Software Engineering Governance

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Why Projects Fail …

User Involvement

Clear Business Objectives

Controlled Scope

Standard Software Structure

Firm Basic Requirements

Formal Methodology

Reliable Estimates

From Standish Group CHAOS Reports

…1991…1992…1993…1994…1995…1996…1997…1998…1999…2000…2001…2002…2003…2004…2005…2006…2007…2008…

History repeats itself
[first as tragedy, second as farce]

Karl Marx

Ignorance

Poor training

Ill will

Flawed techniques

Inherent difficulty

an adequate explanation?

An Alternative *Theory*

That organisations are unable to avoid these problems because of structural issues and in particular problems (mismatches) at the interface between the structure of the business organisation and the organisation of software development

Experience

This theory is supported by some personal experience … illustrated later in this talk

A side observation … the relationships between business structures and software engineering are poorly understood and under-researched, for example the relationship between commercial procurement practice and software development

The core area of concern here is what has become known as 'governance'

or IT Governance

I will use the term Software Engineering Governance to capture my focus on software development

Definition(s)

Software Engineering Governance is the set of structures, processes and policies by which the software development and deployment function within an organisation is directed and controlled so as to yield business value and to mitigate risk

Often erroneously thought to be principally about regulatory compliance

Related to …

Software Engineering Governance is a component part of Corporate Governance - *the set of structures, processes and policies by which an organisation is directed and controlled so as to …*

align interests and incentives in the interest of the organisation as a whole and to mitigate risk within a framework of openness and transparency

Legislation …

Large corporate failures in the late 1990s focused attention on governance, giving rise to legislation (eg SOX). This attention necessarily ‘trickles down’ to the software function as a major means by which a business obtains value and locus of cost and risk

Observation …

The centrality of software systems to organisational performance is increasing significantly faster than development risk is decreasing

It is a critical organisational arena in which misalignments of interests and incentives manifest themselves

Requirements Engineering and, most notably, the management of requirements through the *life* of the system is closely intertwined with software governance

SOA (in both its *hard* and *soft* manifestations) substantially change the way that software is developed and deployed, particularly by decoupling services and processes and thus must confront issues of software engineering governance in new and more acute forms

It is important to distinguish governance from the *direct* managerial control mechanisms necessary to ensure ‘low-level’ good practice is followed

Adherence to mandated processes, use of libraries and configuration management, interface control

The State-of-the-Art … ‘standards’ and ‘best practice frameworks’

ISO/IEC 38500: 2008 Corporate governance of information technology

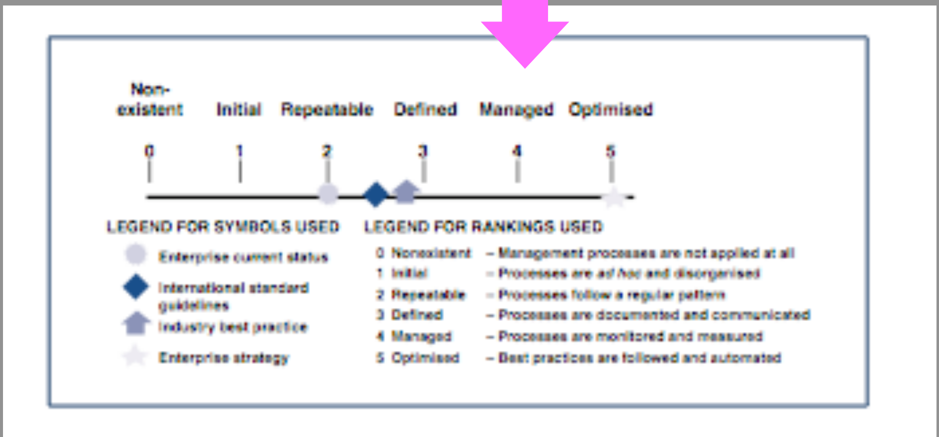
and national variants and precursors

COBIT: Control Objectives for Information and Related Technology (ISACA - Information Systems Audit & Control Association and ITGI - IT Governance Institute

