Project Complexity

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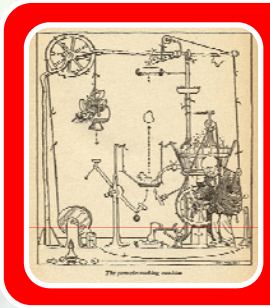
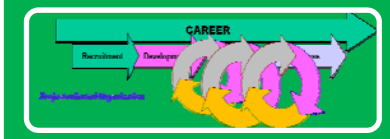
Talking about Complexity



Causes of Complexity in Projects



Responses to Complexity

Why do we do it, and what do we mean when we are

Talking about Complexity?

What is Complexity?

- No generally agreed definition
  - "If you don't know what will happen when you kick it, then it is complex."
- Any definition risks being inadequate
  - "Complex" is different from "Complicated"
  - Complexity is both relative and absolute.

Why are we so interested in it?

- Need for managers of more challenging projects
  - Failure of organizations to grow their own
  - Aging workforce
  - Challenge of Gen Y
- "*Significant growth in project work*"[1]
  - More of the world's problems present complex challenges.
  - Changing face of globalization calls for cross-cultural, international co-operative working.
- Multiplicity of relationship models
  - Alliances, partnerships, outsourcing……
- Reaction to the focus on the common denominator
  - In PM standards, certification, education and training

1. Winter, Smith, Morris & Cicmil, 2006

Various perspectives

- Rethinking PM, 2006
  - “complexity of projects”
  - “complex project environments”
- CSIS/MIT Investigation for Pentagon
  - Sheer number of moving parts and interfaces
  - Non-decomposability
  - Focus on governance
- ICCPM (Formerly CCPM)
  - Founded 2006
  - Re-born 2008
  - Strong interest from global defence community
- Cicmil, Cooke-Davies et al, 2007
  - “complexity in projects”
- Numerous Publications
- PMI 2007 →
  - Multiple workshops
  - “Aspects of Complexity” to be published in June 2011

Arguably all projects are complex

- …if people are involved

  "Consider what happens in an organisation when a rumour of reorganisation surfaces: the complex human system starts to mutate and change in unknowable ways; new patterns form in anticipation of the event.

  On the other hand, if you walk up to an aircraft with a box of tools in your hand, nothing changes"

Snowdon, 2002

What are

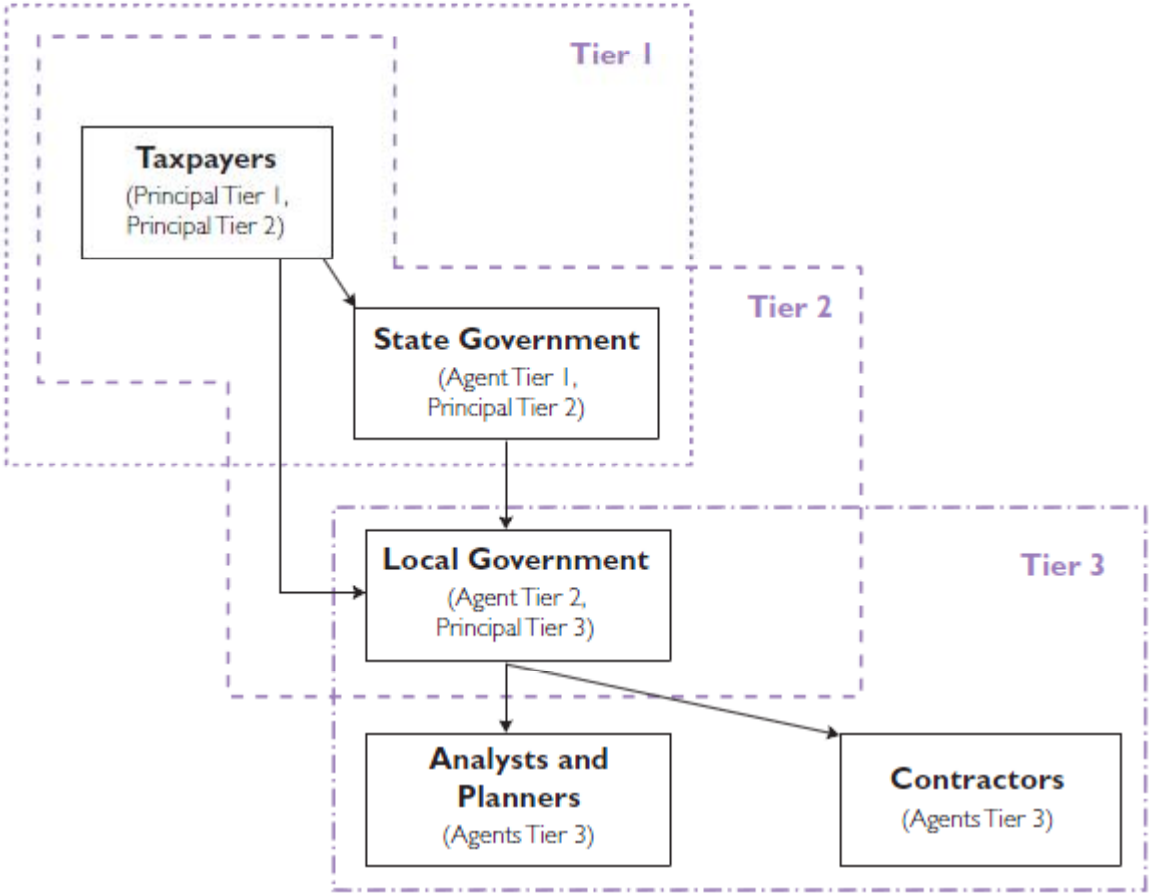
Causes of Complexity in projects?

