Solving tensions of overlapping PM & SE with elegance of complex systems governance approach

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Reviews

- “strong incentives & weak disincentives for cost underestimation and thus for cost overrun may have taught project promoters what there is to learn, namely that cost underestimation and overrun pay off. If this is the case, cost overrun must be expected & it must be expected to be intentional.”

- Cost underestimation & overrun have not decreased over the past seventy years. No learning seems to take place; cost underestimation & overrun cannot be explained by error and seem to be best explained by strategic misrepresentation, namely lying, with a view to getting projects started.”

2003 Bent Flyvbjerg, Megaprojects & Risk
“Witnesses have presented numerous cases whereby the expectation that a procurement activity is OTS (off the shelf) has led Defence to believe that a product is more mature or an outcome more predictable than experience (or an experienced review) would indicate. The conspiracy of optimism, referred to by a number of witnesses, appears to have led Defence to undervalue the role that developmental test & evaluation can play in the early stages of the acquisition cycle to identify & analyse risk in a quantifiable & defensible manner…The committee notes that this conspiracy of optimism may have tended to crowd out or ignore dissenting voices that could alert Defence to the true extent of capability, technology, integration and certification (hence cost & schedule) risk represented by a proposed project”

- risk…inadequately described during the capability definition & planning phase…
- risk identified by domain or subject matter experts but downplayed, misinterpreted, or ignored by more senior non-experts…
- failure to appreciate the challenge of being a customer of a first-of-type program;
- under-estimation or under-statement of the level of technical maturity with programs proceeding without the requisite level of knowledge – numerous examples where developmental projects were deemed incorrectly to be MOTS:…..
- Under-estimation of complexity of integration;
- Inadequate specifications;…
- Poor understanding of overseas certification standards & Australia’s requirements;…
- Inadequate planning of testing & acceptance;…
- Inadequate testing of contractors’ claims with a “shallow” understanding of industry’s capacity to deliver”
Series of Government Policy implementation disasters where Royal Commissions found:

- ... program design and implementation compromised by ... failing to provide robust advice
- ... did not draw sufficiently on external views and expertise
- ... unable to exert influence through its advice to ministers
- ... failure to provide sufficiently frank and forthright advice to ministers on important elements of policy design and risk
- ... significant gap between the inadequate levels of candour displayed in written advice and that reportedly conveyed in oral briefing
- ... failed to keep detailed records of key decisions and how they were arrived at

Conclusions

- F.23 The default position that new policies proceed straight to large-scale roll-out should be reversed & instead new policy proposals should include a trial or demonstration stage, allowing new approaches to be developed fast & evaluated early.
- F.24 Staged decision-making for large projects should incorporate the allocation of seed funding to agencies to develop a business case & proof-of-concept, which can be tested before the project moves to a further stage.
In scoping projects, questions usually answered well vs poorly

- What equipment do I have to buy?
- Who sells such equipment?
- What do I have to build?
- When do I want the equipment?
- What will it cost me to buy/build?
- What are the risks to success?
- Who are the stakeholders?
- Who pays & when?
- What written plans are needed?

- What does success look like for each stakeholder?
- What are the critical operational issues (benefits to be realised)?
- What are the measures of effectiveness?
- What are the practical activities to de-risk the project early?
- Can this be trialled?

Complexity Categories

- **Management Complexities**: Requires Efficient Management Capabilities (Project/Product/Portfolio)
  - Not necessary to have separate SE & PM teams
  - Collaborative efforts required is low
  - Complex to Chotic projects
  - SE effort required is high and PM effort is low
  - Collaborative efforts required is medium to high

- **System Complexities**: Requires Efficient Systems Engineering Capabilities
  - Complicated to Complex projects
  - SE effort required is high and PM effort is low
  - Collaborative efforts required is low
  - Complicated to Complex projects
  - SE effort required is high and PM effort is low
  - Collaborative efforts required is high
PMs focus on cost & schedule
SEs focus on capability & rigour
Add preconceptions and mis-communications
overlaps or gaps in responsibilities
over-elaboration in requirement setting
over-elaboration in project planning
lack of mutual understanding and respect
Process issues are exacerbated by the ‘tension fields’ in project environments
Both SE & PM practitioners must recognise and understand how their perspectives and actions both affect, & are affected by, these tensions.