And of course …

The inevitable maturity model

IT Governance Institute 'Board Briefing on IT Governance'



LEGEND FOR SYMBOLS USED

- ● Enterprise current status
- ◆ International standard guidelines
- ⬆ Industry best practice
- ☆ Enterprise strategy

LEGEND FOR RANKINGS USED

0	Nonexistent	– Management processes are not applied at all
1	Initial	– Processes are *ad hoc* and disorganised
2	Repeatable	– Processes follow a regular pattern
3	Defined	– Processes are documented and communicated
4	Managed	– Processes are monitored and measured
5	Optimised	– Best practices are followed and automated

ITGI focal areas for governance

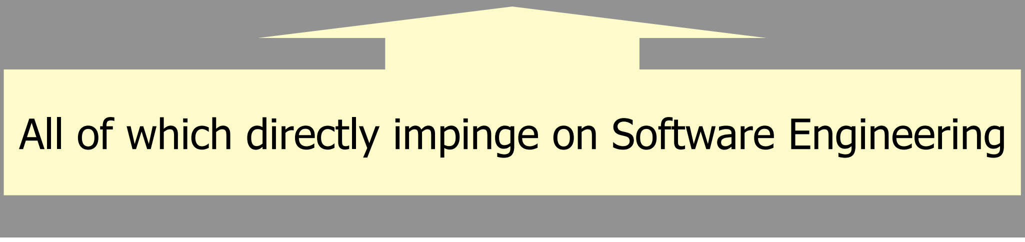
Strategic alignment

Value delivery

Resource management

Risk management

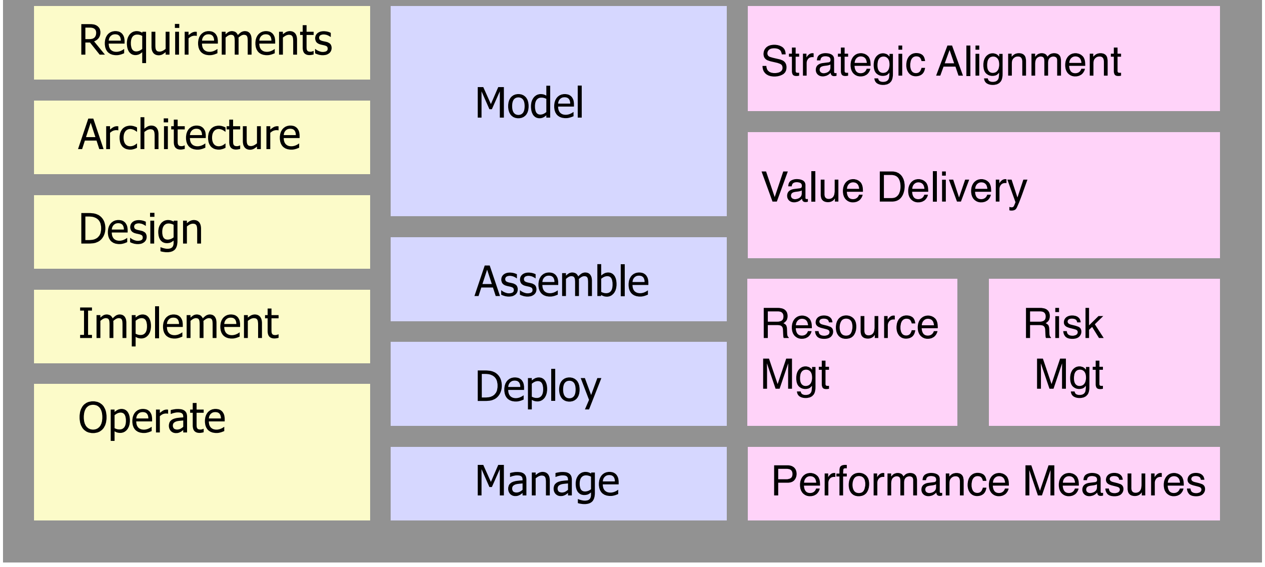
Performance measures



All of which directly impinge on Software Engineering

Lifecycle

There is a need for governance at every stage of the life of the system. The balance of attention shifts across focal areas as development proceeds.