Human Beings are ambitious, and projects involve diverse interests.

- Consider behaviours between Project Owner as Principal, and Project Manager as Agent.
- There is a critical need for
  - Alignment of interests between principal and agent
  - Use of both structure and collaboration to deliver high performance
  - Productive, trusting working relationship.

Source: Turner J. R. and Mueller, R.. (2004)

With Complex Projects, This Situation is Compounded… …



The number of tiers, and the differing pressures and interests make the prerequisites for effective P-A relationships harder to achieve, and the challenges presented by equivocal goals and multiple agendas far more severe.

Source of Diagram: Flyvbjerg at. Al. (2009) *Delusion and Deception in Large Infrastructure Projects*. California Management Review. Vol. 51, No.2 p177

… And Unforeseeable Behaviour by Principals Impacts Project Performance.

As NAO writes in the 2009 Major Projects Review:

"Such corporate decisions [to slip projects] make it difficult to conclude on the effectiveness of the delivery of individual projects by both the Department's staff and its commercial partners. It would be unfair to chastise those charged with delivering projects when the major drivers of cost increases lie outside their control."

One Consequence: Goals are Equivocal, with Multiple Agendas.

"Did (the company) achieve a positive financial outcome? Yes. Was it was what they'd originally thought? No. Did the customer achieve their outcomes? Yes. Was it in the timeframe they'd hoped for? No. Overall the project will have been a success. It will probably cost a little more than it should have and probably taken a little more than it should.' [PS-02: Project Sponsor]

There are gaps between what we communicated and the customer expectations. Although I find you can always cover more in the scope, in pre-sales, there are many implicit requirements and commitments that don't necessarily get communicated in the scope documentation. This is where trust between companies comes in. There is not always enough time to clarify gaps, so the gaps stay there. Sometimes you never need to address those grey areas, but sometimes you do and if necessary you go into escalation. If we promise something and don't deliver, everyone suffers. Expectations versus what is in writing is a problem. [PS – 01: Project manager]

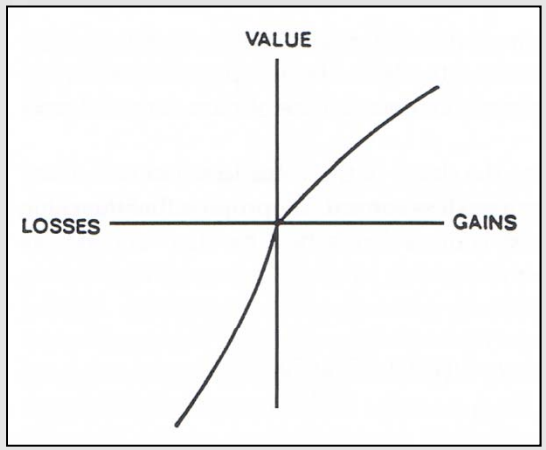
Svetlana Cicmil et. al (2009) Exploring the Complexity of Projects: Implications of Complexity Theory for Project Management Practice. Project Management Institute..

- Prospect Theory
- Delusions of Success
- Executive defensiveness
- Human decision-making and irrationality

Aspects of Human and Organizational Behaviour

Prospect Theory

- Kahneman & Tversky awarded Nobel prize for economics in 2002.
- Challenged “expected utility theory” of decision-making under risk. (Rational choice)
- Attitude to risk depends upon the “frame” through which it is viewed.
- More willing to entertain risk for “gain” than risk of “loss”
- Introduces human behaviour and psychology into decision-making theory.