Xue, 2016, “Improving Cooperation between SE & PM in …,” Dissertation
In an era when “collaboration” is increasingly recognized as a central operational component in the best of private sector organizations, & a critical element of their success, it is in worrisome decline within the government itself & such decline has frequently been cited … as a contributing factor in underperforming government programs, duplication & fragmentation. Disconnects between the policy, human capital, mission, technology & acquisition communities have improved only marginally at the leadership levels & almost imperceptibly, if at all, at the operational levels.

Rebentisch, p. 12

some SEs & PMs have developed the mindset that their work activities are separate from each other …

work often costs more, takes longer, and provides a suboptimal solution for the customer …

there are barriers, or at least a lack of coordination … between the SEs and PMs.

The bigger the enterprise is, the more difficult it is to collaborate.

Xue, p. 1
• Xue finds SE standard has a tendency towards progressive processes whereas the project management standard tends towards addressing processes in parallel: complex systems obviously require iterative & adaptive processes.

• “The group of programs with greater integration is significantly more likely than programs with lesser integration to have better performance in schedule and budget performance, as well as client requirements and satisfaction,” with orders of difference between 14 & 21% [Rebentisch, p. 245-246].

Integration factors that correlated significantly with higher success were:
• “rapid and effective decision-making”
• “effective collaborative work’ &
• “effective information sharing”

Sources of unproductive tension were:
• “lack of integrated planning”
• “authority not clearly defined”
• “conflicting practices”
• “job positions not clearly defined”
• “unclear expectations from executive sponsor”
• “authority not clearly understood”

• Gray et al. (2017) developed a highly promising ‘combined Vee-model which highlights areas of overlap [between SE & PM] & where the two views complement or enhance each other (‘touch points’).’
Gray et al. (2017) recommends 11 fusion points for integrating SE & PM:

- Employing SE techniques in project product-based planning
- Adopting a system-of-systems approach to programme definition and management
- Utilising architectural modelling in defining programmes and projects
- Verification and validation in benefits management
- Identifying and managing project-to-project interdependencies
- Applying soft systems methods to stakeholder management
- Using SE to improve the governance of complex projects
- Requirements definitions in contract management
- Transition definition and management
- Managing change across the supply chain-based product delivery system
- Integrating review gates throughout project delivery phases

Illustration of PM & SE integration using Vee Model & usability activities to reinforce key communications (adapted from Gray et al. (2017), Hoehne (2017) & Joiner et al. (2018))
Number of factors to manage in-service requires continuous & evolving T&E

Significant change-agents:
- Cyber-threats
- ICT (networking)
- AI (autonomy)

Change demand is:
- Persistent
- Advanced
- Customer/operator-led

Complex Systems Governance model (Keating & Bradley, 2015)
Use of CSG for parsimony in governance
An associated pathological approach has been developed for CSG implementation that provides an accretional path of least resistance for the greatest benefits, in part, leveraging survey of the milieu inhabitants of capability governance irrespective of their discipline (Keating et al., 2019).
Real difficulties in PM & SE from:

- Project scoping over-optimism,
- Illusion of off-the-shelf vice mixed-maturity
- Constant change agents of cyber-threats, ICT, user adaptation & now AI
- Lack of infrastructure & processes to evolve (insufficient agility)
- Stove-piped PM & SE governance & structure causing tensions & inefficiency

Current overlays focus on anything to create:

- Teaming
- Collaboration (Communication)
- Alignment
- Early preview or trial risk-discovery
- Rejuvenated focus on usability & iteration

Efficient governance structure needed based on organismic (evolutionary) approach:

- Policy & Identity
- System Development
- System Operations
- Communications fusing these three

Pathological CSG approach offers change that is:

- Inhabitant-led
- Focused on greatest need
- Discerns efficient trade-off
- Accretional improvement
- Efficient
- Evolutionary

Thank You
Questions & Comments