Step back from chaos

Actively managing complexity in programmes and projects

Dr Harvey Maylor
Dr Joana G. Geraldi
Stephen Carver
“Effectively managing complexity is a vital role for project and programme managers today, and a potential source of competitive advantage for the organisation that masters it. ”

Harvey Maylor, Director ICPM
Many organisations today fail to understand what makes their programmes and projects complex to manage. As a result, the route to achieving key objectives is made unnecessarily complex. Time and time again, we encounter examples of poorly defined requirements, inappropriate organisational structures, lack of common processes, disintegrated stakeholder groups and dysfunctional teams. Whilst some of this is indeed just a ‘fact of life’ with certain work, we set out to try to distinguish which factors we would have to live with and which we could look to reduce or even remove. We conclude that being able to assess, reduce and then react to the residual complexity in a piece of work is the route to effectively managing complexity.

The title of this publication is ‘Step back from chaos.’ Actively managing complexity is necessary to avoid the kind of chaos our ever more complex world can create. In this publication, we will show the following:

1. What makes programmes and projects complex to manage.
2. How to assess the complexity of a piece of work using a model derived from our research.
3. How to reduce the complexity of that work.
4. What the residual complexity profile means for the work.
5. What happens when it all changes.

This work is a departure from the conventional approaches used in PPM. We look forward to working with you to develop this further and to evaluating applications of this innovation.

Dr Harvey Maylor
Director ICPM

A feature of complexity in programme management is the necessity to bring together multiple projects to achieve a common benefit. This picture is a classic case where this was clearly not achieved and where the benefits of neither project (the road building or the installation of the telephone wires) would be fully realised.
1. Understanding Complexity

What makes projects and programmes complex to manage?

The terms ‘project’ and ‘programme’ are used as labels for an ever-widening range of work units. As a result, simply using these terms becomes less useful in describing how that work should be managed. For instance, a project that lasts three days with only a few stakeholders, is clearly a very different undertaking than one involving hundreds of people over several years. Both are projects, but the task of managing the second is considerably more complex than the first.

Complexity in managing a task comes from both the number of items that require managing and their interaction. For instance, having many stakeholders is one matter. When they are interacting and changing their requirements to play off against other stakeholders, that makes managing altogether more complex. Here are some other characteristics:

- It is subjective. It is defined by your perspective on the work being undertaken. This is influenced by your previous experience with similar situations meaning you view it as less complex than previously (I can see how we can manage this now) or more complex (this didn’t work well last time and hasn’t been resolved as a problem).

- It involved the PM. Some approaches to complexity assume that the PM has ‘complexity happen to them.’ Our approach recognises that PMs have a significant influence on the level of complexity, for instance, through the level of planning they carry out.

- The level of complexity will change. As will be shown, it is normal for the level to change over the life cycle of the work being undertaken.
We conducted research with hundreds of practitioners over an 18-month period to find out what makes projects complex to manage. The MODeST framework for managerial complexity was the result of this work. MODeST stands for five groups of issues that make projects complex to manage: Mission, Organisation, Delivery, Stakeholders and Team.

Figure 1 shows the five groups and 13 sub-groups of items that were found from the research.

2. Measuring complexity

How to assess a piece of work

Assessing a piece of work involves asking questions to determine the level in each group and then preparing a profile. A selection of the questions that need to be asked are shown in Table 1 overleaf.

For a full list or to use the full complexity assessment tool, see www.cranfield.ac.uk/icpm
Table 1: What makes a project complex to manage?

