A Systems Framework

For Complex Projects

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1. Project Management on Trial

Due to bruising experiences, there is a perception by some CEOs that delivery of large project business benefits cannot be relied upon.[i, ii]

Whilst project management is good at delivering projects that are well understood and defined, the question arises whether project management, a discipline rooted in the industrial era, has been sufficiently transformed for use in the information era on today's highly complex projects.

2. Complexity

A project team may talk to ten suppliers, but those suppliers need to co-ordinate technical details between them. They may do this directly with each other or through the project team … or not at all, which creates a problem. Add to that that the project administrator talks to them about billing, the project manager about schedule, the technical consultant about technical performance, etc. Extend this example to encompass the many project relationships to reveal the network that forms a dynamic project system.

Complexity is created because changing one component in a system has an impact on other components because of the relationships between them. An event in one place ripples through the system according to the relationships. Components may be human or inanimate (e.g. between IT systems).

Complexity relates to the number of relationships between the components, and complexity *rises geometrically* with the increase in the number of relationships.

Relationships and component behaviour are not predictable in the way we assume. In the face of complexity rigid planning tends to fail, as it cannot account for the large number of variations from expected behaviours and outcomes. To plan a system exactly it would be necessary to model all possible behavioural responses to each activity, then each outcome is applied to the next activity, etc. This is an impossible task.

There are five particular complexity factors that are important to this discussion, which help explain why linear forecasting will always be inadequate for complex projects.

Transformational Uncertainties

Physical engineering projects are about building inanimate constructs. The engineering principles and outcomes are well understood. However business transformation projects, typically surrounding IT system implementations, are a journey into the relatively unknown, which creates a high level of transformational uncertainty.

Behavioural Uncertainties

Most large projects are a balance of technology (inanimate) and people (very animate) change. People create behavioural uncertainty, and this increases the less the methods are defined. Moreover, the less the goals are defined in detail and therefore the less

engineered are the deliverables the greater the multiplier effect of behavioural uncertainty on transformational uncertainty.

Compression of Time
Compression of time has created far more complex project systems with numerous feedback loops and changes to plans, which do not conform with the sequential phases used, for example, in so called 'cascade methodologies' in software development projects. Project management in construction has developed fast tracking in response to time pressures, but this is for an engineered environment. Project management tools are not well adapted to continuous feedback-based adaptation for projects with less well-defined goals.

Uncertainties of the Unknown
Technology has the capacity to produce unexpected complexity, often as the technology is over-sold and integration implementation is inadequately understood.

System Discontinuities
Systems exhibit an ability to react out of time and space relationships, i.e. reactions may be triggered in remote locations or time-lagged with no obvious reasons. These are more evident the more complex the system. Moreover, systems are inherently stable; attempts to change them create pushback, often creating these unforeseen effects.

The system effects are generated out of the operation of the whole system, not the individual components, so they are missed by project management forecasting and planning techniques, which are focused on broken down work components.

3. Project Management – The Verdict

Because complexity increases exponentially, the cost of all of the planning and control causes overheads to rise exponentially and/or the project becomes increasingly unmanageable. The more complexity in the system to be changed the more effective the push back against change and the more likely the project will falter.

This is exactly what has happened; with many large projects we have seen escalating budgets, delays and failures despite the best attempts of well-intentioned people.

The assumptions behind project management are born of the industrial era technique of reductionism applied by scientific management - reduce everything to its components and plan and control each component, assuming linear cause and effect.

Linear project management techniques cannot handle complexity. A new approach is required to manage complex projects.

4. New Ideas

Strategic innovation and synthesis is required if real progress is to be made in renovating the perception of project management amongst business leaders and in use of best practices in the field.

