MAJOR PROJECTS
ASSOCIATION

MANAGING COMPLEXITY
IN MAJOR PROJECTS

Seminar 148 held on 31st March 2009
at Savoy Place, London

SUMMARY

KEY CONCLUSIONS

- Break complex programmes into manageable pieces. Introduce stability of operation for the teams. Ensure clear boundaries and actively manage the interfaces.

- Create stakeholder management systems. Resource the team to manage stakeholders. Different team members should manage stakeholders flexibly The team will need discipline to manage stakeholder expectations.

- An intensive assessment phase prior to starting will yield benefits later. Actively resist churn in the project's scope.

- Achieve staged approvals and obtain early sign-off to fix forward decisions. De-scope multi-faceted requirements to achieve the minimum necessary. Separate hard and soft changes.

- Think about applying the 'personality' to a project such that the project passes through different phases. For example, silos are relevant, if not desirable during design, but integration of their outputs prior to commissioning requires a different system management approach. This system requires integration to bring the parts together and needs 'lifeblood' and energy to succeed.

- Establishing a 'War Room' with whiteboards and an 'eyes up' culture helps to get buy-in from all participants, even though individual agendas may be in conflict. With overt markings of green ticks and red crosses for all outputs, the culture in the room becomes one of change in behaviour and support of a common goal.

- Where complex programmes have large numbers of stakeholders, owners and participants, the outcomes must deliver dynamic offerings. Therefore the programme has to be vision led with flexibility built in. Trial small-scale pilots before rolling out. Leadership requires a light touch, rigorous procedures, constant checking, support and trust.

- The programme management team should be context active and provide real-time issues for consideration. Design and build in for future upgrades over the life of complex projects.

'Complexity' means many things to many different organisations, and is rapidly becoming one of those overused yet much misunderstood pieces of terminology. It can include the multifaceted nature of stakeholders, diversity of requirements, the intricacies of multi-level systems design and architecture, and the challenges of integration, test and acceptance.

These complexities translate into major change programmes as projects go into service and transition into the operational phase. They are overlaid by complex financing, contracting, ownership and organisational issues as well as the management of extended supply chains, alliances and partnerships.

All these factors shape the way in which projects should be procured and managed. Through presentations covering a range of past and current delivery programmes, this seminar explored the challenges and the solutions to handling complexity in major projects in the military, health, air traffic management, vehicle licensing and rail sectors.

MERLIN – A WORKED EXAMPLE IN MANAGING COMPLEXITY

In 2005 the Ministry of Defence (MoD) awarded Lockheed Martin the prime contract for the Merlin Mk2 helicopter, which comprises a programme to update and sustain the fleet of Merlin Mk1 helicopters and the accompanying support infrastructure. Focusing on enhancing the flexibility and capability of the existing fleet, the Merlin Mk2 programme encompasses delivery of the helicopter and trained personnel, through to the systems required to support the helicopter before and after it flies.

Lockheed Martin outlined the background and objectives of the programme, and considered some of the technical, schedule and programme complexities. The presentation looked at examples of how complexity has been managed to meet specific objectives for stability and design assurance, and the tools and processes that have been introduced to manage stakeholders, requirements, design baselines and change. For example, stakeholder management can be complicated by personnel changes in customer organisations: established processes and shared tools enable both visibility and shared working, creating the necessary framework for stability.

Key points were summed up as follows:
- Managing complexity is possible given adequate design stability: creating stability in the engineering design process requires the establishment of clear boundaries for customer/stakeholder acceptance activities through staged events.
- Change happens in any programme, and can create difficulty: it must be managed quickly and effectively, by introducing baselines early so that change is managed around them.
- If there is customer acceptance of details, ensure the design is prototyped and accepted as early as possible before design freeze.
- Strive for the paperless programme.
- Avoid 'information stovepipes' by using common tools and maximised visibility through shared work areas with all stakeholders.
- Institutionalise the use of metrics to help identify problem areas before they occur.

The Nichols Group provided a non-technical perspective on the 'personality' of complex projects, proposing that it is an important influence on systems integration involving multiple teams or organisations.

These ideas came from first-hand experience of reviewing several large rail and finance sector projects, all of which required management and reconciliation of complex issues, and where common patterns and behaviours were encountered.

Two dominant personality types were outlined: the silo and the system personalities, both of which are necessary for the successful delivery of complex projects. The silo personality is where the team is encouraged to focus solely on their internal objectives. It is beneficial during the 'build' phase of a complex project, providing a strong delivery focus through defined objectives and enabling multiple teams or work packages to proceed concurrently within clear reporting lines.

