Managing at the Edge of Chaos: Lessons from Defence Acquisition

London | 10 Mar 2014
Understanding Complexity

Programme Complexity

Structural Complexity
- Size: Number of elements
- Interdependence of elements

Complex interactions; Total > ‘sum of parts’

Uncertainty
- Uncertainty in goals
- Uncertainty in methods

Structural Complexity compounded by uncertainty

Adapted from ‘Modelling Complex Projects’ (Williams, 2002)
Complexity Drivers

**Technical Complexity**
- Functional complexity
- System diversity

**Managerial Complexity (Structural & Dynamic)**
- Client-side Organisation
- Client / Provider Relationship
- (Global) Supply Network Issues

**Technological Novelty**
- Design Tools
- Novel Systems / Interfaces

**Timescale factors**
- Time Constraints
- Rapid Turnaround
- Project Durations
Programme Complexity: Maritime Defence examples

**Technically Complex:**
- >140 systems; >10M man hrs Design; >15M man hrs Construction (First of Class)
- Design products: >70,000 Integrated Product Schedule activities
- Bill of Materials: >25,000 parts; >130,000 items

**Managerially Complex:**
- 3x Tier 1 Suppliers & Complex Supply Network
- Developing management arrangements – collaborative approach
- International collaboration & supply solution
- Industrial sustainment & demographics

**Technologically Novel:**
- New Propulsion technology
- New Weapons systems equipments

**Long term dynamic system:**
- 20+ years acquisition, 30+ years operation
- Managing Obsolescence
- Technology Insertion & Upgrade
# Technology Issues 1: Differing Technology Cycles

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- Full Lifecycle: Concept, Design, Build, Operate, Refit, Operate, Dispose
- Hull Life: 25 Year Hull Life; 5 yr Lifex
- Propulsion: 20 year technology cycle?
- Electro-mechanical/ weapons: 10-15 year cycle?
- Power Systems: 10 year cycle?
- Electronics: 
- Software: 
- Moore’s law: 

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*Source: BMT Group*
Technology Issues 2

- **Ability to predict required Performance**
  - Forecast threat development
  - ‘Black swan’ technologies
  - PESTLE issues – oil price, bases, operating areas

- **Obsolescence Management**
  - Life-time purchase of spares
  - In-build obsolescence management
  - Supply Chain Fragility

- **Integration**
  - Physical Integration into challenging environment
  - Functional Integration of complex systems
  - Dynamic system
  - Multi-national interoperability
Systematically Analyse Complexity

Product Process Organisation

Structural Complexity

Size: Number of elements

Interdependence of elements

Complex interactions; Total > ‘sum of parts’

Programme Complexity

Changing Requirements

Uncertainty

Uncertainty in goals

Uncertainty in methods

Structural Complexity compounded by uncertainty

Novel Technology, New Interfaces

Business Change

Adapted from ‘Modelling Complex Projects’ (Williams, 2002)
Complexity and Uncertainty

- Increasing Structural Complexity
- Increasing Uncertainty

Complex Systems: Information structures & Product breakdowns

‘Traditional Project Management’: Defined Tasks Bounded Risk

‘Complex Programme Management’

‘EDGE OF CHAOS’

Scenario Management

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Governance, Control and Assurance

Governance: ‘the means by which order is accomplished in a relationship in which potential conflict threatens to undo or upset opportunities to realize mutual gains.’

- Fully Understand Stakeholder Objectives
- Establish and sustain right cultural environment
- Create clear structures and boundaries
- Measure progress and make risk-aware decisions focussed on successful project delivery
- Report to enable risk-aware strategic decisions
- Deliver Programme Outcomes to meet Stakeholder Needs

(Client and Providers)

Government/ Industry Relationship: SCM, Partnering, Incentivisation

Project objectives, Scope, OBS, WBS, CBS

Earned Value Mgt & Risk Analysis, Engineering & Mgt processes

Programme Review Structure

(Client and Providers)

Governance: Stakeholder Goals in Tension

- **Shareholders/Employees**
  - Increased Return on Investment
  - Economic Benefits

- **Contractability**
  - Increased Security of Supply

- **Capability**
  - Increased Effectiveness

- **Affordability**
  - Reduced Opportunity Cost

- **Military Users**
  - Increased Security

- **Taxpayers**
  - Increased Economic Benefits

Align goals & reconcile tensions to deliver Programme benefits

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Management as both Art and Science

Less prescriptive approach requires confidence that lower level projects run to meet PTC goals

• Clear definition and flow-down of objectives
• Allow flexibility in meeting objectives – ‘Mission Command’

More sensitive to relationships

• Complex relationships run greater risk of asymmetric information & sub-optimal decision-making
• Greater need to develop and maintain trust

Requires more experience, less able to ‘productise’ problems

• Need for Leadership as well as Management
• Ability to make decisions on lower levels of certainty
• Need to allow for the ‘unknown unknowns’
Summary: Lessons for project delivery

Systematically analyse complexity at outset …
• Technical/Integration; Managerial; Technological; Urgency & Timescale

… but don’t become a slave to process
• Process can speed analysis for short turn around projects
• Process can obscure for complex projects

PLAN:
• Set out clear Objectives based on rigorous analysis at appropriate level

MONITOR:
• Set up Control Organisation and Process to deliver to Objectives
• Set up leading performance indicators - One size does not fit all!

REPORT:
• Single Version of Truth for Stakeholders to take Strategic decisions
Thank you

Acknowledgements:
Williams, T. “Managing Complex Projects” (2002)
NAO “Effective Project Control is a Key Factor in Successful Projects” (2005)
Williamson, O.E. “Mechanisms of Governance” (1996) and other papers
OGC “Managing Successful Programmes” (2007)

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