Delusions of Success

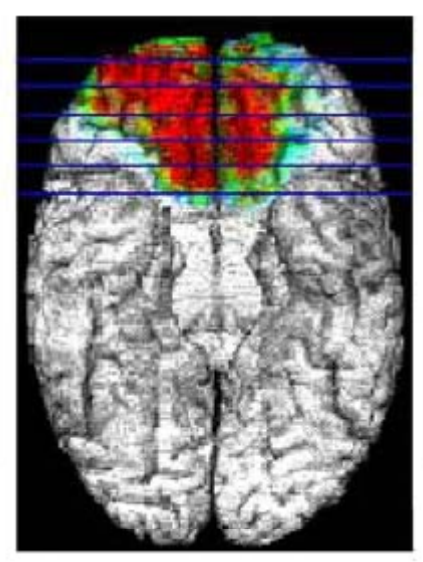
- Lovallo and Kahneman (2003) in HBR stated:
- “In planning major initiatives, executives routinely exaggerate the benefits and discount the costs, setting themselves up for failure.”
- They cited three contributory factors:
- Optimism bias, reinforced by attribution errors and the illusion of control
- Anchoring
- Competitor neglect

A Decade Earlier, Argyris Had Pointed Out How Bad Executives are at Learning

- "Teaching Smart People How to Learn", HBR, May-June 1991.
- "Professionals embody the learning dilemma: they are enthusiastic about continuous improvement – and often the biggest obstacle to its success."
- Executives strive
  - To remain in unilateral control;
  - To maximise "winning" and minimise "losing";
  - To suppress negative feelings; and
  - To be as "rational" as possible.
- Use their intelligence to "reason defensively", and avoid "doom loop".

Human decision-making and irrationality

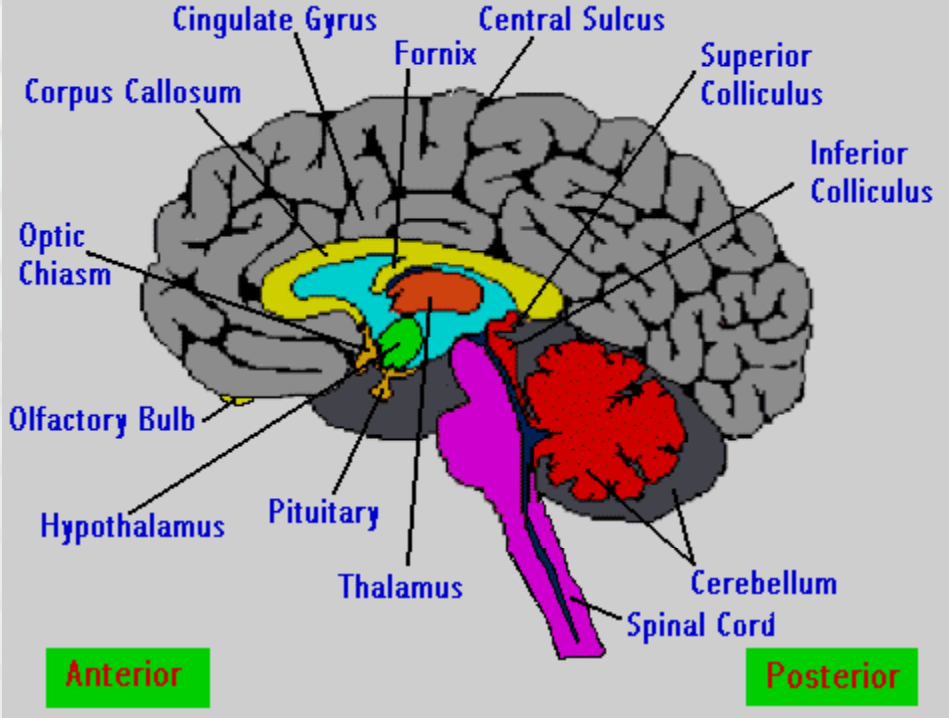
- Wason's experiments nearly 50 years ago showed that emotion drives decision making:
  - 2 4 6
- Neuroscience is reinforcing that understanding.
  - E.g. Bechara (2004) The role of emotion in decision-making. Brain and Cognition Vol 55. 30-40



"Strategic Misrepresentation"