Requirements

Architecture

Design

Implement

Operate

Model

Assemble

Deploy

Manage

Strategic Alignment

Value Delivery

Resource Mgt

Risk Mgt

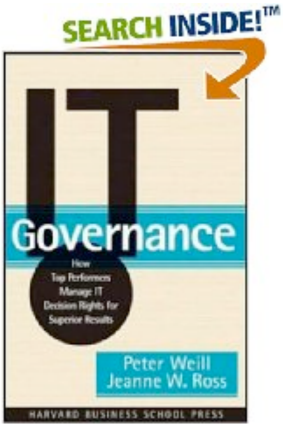
Performance Measures

Key research contribution:

Peter Weill & Jeanne Ross

‘IT Governance: How Top Performers Manage IT Decision Rights for Superior Results, Harvard Business School Press (2004).

Note the connection between performance and governance


SEARCH INSIDE!™
IT
Governance
How Top Performers Manage IT Decision Rights for Superior Results
Peter Weill
Jeanne W. Ross
HARVARD BUSINESS SCHOOL PRESS

10 Principles of IT Governance

1. Actively design governance
2. Know when to redesign

   for example when introducing SOA
3. Involve senior managers
4. Make choices

   provide a structure for highlighting conflicting goals
5. Clarify the exception handling process

10 Principles of IT Governance

6. Provide the right incentives

   align incentives and governance structures

7. Assign ownership and accountability for IT governance
8. Design governance at multiple organisational levels

10 Principles of IT Governance

9. Provide transparency and education
10. Implement common mechanisms

    across the six key assets

    relationship assets, human assets, IP assets, information and software assets, physical assets, financial assets

Structures typically in place

Board level - strategic investment management

Executive level - business case scrutiny and requirements management

Group level - technical authority

Operational level - monitoring execution of key decisions, risk and compliance

Operational level - design review and architecture compliance

Why is SOA governance particularly difficult?

Because business logic is shared outside traditional silos the potential company -wide impact of any given service becomes greatly increased

Complex ownership of services and relationships

Difficulties of aggregating services on a shared platform that delivers the appropriate non-functional properties

Why is SOA governance particularly difficult?

Ease of creating and using ‘rogue’ web services

Incoherent architecture arising from services developed in projects chartered to solve conflicting business problems

adapted from Laurent, 2007

Symptoms of poor governance in a SOA setting

Single use services and point-to-point connections

Proliferation of redundant services and data types

Inconsistent implementation of cross -cutting capabilities (security, reliability, transactions, logging, routing, filtering)

adapted from Manes, 2007

Risk & Compliance

Substantial growth in risk and compliance audit, most notably in the area of security

Methods not compatible with software development methods

Tendency to more ‘negative’ governance than ‘positive’ governance

Case studies (close to home)

‘CAPSA and its Implementation’

Report to the Audit Committee and the Board of Scrutiny of the University of Cambridge (October 2001)

Experience points clearly to the intimate relationship between governance and successful system development and deployment

Lesson learned …

An organisation with a flawed governance structure cannot articulate its requirements, charter a project, identify appropriately skilled staff, manage the concomitant change process, determine if the project has been successful or even deal with the consequences of failure

Case studies (close to home)

ABC is a large, research-intensive, metropolitan university in the UK. It has a dedicated and professional IT services function that engages in small-scale development and large-scale customisation and deployment projects.

A participant-observer

I have strong sense that many of the biggest problems encountered have their roots in governance issues or at the interface between governance and requirements engineering

Example I

Left Field

Complex processes with substantial IT implications introduced as it were ‘out of left field’, that is from other ‘lines of governance’.

