

Avancier Reference Model

Architecture Management (ESA 11)

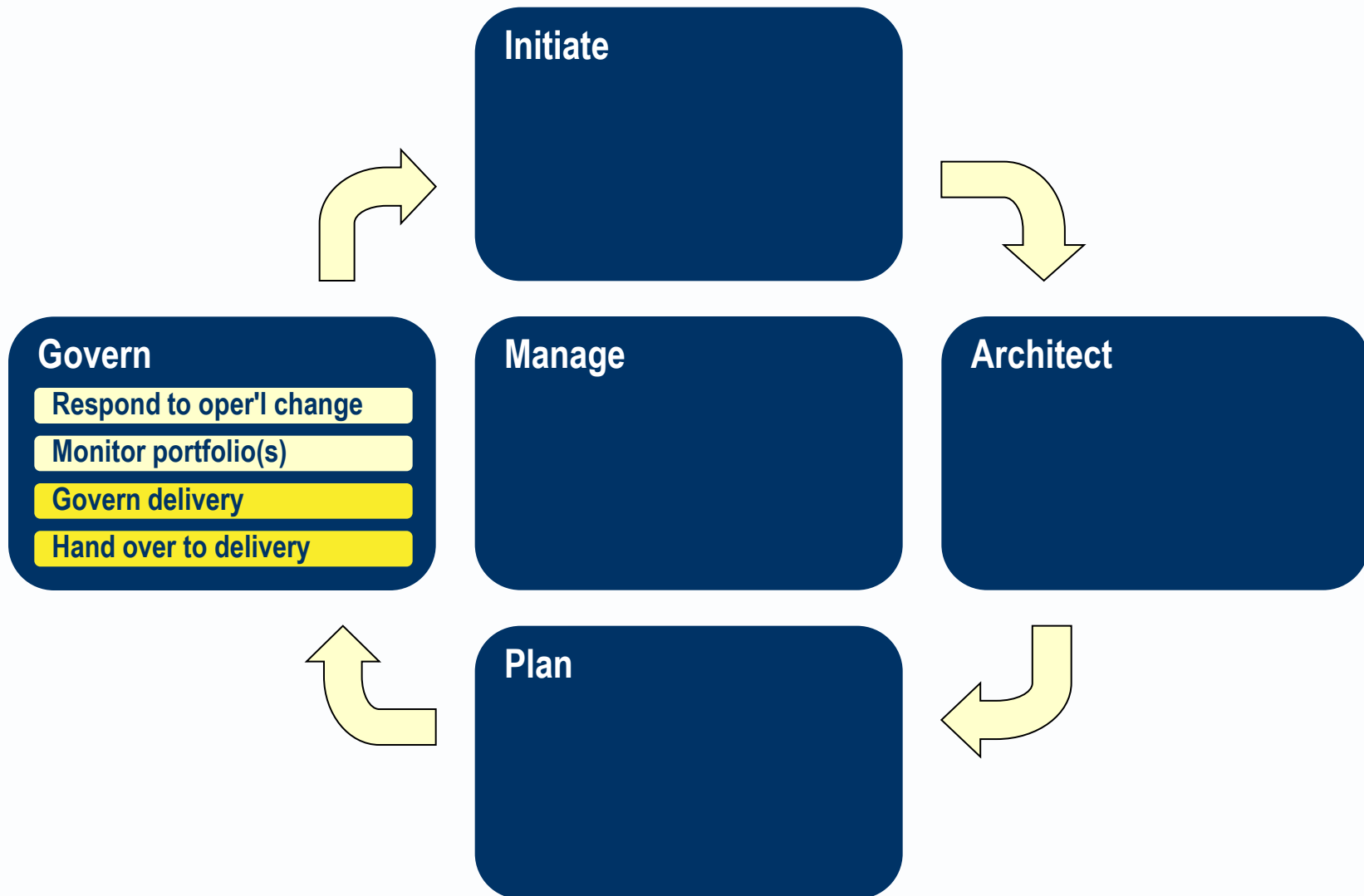
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Architecture management

The organisation and processes that are needed to **govern** and **implement** an architecture description, both in development and in operation, including the management of **changes**.