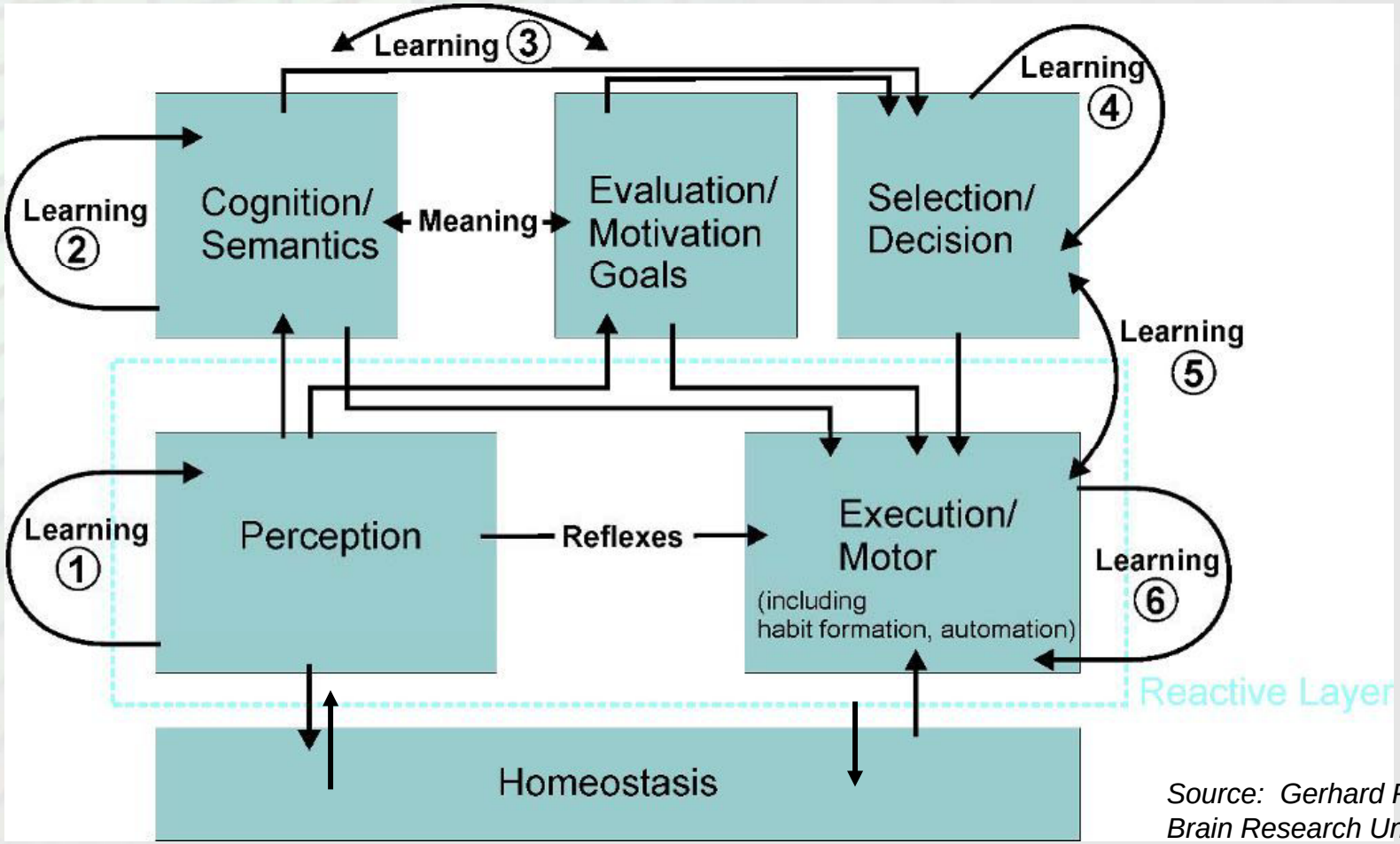
- Flyvbjerg and his colleagues agree about optimism bias, and the need for an outside look, but
- Cite "strategic misrepresentation" as a more significant factor than optimism bias, especially when political pressures are high for the project to go ahead.
- But Human Beings have many ways of lying to themselves and each other.
- It is culturally embedded in our tribal history for ca. 300,000 years.

The Human Brain Is Complex



- Weighs ~2% of body weight, yet uses 25% to 40% of energy.
- Limits energy usage utilising habit and reflex.
- Is itself a source of complexity: 1 signal at periphery could become 100,000 impulses at centre.