In contrast, the system personality considers how all the different aspects of a project link together to make the whole; it is crucial at the beginning of a project and to handle the multiple, complicated and time critical issues that can arise at the integration phase prior to bringing assets into use.

These ideas were illustrated using the case study of St Pancras station, where solutions were found through consensus to issues that arose during the late stages of the programme. The project had a number of technical, operational and commercial stakeholders with different views. Stakeholder representatives were brought together in ad hoc teams which met several times a week to solve specific issues. Facilitated and coordinated by a 'system role model', system behaviour and action were reinforced at these integration meetings, and it was made clear that silo behaviour in the late stages was not welcome.

The presentation concluded by summarising the skills needed to create successful systems integration outcomes.

In 2006 the PA Consulting Group was commissioned by NHS Connecting for Health, which is delivering the National Programme for IT (NPfIT), to shape and deliver a programme that underpins emerging health policies. With an ageing population and an increased prevalence of chronic illness, UK public health care is generally moving away from treating people on an episodic basis, to treating long-term conditions such as diabetes.

While the telehealth project is relatively small compared to the overall NPfIT, its objectives are huge. It is designed to implement preventative care services, which will be delivered to patients closer to home via telecommunications technologies. These will be enabled by a new range of remote monitoring devices supporting services such as telecare, (e.g. tracking of medication) and telehealth (e.g. monitoring of blood pressure and glucose levels). The telehealth programme involves developing new concepts into operational services, and requires collaboration across many different stakeholders.

PA Consulting outlined the background to this emergent project and explained that the key objective was to establish a robust and scalable technical infrastructure with both suppliers and selected end-users, catalysing a structural change in the industry. The challenge involved creating a supply chain that both serviced immediate needs and evolved along with the NHS in servicing long-term ones.

The management of this programme required a tailored approach, focusing on two factors or complexities: a high degree of uncertainty because of immature technologies and the fact that those technologies have not yet been widely adopted.

A flexible approach to programme delivery was essential. PA explained how this had been achieved by establishing and communicating a clear vision for the future, and using this to focus efforts on initiatives that not only realised short-term value but also built towards the long-term vision. It was explained that the vision had to be sold at every level of the NHS in order to bridge the gap between policy 'theory' and front line 'practice', and to ensure that there was sufficient momentum to carry it through.

A number of trials and pilots have been designed to make the vision real to the user community, and to create demand and support through seeing what is possible. Once the vision had been adopted by a number of people certain key lines of development were defined, and 'time-boxing' of work packages implemented to judge the effect of these trials and whether to continue investing in them.

Early trials have shown that the use of such technologies is welcomed by patients, carers and clinicians, and in the longer-term are also a much cheaper option for patient care. However, adoption of the techniques is at present very limited, and the challenge is to move to large wide-scale use within the timeframe implied by the demographics.

COMPLEXITY AND AIR TRAFFIC MANAGEMENT

In 2007–08 NATS amalgamated two separate operational sites and moved 500 staff and support systems from the air traffic control centre at West Drayton, near Heathrow, to Swanwick in Hampshire. Although an earlier project had encountered problems, this later programme was delivered under budget and on schedule without any adverse impact on air traffic operations.

This presentation outlined the problems that had to be overcome, and discussed some of the themes which were instrumental in making this complex programme an unqualified success.

NATS controls air traffic, not just at the UK's 15 major airports, but over the whole of the UK and the North Atlantic region out to 30 degrees (longitude) west. Any reduction in operations impacts not just on the UK, but affects the rest of Europe and flights to the US. The programme involved relocating an operation that could not stop and integrating it into another operation that could not stop, whilst not compromising safety in any way. In addition, it involved relocating people from a centre which had been operational for 20 years, many of whom were not convinced the move could be done effectively.

The main message distilled from the management of a complex move and complex integration programme, with sceptical staff, was: do not try and manage complexity, but reduce it and limit the amount of change. On this programme, reducing the complexity not only reduced the risk in implementing the project, but also saved money.

Programme complexities were divided into manageable self-contained chunks, and the interfaces and interactions managed. New systems were implemented only when absolutely necessary – it was noted that there is often a temptation when undergoing a change to look at what is wrong with a system, and use it as an opportunity to implement new functions in this programme

One of the key requirements for success was creating the right environment, and the right relationships of people in the teams. Building trust and understanding by having regular meetings and other communication with staff and the unions was key to success. It was crucial to listen, respond and support individuals throughout the change cycle, which involved considerable change in people's private and professional lives. Without the buy-in of the individuals concerned, change would have been impossible.