	People	Processes	Products
General Management	Board Manager Team	Set aims and directives Plan Start/initiate Monitor Control Stop/close	Aims and directives Plans Review criteria Progress reports Conclusions Process definitions

Architecture Implementation - in the AM process



Architecture implementation

The realisation of an architecture description as a system, through development and deployment.

This requires programme and project management organisations and processes.

It uses tools (e.g. for source code management, unit testing load testing, regression testing, security testing, and compliance testing).

Software Development Life Cycle (SDLC)

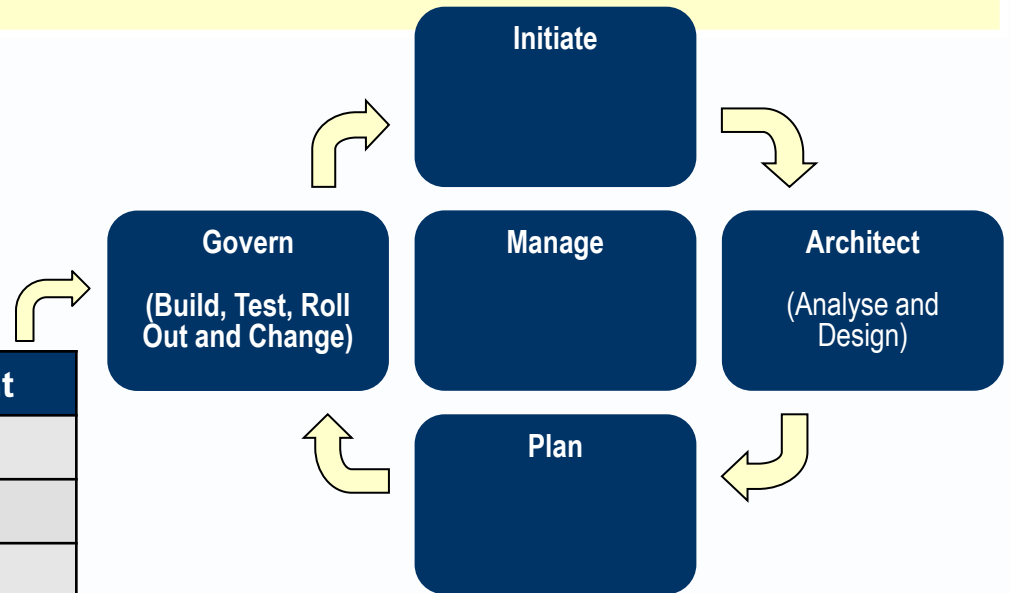
A solution development process centered on software engineering.

There are agile, iterative and waterfall variants.

	People	Processes	Products
SDLC	<ul style="list-style-type: none"> Steering group Project manager Project team 	<ul style="list-style-type: none"> Plan projects Initiate projects SDLC Phase/milestone reviews Close projects 	<ul style="list-style-type: none"> Project plans Project initiation documents Review checklists Review reports Project closure reports Process definitions

Waterfall A solution development process that is sequential. The sequence is usually analysis, design, build, test and roll out. The idea is that engineers proceed from one kind of work to the next without significant iteration or parallelism between stages.

Waterfall system development and deployment					
Analyze	A				
Design		D			
Build			B		
Test				T	
Roll out					R



Architecture Implementation - Iterative Development

Iterative Development (aka Incremental Development in DSDM)

A development process that proceeds by increments, meaning that a working subset of the full solution is delivered as early as possible. Not necessarily agile.

E.g. The Unified Process is iterative, but not fully agile. It is loosely associated with UML. (RUP is a commercial variant embodied in CASE tools from IBM/Rational.)

Learn from results and process

Learn more

Iterative system development and deployment					
Product v1	A, D,	B, T, R			
Product v2		A, D,	B, T, R		
Product v3			A, D,	B, T, R	
Product v4				A, D,	B, T, R

Agile Development

A solution development process that is not only iterative, but also flexible about the requirements, the solution and the process being followed.