Challenge: how can process and business governance arrangements be meshed with software governance

Example II

Gaps

Decisions driven down to too low a level in the governance structure leaving the technology to leverage the change. Inadequate intermediate level structures to mediate between strategic intent and execution

Challenge: how to ensure decisions and responsibility for changes are made at the right level within the organisation

Example III

Integrity

Failure to maintain the integrity of the planning and governance process in the face of senior management decision making

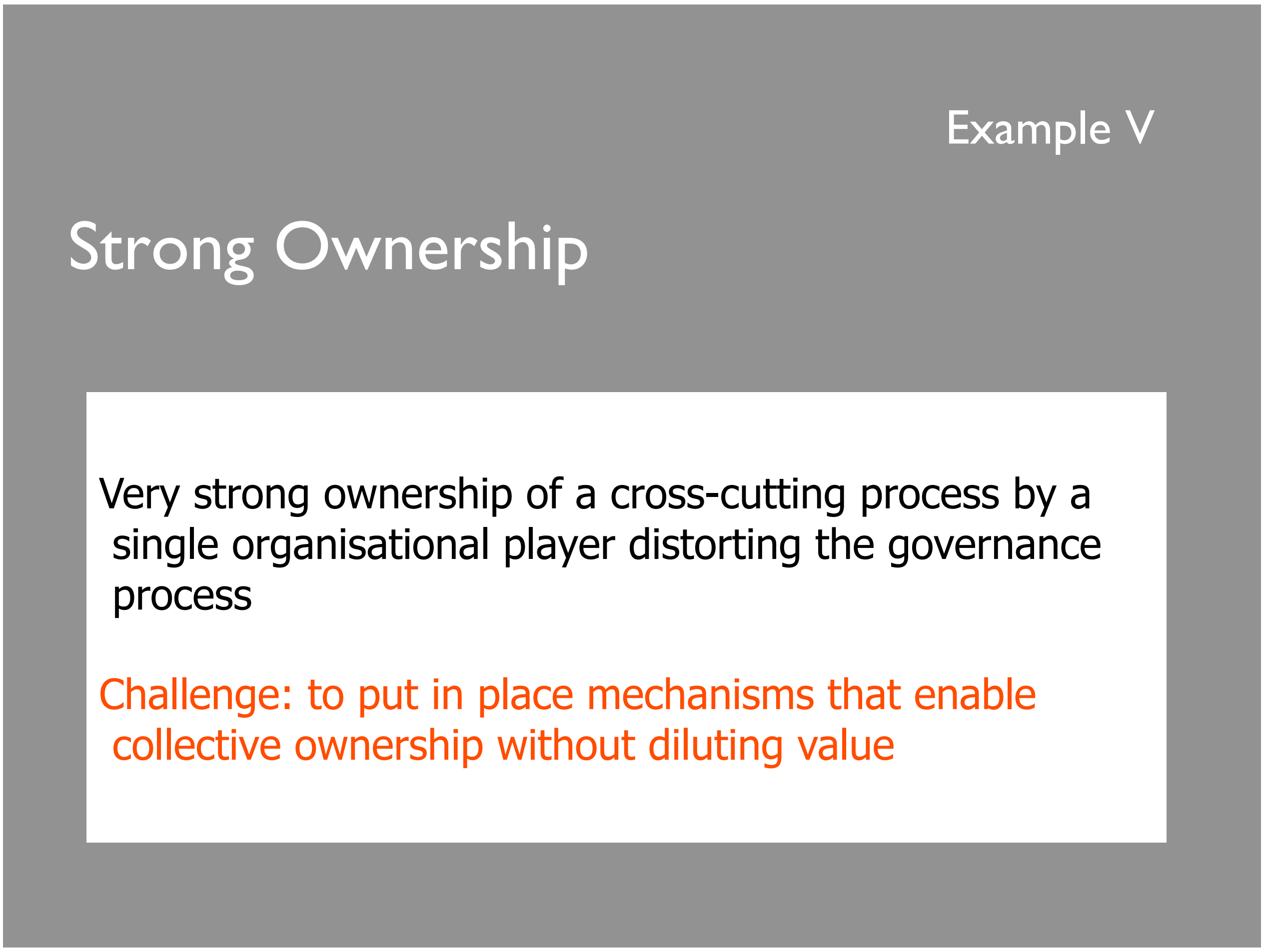
Challenge: how to find structures that are responsive and preserve strategic leadership but also support a stable, planned and directed programme