THE COMPLEXITY JOURNEY AT THE DVLA

This presentation from IBM explored their partnership with the Driver and Vehicle Licensing Authority (DVLA) undertaken through the Partners Acting in Change Together (PaCT) contract. PaCT's pilot project, Electronic Vehicle Licensing (EVL), was to enable the public to license vehicles over the internet. EVL's two major functions are to allow a user to re-license their vehicle and declare a Statutory Off Road Notice (SORN). As is often the case with significant IT projects EVL had a range of issues, complexities and challenges to overcome, but was delivered very successfully. One of its outcomes is that the DVLA is now one of the biggest online retailers in the UK, with more than a millions transactions per month.

From this highly successful beginning, the DVLA and IBM have continued on a journey to extend the breadth of online services, and also deliver further business objectives, business efficiencies and maintenance of the IT estate. Various aspects of this journey were examined, looking in particular at key areas of complexity growth such as changes to the stakeholder base, increases in the number of business priorities and projects, and technology and environments. For example at the beginning of a project it is important to decide whether you are putting in a practical solution to current problems, or a strategic one which takes account of any future IT systems and stakeholders.

The presentation ended with a number of points on improving change management:

- Consolidation leads to contention, which leads to complexity
- Build a 'content active' programme integration office
- Bundle change carefully
- Build shared outcomes to reduce change
- Test change early and then progressively avoid change

DELIVERING A MAJOR NEW UNDERGROUND RAILWAY IN AN HISTORIC CITY

Crossrail is seven years into a fourteen year project that will provide new mainline railway services from Maidenhead and Heathrow in the west, under London and out to Shenfield and Abbey Wood in the east. Existing surface rail infrastructure will be upgraded and connected to new tunnels, and eight new underground stations are to be constructed across London. Having achieved Royal Assent in July 2008 the delivery phase is now well underway, which has heralded changes to the delivery organisation, and engagement with stakeholders and suppliers. The objective is: *'A world-class affordable railway delivered through effective partnerships and project excellence.'*

Using this project as an example, Crossrail explored the main features that make railway projects particularly complex, with many logistical challenges, and how this complexity is managed. These features include:

- Project scale:
  - Railway projects may be a mixture of new infrastructure and systems, and upgrades of existing railway assets. They are linear, extend over long distances and are often located alongside existing railway infrastructure that must continue to provide services with minimum disruption. Working in central London poses particular problems in the provision of worksites with adequate access.
  - Land acquisition should really be considered as a project in its own right – on Crossrail, for example, there are 4,000 land parcels, not all of which will be purchased at once.

- Stakeholder management:
  - Projects include a wide range of diverse stakeholders (e.g. sponsors, local authorities, community groups and users, developers) and sufficient resources must be allocated to manage these effectively at the appropriate time.

- Project duration:
  - The duration of a railway project and the long operational life of its assets have a profound effect on planning. There are always step changes in a project of this scale, creating the necessity for defined stages and a change management programme. The corporate and project knowledge must be stored and actively managed so that it provides readily accessible knowledge.

    – Delivering the project:

        • Successful delivery requires established partner agreements and an agreed strategy. It involves identifying and managing the system, construction, information and physical interfaces; resourcing both internal and external interfaces; controlling value management and value engineering; and having optimised contractor involvement in the supply chain.

In summary, successful delivery depends on:

- Identifying and managing the system, construction, information and physical interfaces
- Resourcing both internal and external interfaces
- Controlling value management and value engineering
- Having optimised contractor involvement in the supply chain

CONCLUSION

Chairman of the seminar, Sir Robert Hayman-Joyce, summed up the proceedings by focusing on some of the main issues that had emerged during the day concerning people and process:

- Without effective leadership and a clear vision for going forward the project will fail.
- Turn disbelief into belief: in other words, 'Get your people on side because they are your most important asset.'
- The role of the honest broker in the war room is to bring the silos together and ensure people honour their commitments.
- Early thinking means thinking broadly.
- Simplify complex processes where possible
- Requirements are not always crystal clear and may change: it is essential to understand them properly before embarking on a programme, and be flexible to change.
- Establishing baselines enables measurement of progress – or lack of it – during the programme. Baselines in a project can be reset, but if they do not exist, earned value management is impossible.
- Choose the right metrics to drive behaviour and be prepared to change them if they are not working.

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