this assured evidence, for example, regulation authorities.

Governance typically consists of the following approach carried out through four key activities: Planning, Oversight, Review and Endorsement (PORE) (Cowper et al, 2014). This provides a structured approach to implementing activity along the development life cycle in a forward-looking way (the route to approval of which assurance is one part) rather than a retrospective way (assurance of post-delivery evidence). Systems Engineering assists Project Management in consideration of technical governance through progressive assurance, whereas the alternative is to rely (quite legitimately) on thorough and interdependent scrutiny of the project evidence outputs. The benefit of progressive assurance is demonstrating 'control of design' and from a Enterprise perspective the opportunity to manage risk to make decisions earlier on the cost of change curve as given in the SE Handbook v4, figure 2-4 (INCOSE 2015).

4. What Are The Issues

Key Issues:

- *Alignment of Goals and Objectives;*
- *Integrated Planning of Governance Activities;*
- *Governance Decision-Making Boundary Definition;*
- *Maturity Risk Identification & Mitigation;*
- *Alignment of Review Evidence & Progressive Assurance*

Based on the INCOSE UK and APM SEPM Joint Working Group case studies[2] report (SEPM JWG, 2015), a key fusion point between Project Managers and Systems Engineering Managers is to define the integration between their two governance activities. This includes:

- Alignment of governance of progress towards goals and objectives (what does success look like),
- Integrated planning and execution of governance activities (alignment of Project and Systems Lifecycles, key project and technical review points),
- Definition of governance decision making boundaries (who is responsible for what),
- Identification and mitigation of maturity risk (includes the number, timing and impact of changes)
- Alignment of project and technical review evidence and integrated progressive assurance.

Alignment of governance of progress towards goals and objectives

Locatelli et al (2014) highlight that in complex projects it is not always enough to deliver a project/system that meets the required performance on time and within budget. In order to meet customer expectations, a more holistic approach is required to consider correlated aspects (for example, the Defence Lines of Development) in order for the system to deliver customer/stakeholder benefit. Locatelli et al go on to propose that there should be a shift from project to system governance.

Integrated planning and execution of governance activities

It seems obvious that the technical planning of a project should be integrated with the project and commercial planning. However, this is quite often not the case as they have differing motivation, viewpoints, lifecycles, emphasis and language (Smith's 2004). There can also be an absence of an appreciation of others' viewpoints and individuals may become less co-operative and suspicious of the motives of others. These differences can lead to disconnects occurring across important interfaces within the organisation. These issues increase when one adds in different organisations across the extended enterprise, e.g. customer/approving authority, contractor/design organisation, their supply chain, and any regulator(s) that may be involved.

The requirements for governance (both project and technical) needs to be established early on and planned for throughout the system and project life cycle and key areas of governance interaction (e.g. where technical governance evidence supports a project governance objective) identified.

Definition of governance decision-making boundaries

Management (both project and technical) must retain a focus on the delivery of operational capability and business benefits. However, although this is normally the intent at the outset of a programme or project, quite often the team, including the leadership, get drawn into the delivery of the detail of the solution and lose site of the overall goals or "end game". In essence they end up down in the weeds and decision-making is not carried out at the appropriate level. Establishing the authorities for defining benefits, the policies and the architectures (technical and operational) required to deliver them early on in the formation of the programme or project is key to defining who is responsible for making which decisions at the

[2] The case studies used were: Thameslink Programme, East London Line Project, NATS Prestwick Air Traffic Control Centre, London Heathrow Terminal 5.

appropriate level. This includes strong, evidence and risk based, governance and approvals of system definitions, requirements and instructions for work.

Identification and mitigation of maturity risk

A key function of both project and technical managers is to monitor the progress of activities and to manage risk. Elements of the project that are immature (ill-defined, uncertain, incomplete, etc.) present the project with risk. Therefore being able to measure maturity early is a key aspect in managing the project risk. Elements that are identified as being immature will require additional effort in increasing their maturity, i.e. removing uncertainty, providing better definition. Periodically reviewing activities in terms of measured maturity against expected maturity is essential for both project and technical managers.

Alignment of project and technical review evidence and integrated progressive assurance

The purpose of project and technical reviews is to take a snap shot at key points within the project and system lifecycle to assess progress in terms of maturity (i.e. has the project or system made the level of progress expected by this point) and what level of risk is being carried (i.e. areas of immaturity - especially if it is unexpected). Each review will require evidence (outputs from the processes and activities being carried out) to be reviewed in order to form a judgement regarding maturity and progress. If all the reviews align correctly then this review evidence provides confidence that the solution will be fit for purpose, can support safety cases and justifications and provide confidence that benefits will be realised. This is often referred to as progressive assurance of programme, project and technical maturity.