Example IV

Weak Ownership

‘Orphan processes’ that are not strongly owned and thus never receive the necessary advocacy to have their requirements heard

Challenge: to identify and to ‘promote’ orphans, particularly if they are high aggregate value, or low -hanging fruit

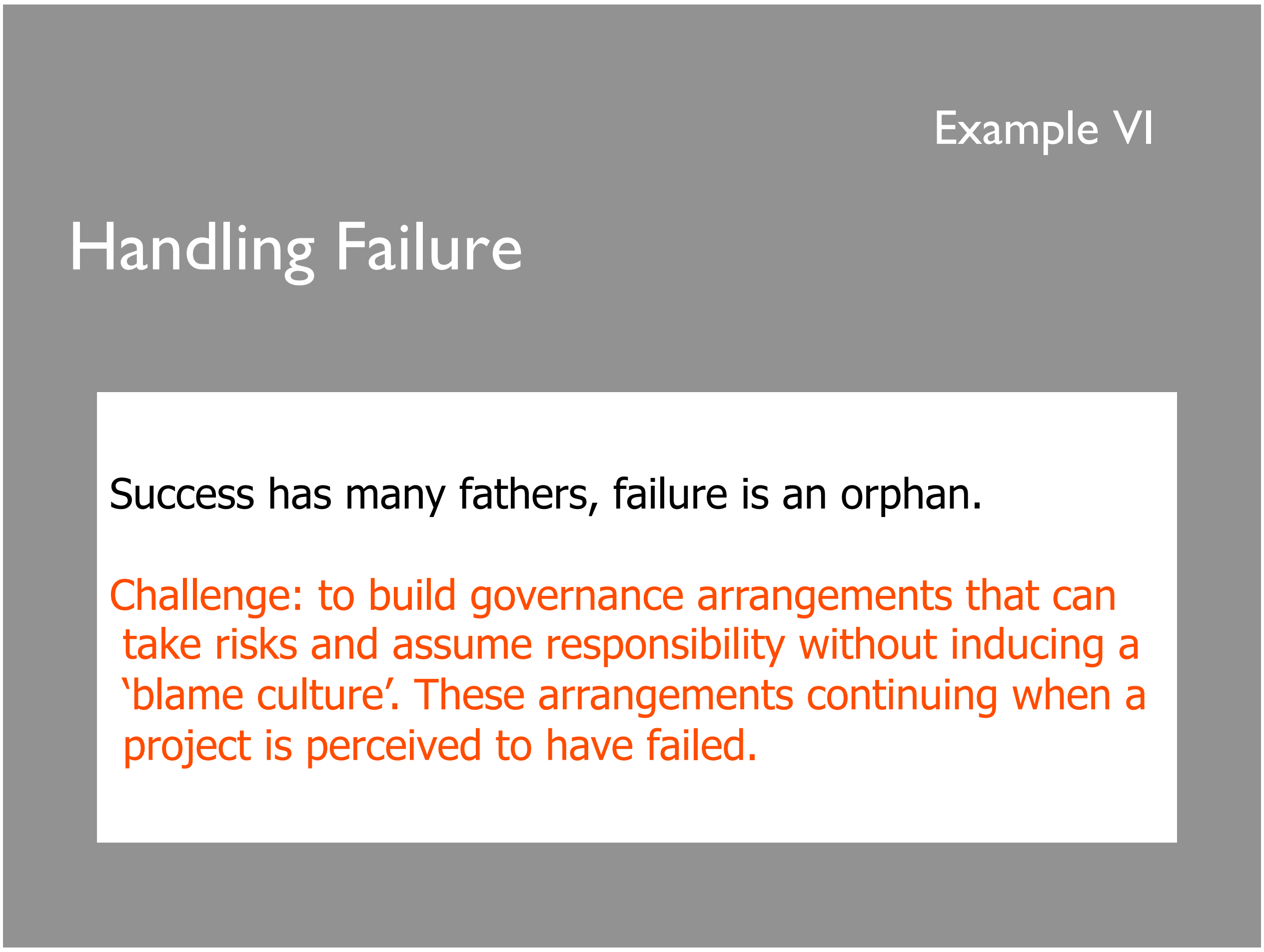


Example V

Strong Ownership

Very strong ownership of a cross-cutting process by a single organisational player distorting the governance process