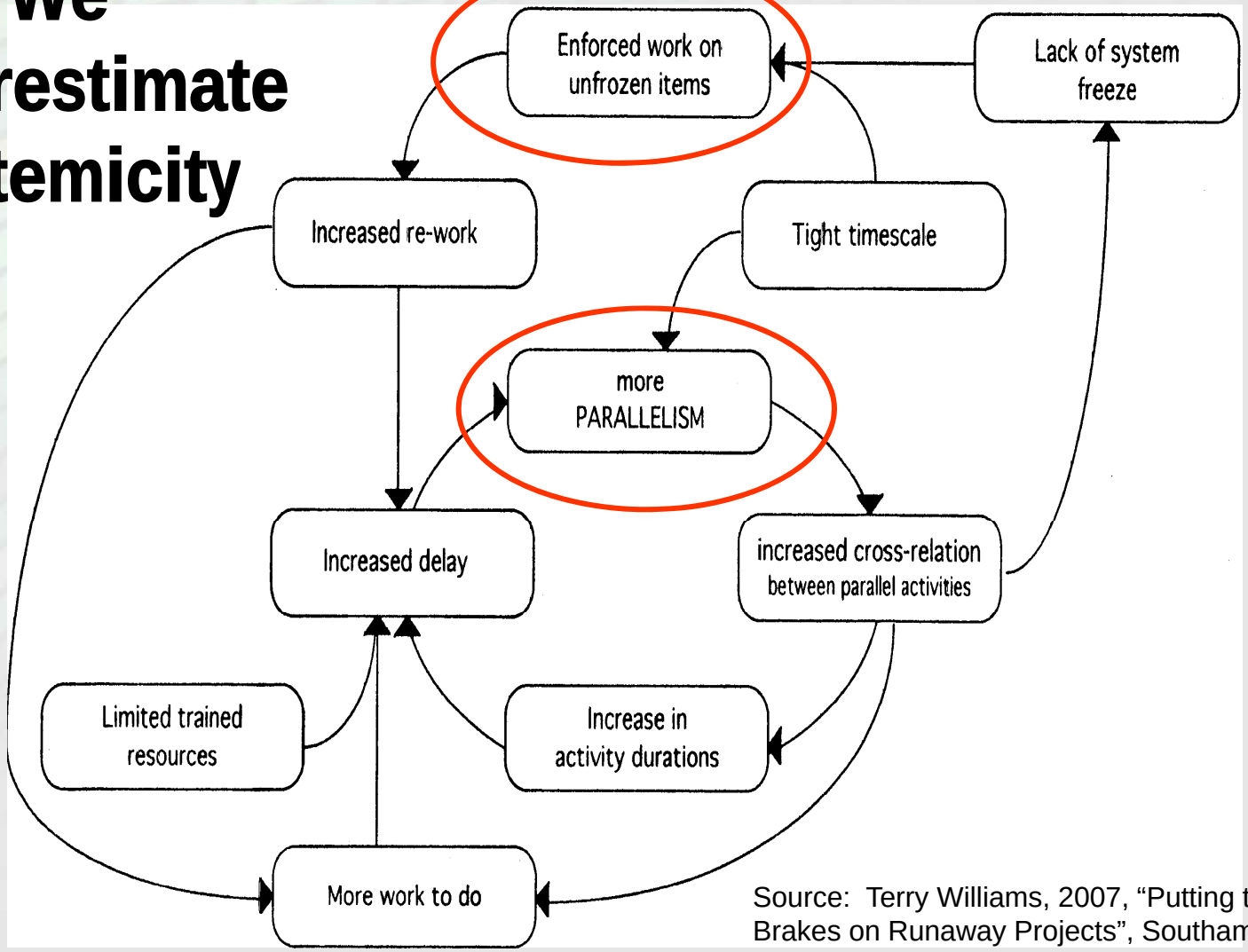
PARALLEL-CONVERGENT-DIVERGENT CIRCUITRY OF MAJOR FUNCTIONAL BUILDING BLOCKS OF THE BRAIN



Source: Gerhard Roth: Brain Research Unit: University of Bremen

HIERARCHICAL-HETERARCHICAL ORGANIZATION

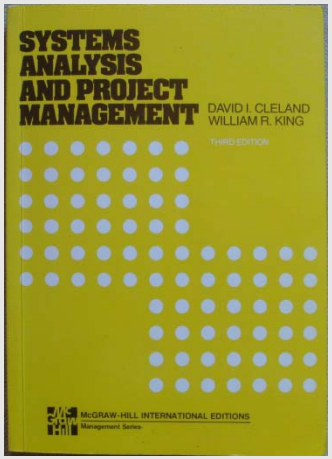
We underestimate Systemicity



Source: Terry Williams, 2007, "Putting the Brakes on Runaway Projects", Southampton University, Concertante Consulting

Project Management Was Born In A World Of Systems

Atlas Program: 1954. Under leadership of General B. A. Schriever implemented management system to oversee and manage the development of the complete missile system. Specified concepts fundamental to all future project management.



Cleland and King's 1968 Classic made the link explicit between the system (or product) being developed and the (management) system for controlling its development.

Polaris Program: 1956/57. Under Admiral Raborn, the program developed Program Evaluation and Review Technique (PERT) – one of the two sources (with Critical Path Method) of modern Critical Path Analysis.