5. How Can A Fusion Between SE & PM Help

Using SE to improve the governance of complex projects

In "*Systems engineering to improve the governance in complex project environments*", Locatelli, Mancini and Romano (2014) discuss how the performance of projects can be improved through transforming governance from "project governance" to "system governance". By considering key elements of SE shown in Figure 1, and how these elements interact in Figure 2, they argue that SE tools and practices "enable Project Governance to deal with uncertainty and complexity by introducing flexibility and a higher reliability of project planning and control".

Benefits

SE tools and practices "enable Project Governance to deal with uncertainty and complexity by introducing flexibility and a higher reliability of project planning and control"

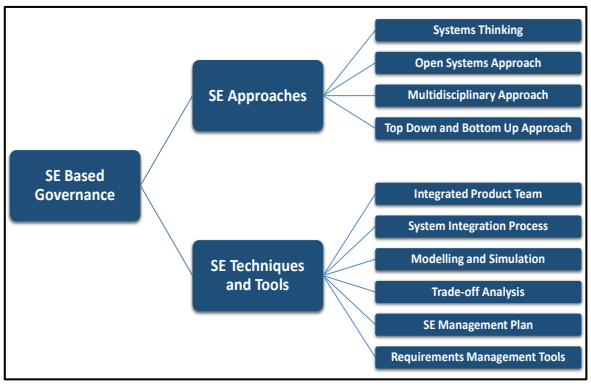

Figure 1: The elements of SE that impact on project governance (from Locatelli et al)

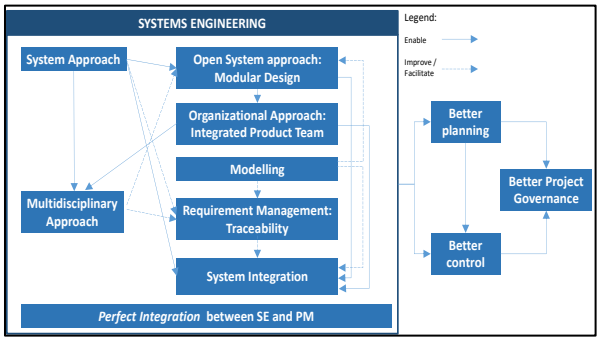

Figure 2: Systems engineering and project governance (from Locatelli et al)

Using System Engineering approaches, tools and techniques can help project governance by:

- Establishing a common understanding of the context of the system being changed or introduced within the environments.
- Identifying and managing the range of stakeholders across all stages of the lifecycle.
- Establishing a common understanding of the boundaries of the systems and their alignment to the requirements for programmes and projects.
- Establishing a common understanding of the breakdown structure or design of systems and consider all elements of the system and its architecture (i.e. not just operational assets, technical systems, processes & people, but also business change, and the provision of supporting services such as information management).
- Consider the whole lifecycle for all elements, including elements required for non-operational lifecycle stages such as development, testing, integration, maintenance and disposal
- Assure coherence of requirements across all projects and programmes, in particular, any interoperability, interface and dependency aspects and the verification and validation evidence to ensure compliance and fitness for purpose.
- Reduce risk through publication and adoption or open standards, and re-use of generic flexible products and common services.
- Apply common language & processes across the portfolio of projects providing sufficient variation to meet individual project and programme needs.

In concluding that elements such as Systems Thinking and the Integrated Product Team can transform Project Governance, Locatelli et al also put forward three propositions to form the basis for further research:

- The successful application of SE to transform the Project Governance is proportional to the company's maturity in portfolio management, programme management and project management.
- The successful application of SE to transform the Project Governance depends on the organisation's structure.
- The application of SE fosters the efficient systems reuse – and efficient systems reuse hedges the risk in delivering projects in complex environments and can cut costs.

