Exploring the link between complexity and risk – The energy view

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About Dimitris

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Author of the book ‘Demystifying Project Control’

Worked for various organisations such as:
And in various roles:
Programme Manager, Head of PMO, Project Manager, Head of Project Control.

PhD in Complexity, MSc in Project Management and BEng (1st) Mechanical Engineering

• Fellow of the Association for Project Management
• Fellow of the Chartered Management Institute
• PMGreece founding member
The presentation will cover:

• Some facts about the background and the challenges in the energy sector
• Decisions and approach to tackle the challenges
• Software systems and structures
• The approach to Risk Management
• The Issues with the implementation
• Some results from surveys, interviews and case studies
• Rethinking the approach - the call for complexity management
• Complexity characteristics
• Conclusion / Discussion
The energy background and the challenges - 1

- The external environment
- The Internal environment
- The collaborative environment - Contractors / Suppliers
- The interconnections between the organisations
- The implementation of processes.
- The large number of small projects.

For example:
- Regulated annual workload: approx. 45% of projects with budget less than £0.5M
- Non-regulated annual workload: approx. 75% of projects with budget less than £200K

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The other challenges and decision taken

- Faced with the above and the RIIO – ED1 requirements for:
  - Significant efficiency and innovation
  - Quality and service
  - Difficult competitive landscape
  - Skills shortage

- Embarked on major Business Transformation Programme changing processes and systems to enable:
  - Collaborative working
  - Geographical diversity
  - Varying work practices
Risk Management & Structures

Managing Risks from within a plan

Risk Breakdown Structure

Aiming to:

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Risk Management examples
Risk Management

governance and reports

Monthly Director level report by Programme Manager

Submission to the Risk Advisory Board

Linking risks to activities
The issues

- Compliance at all levels
- Adherence to IRM guidelines
- Standardisation
- Data integrity by transferring data to excel
- Commercial process issues
- The proper implementation of collaboration processes
- Understanding of the use of various tools e.g. buffers
- Behaviours
- Follow up
- Interfaces
- The initial conditions
- Integration of corporate tools

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Results - 1

The prevailing conditions in projects


Dynamic & Complex

Percentage of respondents

More Static, Simple, Friendly

Static, Simple, Friendly

Half way

Dynamic, Complex

More Dynamic, Complex


According to the practitioners surveyed Management Style is the biggest contributor to success.

IM is within this group of process.

Contribution of project management sub-processes to the success of the quality of the project management for levels – Substantial to Excellent

% Drop in Performance - Only Construction Case Studies


Case Study G1.1.2

Case Study G1.2

Constr Average

% Drop in Performance
Results from a relevant IUK survey are telling us that:

- The initial conditions
- Roles and responsibilities
- Selection of team members
- Team Structure
- Leadership
- Behavioural changes
- Data and information integration
- Systems and processes
- Performance
Since projects and programmes are defined as a temporary endeavour in a dynamic environment project management can be defined as:

*The management of transient, dynamic and complex adaptive systems/agents, so as to deliver the expected change within certain parameters that are established by seemingly ordered and stable environments.* (Antoniadis, 2009)

Therefore, we need to change our mode of thinking and consider project and programme management, especially in a collaborative environment, under a different viewpoint and in the context of complexity. But first we need to look at the definition.
Complexity is defined as ‘the dealing with interconnections between dynamic systems’ and has characteristics (as defined by C.Lucas of CalTech).

Classification of complexity characteristics by type (Antoniadis, et al., 2006)

**Conditional:**
Autonomous Agents, Instability, Non-equilibrium, Non-linear, Attractors

**Developmental:**
Co-evolution, Self-modification, Downward causation, Mutability, Non-uniform, Emergence, Phase changes

**Behavioural:**
Unpredictability, Non-standard, Undefined values
What needs to be considered

With Complexity we need to consider:

• Importance of initial stages,
• Minimise the introduction of ‘pathogens’,
• By understanding the length of the pathogens’ incubation period and when they are likely to occur, we should be able to manage their effect and therefore the threats,
• Manage collaborative work and its risks through the management of complexity,
• Implement enablers through integration of data – in a truly open and transparent environment,
• Look at the monitoring activities and make these as less intrusive as possible,
• How do we manage the effects of complexity through its characteristics on the specific process(es) as well as the compound effect of these.
To improve the link between Complexity and RM we need to:

- Identify the Complexity characteristics that affect the Risk Management process,
- Develop a framework (a working tool) that will enable the project teams to work through and take the right steps to deliver the process,
- Improve the integration of the cost loaded schedule with the threats and opportunities – no more segregation of data,
- Educate the project teams about the importance of the interfaces with others and the effects of these on the threats / opportunities,
- Improve the environment within which the project teams are attempting to implement the risk management process (using the complexity framework)
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Complexity Characteristics

**Autonomous Agents**
Complex systems are generally composed of independent or autonomous agents. All of these agents are regarded as equally valuable in the operation of the system.

**Non-Equilibrium**
Energy flows will drive the system away from an equilibrium position and establish semi-stable modes as dynamic attractors.

**Non-linear**
Complex system outputs are not proportional to their inputs.

**Co-evolution**
The parts are regarded as evolving in conjunction with each other in order to fit into a wider system environment.

**Downward Causation**
The existence and properties of the parts themselves are affected by the emergent properties (or higher level systemic features) of the whole.

**Unpredictability**
In interacting systems a chaotic sensitivity to initial conditions can occur.
Results – 1a

The prevailing conditions in projects

Results – 1b

Contribution of project management sub-processes to the success of the quality of the project management for levels – Substantial to Excellent

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Results – 1c

% Drop in Performance - Only Construction Case Studies


Average drop in performance due to not managing the effects of complexity:- 50%