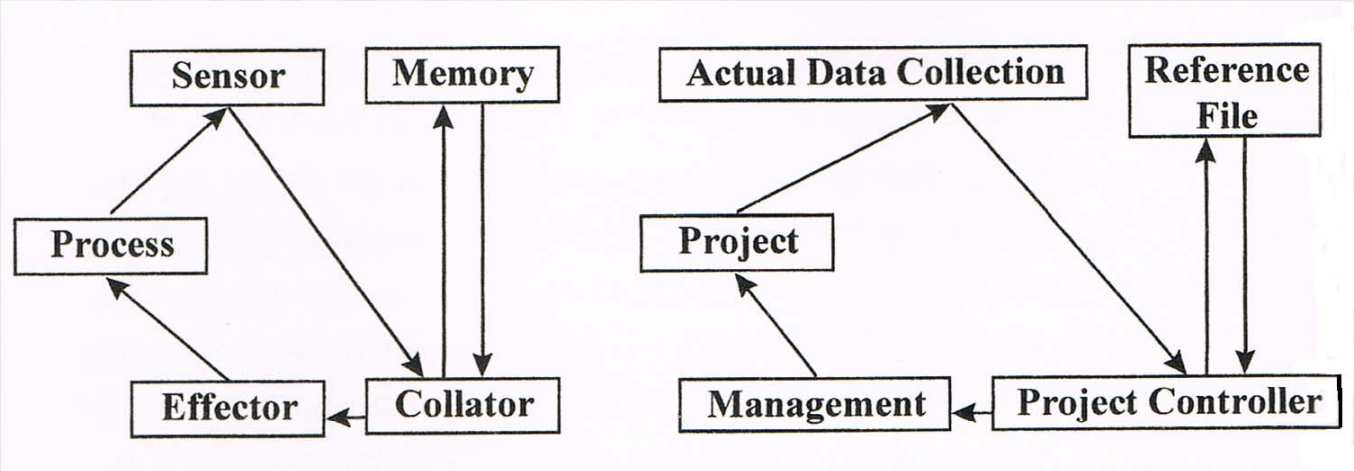
Two Days in July 1969

20 July

2 July

Source: Stephen B. Johnson, (2002) "The Secret of Apollo". Johns Hopkins University Press. Baltimore and London

