

Managing Complex Projects

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What makes projects complex to manage?

Despite significant investment in project management processes, training, and professional Bodies of Knowledge, organizations large and small still often struggle to complete their projects as initially planned. Improving success rates represents a huge economic opportunity yet persists as an ongoing challenge. The tools, techniques and standards developed by and for project managers are undoubtedly valuable, yet managers consider them as necessary but not sufficient to ensure their projects go smoothly. It is the complexity of their work that appears to hinder delivery.

Without a clear definition, complexity can be an unhelpful term as it can mean different things to different people. Much effort has been expended debating the difference between ‘complex’ and ‘complicated’, and there is no universally accepted definition. A useful view is that if you can understand a system in terms of how its parts interact, it is complicated. A commercial jet aircraft, for example, requires expertise to design and manufacture but it follows known laws. Many can be built that have repeatable performance. It is a linear system and can be taken apart, serviced, and re-assembled multiple times. Flying the aircraft with passengers aboard, however, can be a different matter. Here, bad weather can disrupt the pilots’ schedule or planned route, and once we introduce passengers (not to mention a wide range of other stakeholders), we can see that it can be a rather unpredictable, non-linear system that cannot be fully controlled. This is the point at which the system becomes complex, rather than merely complicated.

The idea that all project issues encountered can readily be resolved by the application of appropriate management techniques is unrealistic. A more pragmatic view is that problems will inevitably occur, and that these must be confronted. Much academic work has looked at project complexity (e.g., Baccarini, 1996; Geraldi et al., 2011; Petro et al., 2019). Ackoff (1979) calls such practical situations ‘messes’, and this terminology seems to resonate with managers, who recognize this as their day-to-day reality. For practitioners, finding ‘simple’ solutions to their challenges is unlikely to be realistic (or they would have been implemented already!), but a different way of thinking about the problems to allow thoughtful responses to be crafted can be beneficial. An important point is that ‘absolute’ complexity in this sense (i.e., represented by a number or a point on a scale) is often unhelpful. It is important to consider who is doing the work. An experienced manager with many major projects under her or his belt will have seen many of the problems, or variants of them, before. In comparison, a new manager and team with no previous experience may well struggle even on a seemingly ‘low-complexity’ project because everything is new to them, and every problem is being encountered for the first time. When thinking about project complexity, it is vital to consider not only the ‘what’ of the work, but also ‘who’ is doing it.

Research findings

Asking the simple question ‘What makes your project complex to manage?’, we identified three distinct ways in which the work can quickly get messy (Maylor et al., 2013):

- *‘Structural complexity’*: technical and coordination challenges (e.g.: a construction project with numerous suppliers, a tight timescale and a constrained budget). The difficulty increases with the scale and number of people involved, the number of interdependencies, and the variety and pace of the work being performed. Good project management training can often help address these difficulties.
- *‘Socio-political complexity’*: difficulties due to people, power and political issues with the project (e.g.: a development project with multiple stakeholders who all have quite different views on what they want the work to achieve). Difficult stakeholder issues can be harder to quantify than structural

factors, but this does not diminish the very real effect they have on project delivery. These may require more interpersonal skills rather than ‘book knowledge’.

- *‘Emergent complexity’*: these problems come from the unknown and the unexpected aspects of the work (e.g.: a new product design where the market is unclear and early customer feedback is likely to cause changes to the requirements). Difficulties can be down to limited knowledge (especially in the early stages), and any changes that may arise during the project. By definition these can be hard to foresee but thinking of potential issues and areas you are unsure of can be helpful in navigating the work (see also PMI, 2014).

Practical workshop data with managers shows that management practices are in fact varied and are not necessarily limited to their ‘corresponding’ complexity on the diagonal. Actual responses cover all nine options of complexity and response. This is indicated via the examples in Table 1.

Table 1: Relating complexities and responses (adapted from Maylor and Turner, 2017:1086)

Complexity Response	Structural	Socio-political	Emergent
Planning and control	Initiating, planning, monitoring (e.g., applying Earned Value systems).	Develop a communications plan / establish a project board of stakeholders.	Risk management and change control
Relationship development	Prioritize communications with stakeholders. Conduct project outreach activities.	Engage in teambuilding activities. Invest in social capital.	Socialize changes. Increase informal communications.
Flexibility	Embrace changes from process. Enable parallel development.	Manage expectations of change. Joint planning with stakeholders.	Agile PM approaches. Entrepreneurial PM practices.