6. When Can A Fusion Between SE & PM Help

"Every system has a life cycle" (ISO/IEC 15288:2015). However, systems actually have multiple life cycles. These multiple life cycles can be from differing perspectives, e.g. commercial, project, technical, and/or the development of the various system elements (sub-systems, components etc.). Smith et al (2004) identify issues along the technical (systems engineering) and business interface and that these issues are related to incompatibilities between life cycles and incompatibilities in terminology. Therefore, it is essential that there is early identification, alignment and definition (terminology) of the different life cycles, especially where they compete for resources. Also running through these different life cycles are the various technical assurance activities that are needed to meet the various technical governance requirements for each organization, to monitor design maturity and understand the level of technical risk being carried by the project. Early technical assurance engagement is necessary if assurance is not going to be a simply retrospective review.

Therefore, early identification, definition and alignment of key reviews and decision gates is essential in order to use the assurance process throughout the life cycle to catch problems in time to provide intervention. It is also important to map the key touch points rather than constrain or interfere in the definition of others' as the alternative life cycles have differing purposes (Cowper et al, 2014).

Figure 3 demonstrates how Programme and Project Management, using MSP, and Systems Engineering interact across the Programme/Project and System lifecycle. The key thing to note is how do the various review activities at differing levels across the lifecycle support the higher level reviews. It is important to define this during the programme planning to ensure the programme team understand what review evidence is required by when and by whom and what are the interdependencies between reviews.

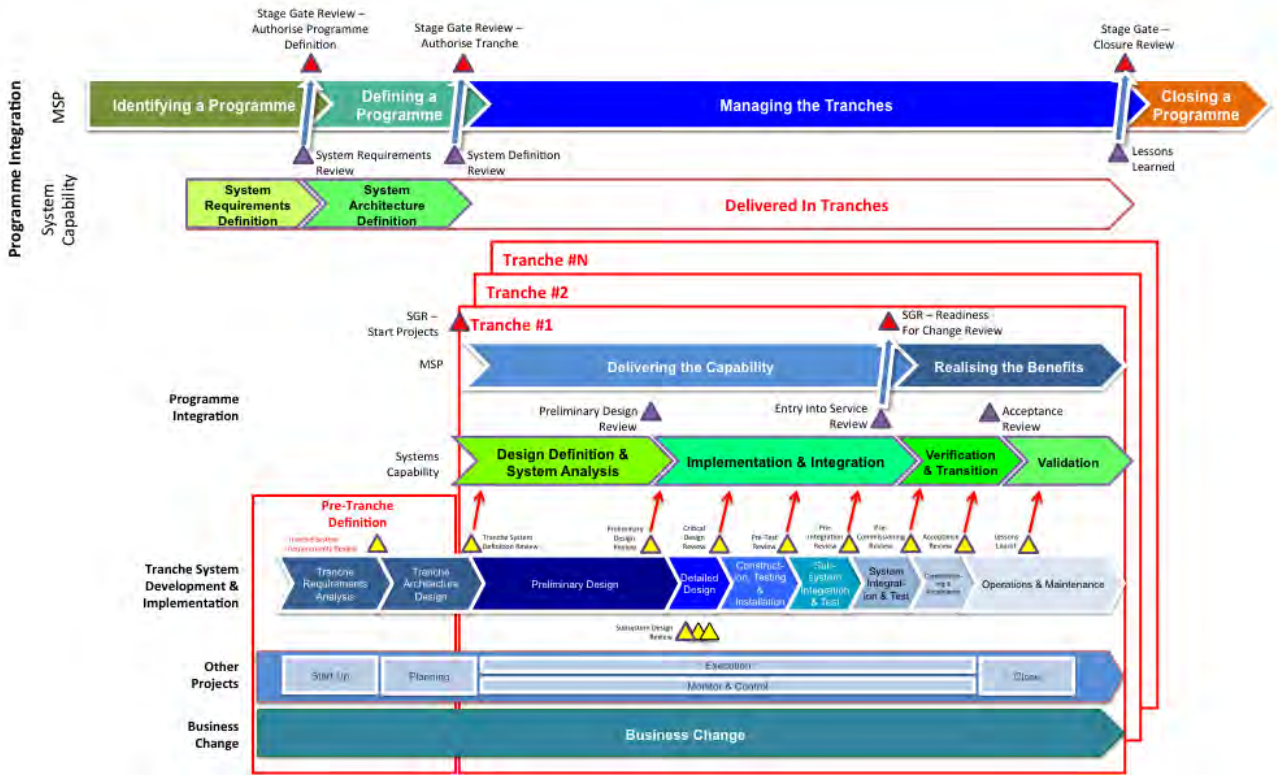

Figure 3: Integration of Programme/Project and System Lifecycles

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