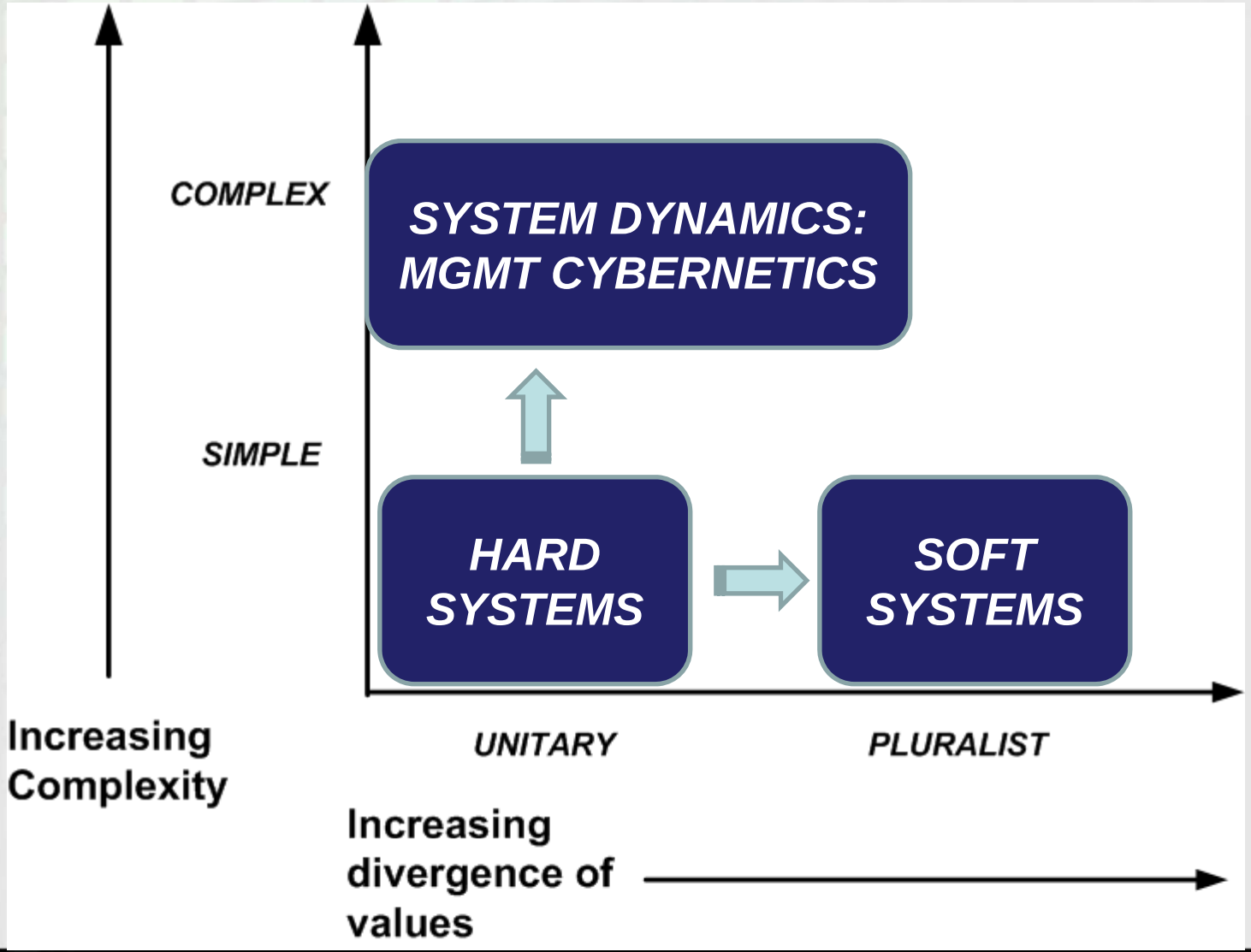
Each Project Stood Alone



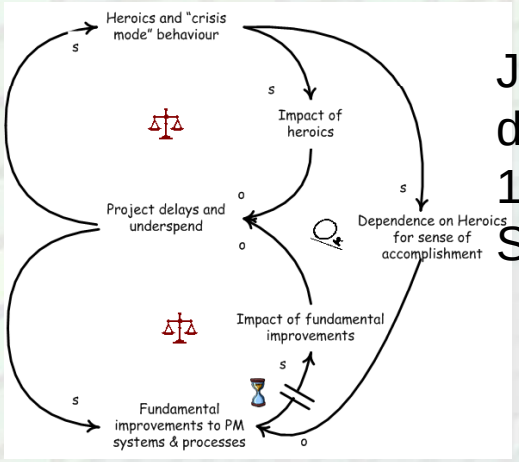
- Illustration from recommendation by H. Hoernke to ESRO for the design of a suitable Management Information System (MIS) in 1968.

Source: Stephen B. Johnson, (2002) "The Secret of Apollo". Johns Hopkins University Press. Baltimore and London p198

Systems Thinking… …

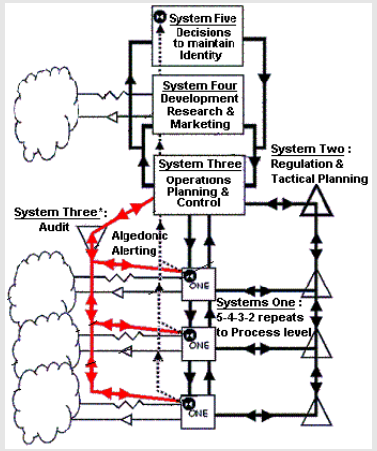


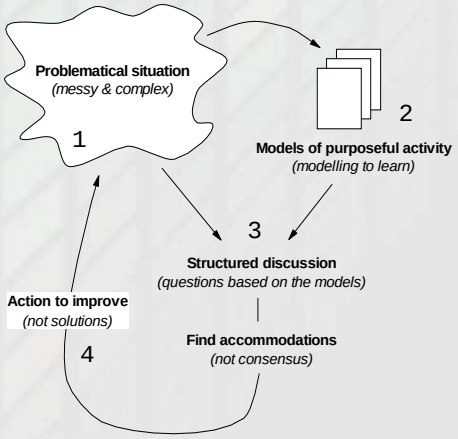
… In Management …



Jay Forrester and others have been developing System Dynamics since the 1960s, and it was popularised by Peter Senge in the 5th Discipline in the 1990s

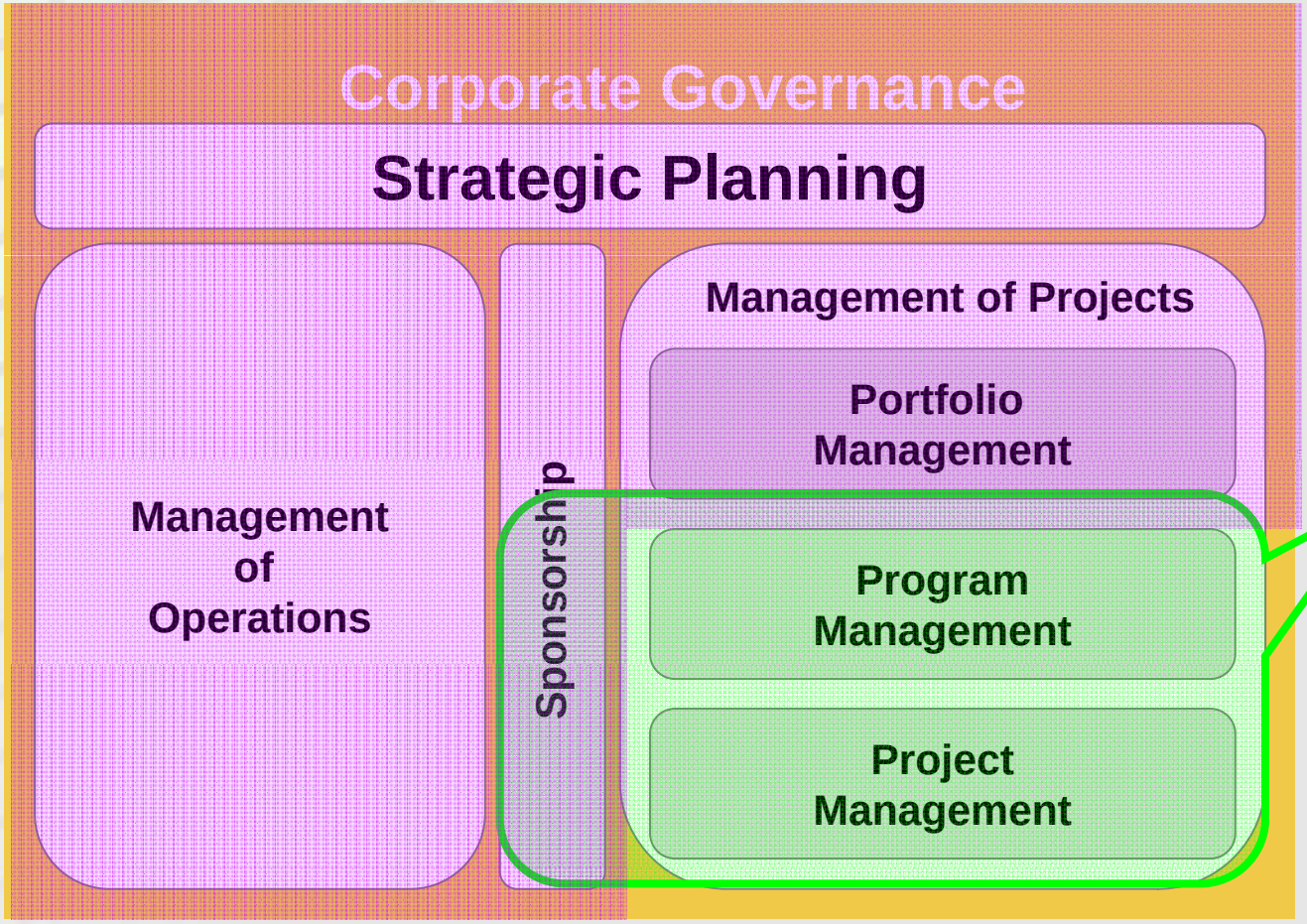
Cybernetics and Operations Research has given rise to concepts such as Stafford Beer's "Viable Systems Model", and similar concepts employed in Systems Engineering.