We have worked with thousands of managers over the years, and this terminology has been shown to be helpful in clarifying the types of difficulties particular projects face, allowing different categories of ‘complex projects’ to be distinguished. The next issue, though, is to find ways to alleviate those complexities.

It is useful to think about the kind of actions that would be most suitable in solving or reducing the particular problems encountered (Maylor and Turner, 2017). For structural complexities, a *planning and control* approach drawing on the management tools and techniques available (see Maylor and Turner, 2022) is generally advisable. There is a wealth of valuable material to support managers here. For socio-political complexities, *relationship development* and face-to-face discussions with key people can be powerful in diffusing tensions. This is an important (and sometimes under-emphasized) management responsibility. Finally, emergent complexity can be lessened by supporting *flexibility*, and

encouraging pragmatic responses from the team as the project unfolds (Antonacopoulou et al., 2022). These responses are not meant to be exhaustive, but indicate how a manager may choose to use her or his time depending on the kind of complexity encountered.

So, what's to be done?

What does this mean for managers? Table 1 indicates that there may not be a 'right' way to identify a complexity response, but it does mean that several options are available. Published studies indeed show that all the elements are in fact readily observed (e.g. Baxter and Turner, 2021; Boehme et al., 2021).

When analyzing what may be done about a complexity, there are three possible outcomes. First, it may be possible to *resolve* the issue using one of the three response options. This is unlikely to be straightforward, and will likely require spending scarce resources. It is important to note that there could in fact be a potential solution, but it may remain unimplemented. For example, if the root cause of the complexity is that the organization is doing too many projects and that resources are too thinly stretched to be effective (a very common problem), then a way forward is to prioritize the projects and stop the ones below the cut-off to allocate resources more appropriately. Easy in theory, but this is fiendishly hard to do in practice and few organizations can manage this successfully. Nevertheless, managers and teams we have worked with are often surprised by how many of these complexities can in fact be addressed. If a problem cannot be completely resolved, there may well be steps that can be taken to *reduce* the impact. Again, this may well involve additional expenditure, but it does indicate that these problems are not insurmountable. We have found through multiple workshops that, perhaps surprisingly, over 80% of problems raised can in fact be resolved or reduced. Many complexities are 'self-inflicted' within organizations, and through openly raising the issues, solutions can be identified and implemented to alleviate the problems. Finally, some complexities just cannot be fixed. We term them '*residual*' complexities and may include issues that are outside the organization's control, such as a particularly difficult stakeholder, or a business environment that they cannot influence. Even though this is not resolvable, sharing awareness of the issue can be useful if it creates a wider understanding of the challenge and allows stakeholders' expectations to be managed more effectively. A sudden announcement of a major unexpected slippage or huge cost overrun is always unwelcome, but keeping others apprised of issues as they unfold is often better than the shock of major bad news.

What to do next? Practical steps

Complex problems, by definition, do not lend themselves to simple solutions. We have found that discussing issues (often informally) and exploring potential ways forward is a powerful way to uncover sensible options. The 3x3 in Table 1 is a helpful tool for analyzing issues or concerns. What sort of complexity is it (structural, socio-political, emergent)? What response might potentially help resolve or reduce it (planning and control, relationship development, flexibility)? This can offer a structured and helpful discussion format in a group setting. What would make sense in this context? What realistically would be achievable? It is also worth considering the level at which solutions can be implemented – is it within the control of the manager and the team, or at the program/portfolio level?

It is also a beneficial reflective tool (Cecchi et al., 2022). Looking back at a project or phase often focuses on the structural (spend, duration, requirements met), but discussing the socio-political is valuable too ('How well did we treat our stakeholders?' 'Did the team develop their skills?'). For emergent complexities, rather than acknowledge how we were derailed unexpectedly, instead ask how we could have responded more effectively. Future (different) disruptions will certainly occur, and we need to consider how we can be more responsive and resilient next time. These are valuable conversations. It is important, however, to ensure that lessons are shared across the organization. Successful practices need to be promoted, and ineffective responses identified so that they are not repeated. This is another notoriously difficult problem, but a combination of formal and informal

knowledge-sharing techniques can be used to boost project performance over time – a hugely valuable outcome.

In the end, though, complexity management requires the skills and expertise of the manager and the team. There is no one-size-fits-all panacea, and solutions cannot be outsourced to a convenient tool or process. Situated human judgement remains key, and this is what separates the great projects from the merely good.

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