<table>
<thead>
<tr>
<th>Element of complexity</th>
<th>Examples of issues that make management complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>MISSION</td>
<td>• Lack of clarity of requirements</td>
</tr>
<tr>
<td></td>
<td>• Large scale, high value, high importance, high urgency</td>
</tr>
<tr>
<td></td>
<td>• Large number of constraints – legal, health and safety, security</td>
</tr>
<tr>
<td></td>
<td>• High level of interaction and interdependency with other projects</td>
</tr>
<tr>
<td></td>
<td>• High level of uncertainty – novelty, implications and side effects</td>
</tr>
<tr>
<td>ORGANISATION</td>
<td>• Multiple time zones project teams operating in</td>
</tr>
<tr>
<td></td>
<td>• Lack of collocation of project team</td>
</tr>
<tr>
<td></td>
<td>• Linguistic differences between team members</td>
</tr>
<tr>
<td></td>
<td>• Lack of appropriate organisational structure used in the project</td>
</tr>
<tr>
<td></td>
<td>• High level of change that the project produces in the organisation</td>
</tr>
<tr>
<td>DELIVERY</td>
<td>• Lack of common or appropriate project management method</td>
</tr>
<tr>
<td></td>
<td>• Inappropriate human, financial or other resources</td>
</tr>
<tr>
<td></td>
<td>• Problematic communications in the project team</td>
</tr>
<tr>
<td></td>
<td>• Lack of clear or timely decision-making</td>
</tr>
<tr>
<td></td>
<td>• Lack of flexibility for the project manager to respond to changes</td>
</tr>
<tr>
<td>STAKEHOLDERS</td>
<td>• Large number of stakeholders with differing requirements</td>
</tr>
<tr>
<td></td>
<td>• Lack of commitment to the project by key stakeholders</td>
</tr>
<tr>
<td></td>
<td>• Interference in the project by key stakeholders</td>
</tr>
<tr>
<td></td>
<td>• Lack of relationships with key stakeholders</td>
</tr>
<tr>
<td></td>
<td>• Problematic inter-relations between stakeholders</td>
</tr>
<tr>
<td>TEAM</td>
<td>• Lack of leadership shown by project manager</td>
</tr>
<tr>
<td></td>
<td>• Cultural and other differences between team members</td>
</tr>
<tr>
<td></td>
<td>• Low level of motivation of team</td>
</tr>
<tr>
<td></td>
<td>• Lack of project, technical and business experience in the team</td>
</tr>
<tr>
<td></td>
<td>• Lack of appropriate training for team members</td>
</tr>
</tbody>
</table>

Having determined the factors that make the project complex to manage, the resulting chart will look like that shown in Figure 2.

Figure 2: Visualising programme and project complexity
3. Deal with complexity hotspots

How to reduce the complexity of the work

Figure 2 shows two projects. Project 1 has a very high level of delivery complexity and project 2 a very high level of mission complexity. These peaks would be the first points of analysis for complexity reduction. For instance, for project 1, re-evaluating the resource requirements, gaining agreement on project management methods or setting up a communications protocol might contribute to the reduction.

Similarly, for project 2, conducting a pilot study to reduce the level of uncertainty, putting in place strategic buffers to insulate against impact from other projects or checking that the constraints were indeed real would reduce the complexity of that aspect.

Actively managing complexity in this way is an approach that can be applied with benefit throughout the programme or project. The tool systematically identifies the aspects that require managerial attention in advance.

We also suggest then looking at the next-highest ranked item and conducting the same complexity reduction exercise.

4. Re-assess

What the residual complexity profile looks like and what it means

What the residual complexity profile means.

The complexity assessment shows those elements that will be the most complex to manage. The implications of this profile include:

- The requirements of the people involved
- The requirements of the systems of work used
- The level of managerial effort required
The people involved

The principle we notice here is that the higher the overall level of complexity, the greater the level of experience that will be required. Putting a new or very junior programme manager into a highly complex piece of work is unlikely to be successful for the programme or the person. Further, we notice that particular types of complexity require particular skills. Some programme managers, for instance, are more suited to dealing with high levels of ambiguity (mission complexity). Others have particular strengths in building relationships with disparate groups of stakeholders.