> **Leadership** is the most important concept to emerge in a radical rethink of business management. Leadership is about giving expression to the people within the organisation and its business network, and encouraging and enabling them to build and use complex systems (their relationships and networks) to advantage. Leadership practices have been adopted by individual forward thinking project managers, and recognised by writers on project management. However, as in business, its full implications have not really been applied as best project management practice.
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> **Systems Thinking**[iii] has made a significant impact on business by challenging the industrial era reductionist paradigm. Meaning comes from connection to the larger whole - isolation does not work. Focus is on increasing understanding not on rules. It underlies a lot of new business concepts and tools.
>
> **Chaos theory** has led to understanding of patterns that emerge from apparent chaos and an understanding of the relationship between chaos and order.[iv] Some of this learning has driven new organisational ideas.
>
> **Natural organisms** provide lessons in the management of complexity[v]. They are self-organising, successful, quick to react yet stable in overall form, and they operate in ways that suggest that command and control management is an inappropriate model for handling complexity.
>
> **Evolution** has been re-examined in recent times; some Darwinian assumptions are being challenged[vi]. Innovation and adaptation is conducted in the boundary layer exhibited by network systems 'at the edge of chaos'[vii] as it cannot occur in highly organised regions, or in unstable highly chaotic regions. Selection is not accidental but by design as part of an active selection process.

Business frameworks that manage complexity are based on systems and network metaphors, and many lessons can be learned from recent thinking in natural systems, evolution, chaos theory and systems thinking.

5. A New Approach

The common themes of systems in the above fields of study are structure, networking, collaboration, authority to act at the component level, constant change, and the vitality of innovation.

A cellular structure, in which teams form around well-defined projects, but within the system mainstream, is the appropriate local organisation model. Teams manage complexity by understanding and fulfilling their roles within the grand scheme, or business purpose.

The change-oriented, strategic level of organising, or 'program management', creates a collaborative environment of enquiry and dialogue at the organisational level which allows the islands of order, or 'projects' to emerge as the means of implementing the business purpose.

6. Managing Complexity with Program Management

Program management is used to facilitate sense making and strategic dialogue; resolve strategic options; deal with uncertainty; channel feedback and changes of strategic direction, and provide the overall high-level packaging of work into strategic initiatives supporting the business purpose.

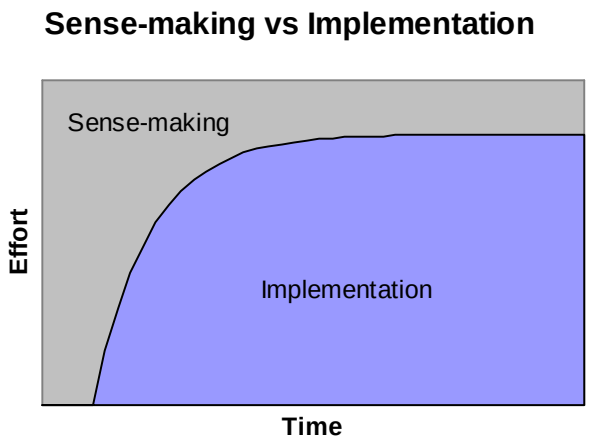
Part of the process of managing complexity is to define islands of order within complex programs, which can be initiated as low (relatively) complexity projects under the program umbrella. Program management co-ordinates the business strategic initiatives, and evolve them to a point where the islands of order can be defined. This results in complexity for a particular area of interest reducing over time. Program management provides the framework for use by project teams and initiates and monitors projects to ensure congruency with the business purpose.

The change in perspective is to see the islands of order as floating within, and fully interacting with, the program environment, including other well-defined projects

Sense-Making vs Implementation

Project management is essentially tactical; it is concerned with implementing a solution. The program management approach is strategic; it is concerned with sense-making and value delivery.

The ratio of sense-making to implementation over time is shown in the diagram below. Initially all activity is directed at sense-making. Once a solution emerges the implementation process gets under way. The whole chart area represents the program, the implementation area represents the project.