Peter Checkland and others have been developing Soft Systems Methodology since the 1970s.

PM is EMBEDDED… …



And BAU is Different

	Projects & Programs	Business as Usual
Organization	Temporary: Purpose = Delivery	Permanent: Purpose = Survival
Challenge	Innovation: Realizing Envisioned Future State.	Adaptation: Improving Known Current State.

But BAU Influences Many Parts of a PM System

- Policy
  - Strategic importance of project management
  - Organizational commitment to project management
  - Maturity level
- People
  - Recruitment, development and maintenance of a program and project-capable workforce.
  - Development of leadership.
  - Encouragement of suitable loose-tight discipline
- Structure
  - Project organization
  - Governance structure
  - PMOs
  - Resource allocation
- Processes:
  - Strategy delivery through portfolio management;
  - Governance processes;
  - Project management processes;
  - Regular organizational processes fit for programs and projects.

How can we develop practical and effective

Responses to Complexity in projects?

Possible Characteristics of PM 2.0

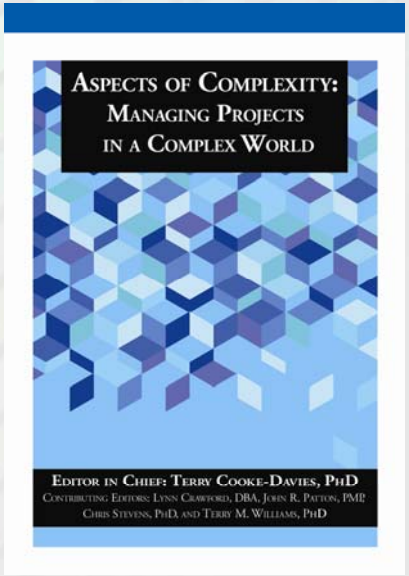
- **Incorporates, but extends, PM 1.0.**
- **Permits "Corporate Jazz"**
  - To exploit complexity with elegance,
  - To encourage innovation,
  - To permit agile and other flexible methods,
  - To attract Gen Y and Gen Z into "the Guild of Project Managers"

Some Ideas from a Rich Source

1 Four ROWS Workshops

2 Illustrious authors:

- Stephen Hayes, Paul Goodge and Dan Bennett
- Kaye Remington
- Christoph Loch and Fred Payne
- Stephen Carver and Harvey Maylor
- Dale Shermon
- Lynn Crawford and Ed Hoffman
- Terry Cooke-Davies
- Terry Williams
- Peter Checkland
- Andrew Dawe



At Organizational Level

1. Drive portfolio selection and evaluation through “value” creation aspects of individual programs/projects, involving both PM and SE in dialogue.
2. Track the “do-ability” of the portfolio in terms of resource capability and complexity.
3. Focus attention on workforce development.
4. Develop sophisticated top-down AND bottom-up estimating.
5. Develop corporate standards that allow different methods for different projects

At Governance Level

6. Establish governance structures to minimise optimism bias and political power-plays.
7. Ensure governance is appropriate for complexity of program/project, whilst using a range of techniques to reduce dysfunctional complexity.
8. Understand dynamic linkages, so as to avoid systemic risks.
9. Ensure sponsors are both competent and motivated to govern.

At Project Level

10. Emphasize leadership as well as management.
11. Develop range of tools to cope with complexity and encourage innovation.
12. Ensure PMs and teams have sophisticated understanding of “systemicity” in specific project.
13. Plug project team networks into organization-wide communities of practice.

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