The system of work used

One response to complexity is to use the systems, processes and routines to help make that complexity manageable. To this end, we advocate that the level of process used (full, partial, light) should be consistent with the overall level of complexity. Often, we see that the work associated with running a process can outweigh its ability to make complexity manageable. This will occur particularly where one aspect of complexity is lower than the others. For instance, some basic communications processes are an overkill if a project team knows each other or is colocated.

The managerial effort

The complexity assessment is useful in pointing to the areas of work that are likely to need the greater attention, in addition to determining the overall level of managerial impact that will be required. For instance, where a high level of stakeholder complexity was identified, it was necessary for a programme manager to recruit additional help in the management of expectations and perceptions of a large stakeholder group.

All of the elements that we have considered so far fall under the heading of ‘Structural Complexity.’ That is, this is the ‘picture’ that we see either prior to the start of a programme or project, or at a given point in its progress.

The research also demonstrated very clearly that for every element of ‘structural complexity’ there was a corresponding element of ‘dynamic complexity.’ That is, just about anything in a piece of work can change and sometimes will change. For instance, whilst the requirements may be well defined at the outset (low level of structural mission complexity) the impact of a change in requirements can be significant, producing a high level of dynamic mission complexity.

In demonstrating the impact of both structural and dynamic complexity on the role that a manager will play, we use the analogy of flying and some scenarios associated with this, as shown in figure 3.

For the purposes of definition, we see that projects are best described as activities that have a low level of structure complexity. Where the structural complexity is high, these are programmes. As shown, we can encounter high levels of dynamic complexity in projects and programmes.

5. Dynamic complexity

What happens when it all changes?
The role of programme managers in this environment resembles that of an air-traffic controller. Their responsibilities differ from those of the pilot, as they are required to guide many planes through take off, flight course and landing, maximising use of the available air-space and preferably without them crashing into each other.

The environment for this programme manager resembles that of a war room. Multiple flights are taking place – some combat flights, others as scheduled (for example, supply) flights. Both the highly scheduled and highly dynamic missions have to be integrated to achieve an overall objective.

In this environment, the role of the project manager resembles that of a highly skilled and disciplined commercial airline pilot. The objective is to complete the flight safely, on the required schedule and preferably be able to use the aircraft again.

A fighter pilot is no less trained or disciplined than the commercial pilot, but has to be able to react to a wider range of circumstances and situations. A mission plan will be developed but it rarely survives first contact with the enemy.
6. What is next?

Actively managed complexity development

Actively managing complexity holds the potential for a number of major benefits to be gained. For the programme or project: to assess, reduce and then respond appropriately to the level of complexity of a piece of work, including:

- Removal of unnecessary issues that cause complexity at the outset
- Better matching of people, systems and effort to a task

For the organisation: to make the topic part of the discussion between a customer and service provider. Specifically, if a requirement is going to cause significant complexity, does this requirement add requisite value for that customer?

For further details or to be part of the development of this approach to active complexity management, please see the ICPM website: www.cranfield.ac.uk/som/icpm or contact us at: icpm@cranfield.ac.uk

Further information:
A world leader in management education and research

The triple accreditation of AMBA, EQUIS and AACSB, held by only 18 schools throughout the world, as well as Economic and Social Research Council (ESRC) recognised research training and degree programme, are testimony to the academic quality of Cranfield.

Partnership is assured through Cranfield’s ability to ‘tailor’ knowledge to individual need, or to develop ‘customised’ programmes for organisations. This personalised approach has long been enshrined in ‘the Cranfield Experience.’

We also place great emphasis on personal development, one of the key benefits that sets us apart from our rivals. We believe that in order for our delegates and graduates to become leaders of the future, they need the right mix of business knowledge and management skills.

About HP

HP creates new possibilities for technology to have a meaningful impact on people, businesses and society. The world’s largest technology company, HP brings together a portfolio that spans printing, personal computing, software, services and IT infrastructure to solve customer problems.

More information about HP (NYSE: HPQ) is available on our website: www.hp.com