Challenge: to put in place mechanisms that enable collective ownership without diluting value



Example VI

Handling Failure

Success has many fathers, failure is an orphan.

Challenge: to build governance arrangements that can take risks and assume responsibility without inducing a ‘blame culture’. These arrangements continuing when a project is perceived to have failed.

It seems easier to know what *not* to do than actually what should be done. There are some governance anti-patterns implicit in the examples I have presented.

Known Barriers

Shifts in decision rights and associated power

Resistance to accept accountability

Inability to obtain sufficient business involvement

Particular complexity with federated and outsourced business structures

What we do know …

Centralised governance for architecture and platform, decentralised for services and applications, lightweight (with central oversight) for processes

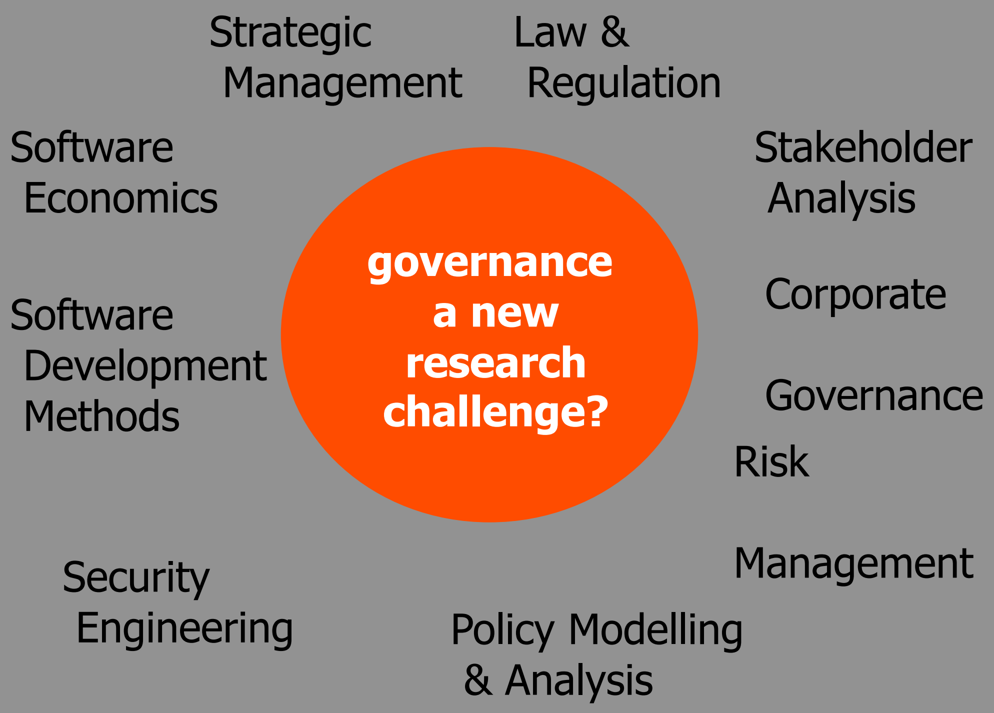
A Sidelight

With management focusing on business goals that cross-cut system structures … perhaps you can see where I am going with this

Use cost transparency and charge back as a key lever to effect change

- A clear mechanism for making business value visible

This is another area that is unexplored from a research standpoint



Strategic Management

Law & Regulation

Software Economics

Stakeholder Analysis

governance a new research challenge?

Corporate

Software Development Methods

Governance

Risk

Management

Security Engineering

Policy Modelling & Analysis