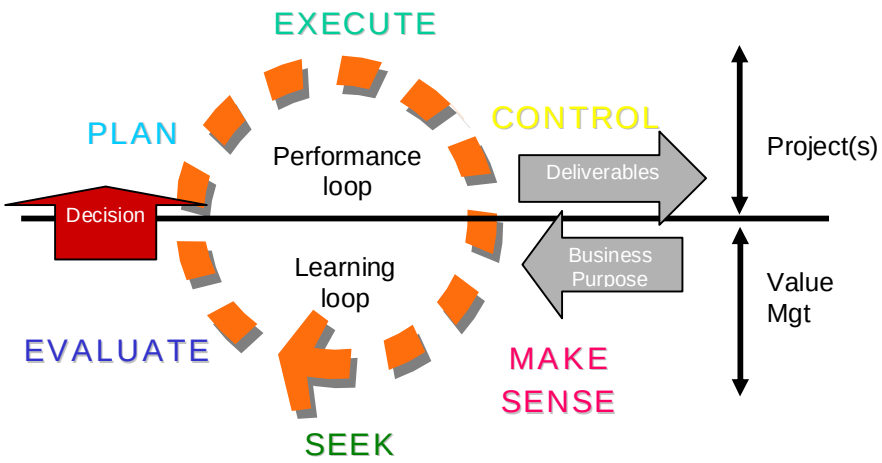
However because the business purpose remains the fundamental goal, sense-making activities continue through the

life of the project as strategic oversight and collaborative interplay with other projects and programs.

Feedback Loops and Speed

Feedback loops are a natural consequence of collaboration at an organisational level. Project management has to allow for continual changes to plans, to allow learning and innovation to take place. Much more discretion must be allowed and authority given to project teams to facilitate the speed necessary for feedback loops to be effective. Protracted approval processes can kill feedback, innovation and constructive change.

The diagram[viii] to the right underlines the feedback loop mechanism that cycles between the learning and performance.



This means that although the project is well defined the plan is not rigid, because interaction with the program using feedback loops may mean the plan needs to change for reasons external to the project, and the program culture ensures that the project manager and team identify with the reason for such change.

Adaptation

Project management processes are directed at delivery, and planning for delivery, whereas program management processes are focused on identifying and securing a business strategic outcome. The influence of program management on project management is to enable adaptation to continue much later, well into the implementation phase. This retention of flexibility is essential to deal with complexity.

7. Conclusion

The power of high performance teams and the collaborative systems perspective has been substantiated in large complex projects as the means to deal with complexity and to facilitate innovation[ix]. Program Management is the vehicle for bringing this learning and experience to corporate strategy and business purpose.

The vision of Program Management embraces the present strategic, visionary and corporate leadership obligations of executive teams whilst providing an organisational paradigm to leverage the enthusiasm, energy, abilities and knowledge of people in the organisation and across its business network. It brings the whole organisational network together as a functioning system, and carries business purpose through to delivery.

Adoption of Program Management, as defined in this paper, is advocated to CEO's and other senior executives who have become disenchanted with large complex project results.

8. Postscript

The last decade witnessed the reduction and removal of operational and functional barriers within organisations, and the process continues. This decade is seeing the lowering and removal of barriers between organisations, assisted by web-based technologies, in the pursuit of lower costs and 'see-through' to the customer[x]

The political and logistical demands on program managers to oversee multi-organisation programs are even greater. The concepts put forward in this paper are suited to this wider purpose. As the very identities of organisations are put to the test in value chain projects, program management will be a skill that executives will need to embrace.

References

[i] The Chaos Report (1998) by The Standish Group International Inc found the success rate for IT projects over US$3m was only 15% or less.

[ii] Just 4% of IT enterprise systems projects achieved all business benefits; less than half achieved half of all benefits, according to 'The Future of Enterprise Systems', a report by Accenture, 2003

[iii] 'The Fifth Discipline', 1992 by Peter Senge; 'The Fifth Discipline Fieldbook', 1994 and 'The Dance of Change', 1999 by Peter Senge et al.

[iv] 'Chaos: Making a New Science' by James Gleick

[v] 'The Web of Life' by Fritjof Capra, 1997, p156

[vi] 'Microcosmos', Margulis and Sagan, 1986

[vii] 'The Origins of Order', Stuart Kauffman, 1993

[viii] Based on: Thiry, Michel, 2000, "A Learning Loop for Successful Program Management", Proceedings of the PMI Annual Seminars and Symposium, September 2000

[ix] E.g., see the story of the Naval Hospital construction project in Portsmouth, Virginia, USA, described in 'Beyond Partnering: Towards a New Approach to Project Management' by Greg Howell, Robert Miles, Charlie Fehlig & Glenn Ballard, http://web.bham.ac.uk/d.j.crook/lean/iglc4/howell/howell.htm

[x] 'The Agenda', Michael Hammer, 2001