The many varieties are characterised by short-cycle iterative development, early testing for usability and performance, and flexible requirements.

User involvement and feedback is a mandatory prerequisite in agile development.

- ▶ *“I estimate that 75% of those organizations using Scrum will not succeed in getting the benefits that they hope for from it.”*
- ▶ Ken Schwaber in an interview posted on Agile Collab

What does agile mean?

- ▶ Fail faster is good!
 - ▶ Delivery early, commit late.
 - ▶ Accept flexible, prioritised and ever changing requirements.
 - ▶ High-level documentation of specifications and models.
 - ▶ Test-driven rather than model-driven.
 - Waterfall methods suggest model > code > test.
 - Agile methods suggest test > code > model.
-
- ▶ "Two of the greatest [agile] rallying cries ... are the slogans:
 - 'Do the Simplest Thing that Could Possibly Work' and
 - 'You Aren't Going to Need It' (known as YAGNI).
 - ▶ Both are manifestations of the XP practice of Simple Design."
 - ▶ Martin Fowler

BUT IN THE FIRST PLACE Was your project suitable for agile?

- ▶ Many life cycle selection schemes have been devised
- ▶ Score your current or most recent project using the form below
- ▶ High scores make agile methods difficult (but not a bad thing)

Agilists
favour

Difficult
projects

What kind of project?		
Time/cost-driven	0, 1, 2, 3	Mandatory requirements-driven
Users available for Joint App Dvlpmnt	0, 1 , 2, 3	Users not available
Developers empowered	0, 1, 2, 3	Developers not empowered
What kind of system and work?		
Divisible into usable releases	0, 1, 2, 3	Indivisible
Client/user interface dominated	0, 1, 2, 3	Server/database dominated
Output/enquiry dominated	0, 1, 2 , 3	Input/update dominated
Simple data processing (row-level CRUD)	0, 1, 2, 3	Complex data processing
On-line	0, 1, 2, 3	Batch
Stand-alone	0, 1 , 2, 3	Highly integrated w other systems
Add up the scores for your agile potential quotient		

Can agile be effective with outsourcing?

12 Lessons Learned by Peter DeYoe www.it-insight-blog.com



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- ▶ **Lesson 1:** [Schedule] an overlap of at least 2 hours for your onshore and offshore teams' working day, if possible. This greatly increased the communication flow and cohesiveness of the teams.
- ▶ **Lesson 2:** Create a robust repository and collaboration site that will be the site of record for all specifications, test cases and discussions. SharePoint [recorded] all communication, collaboration and critical Artefacts.
- ▶ **Lesson 3:** Do not use email as your *primary* method of communication for topics such as requirements clarification or design decisions. Ensure communication is conducted through the repository.
- ▶ **Lesson 4:** Implement web conferencing to create a sense of proximity. We used this daily to conduct stand ups, review wireframes and specifications, walk through requirements and conduct Sprint reviews.
- ▶ **Lesson 5:** Have one central point of entry for project status. Each team member records progress via a central Scrum management tool - we used ScrumWorks to create accurate product backlogs, Sprint backlogs and burn-downs on a daily basis.
- ▶ **Lesson 6:** Ensure your offshore team has their own development and test environments, bug reporting tools (Bugzilla in our case) and source code repository.
- ▶ **Lesson 7:** Shorten your Sprints. We shortened the Sprints from 4 to 2 weeks.
- ▶ **Lesson 8:** The Scrum Master - the key arbitrator - must be top notch - perhaps co-located with Product Owner.
- ▶ **Lesson 9:** If possible, your Scrum Master should speak the languages of onshore and offshore teams.
- ▶ **Lesson 10:** The Product Owner must clearly define what "done" means for each user story. Well- defined acceptance criteria should be included in each user story.
- ▶ **Lesson 11:** A strong technical leader on the offshore team – with all of the technical skills to be self sufficient.
- ▶ **Lesson 12:** The offshore team must be properly trained in Scrum and specifically in your particular implementation of Scrum.
- ▶ Additional thoughts on running an Agile project using offshore resources can be found in an article written by Martin Fowler <http://martinfowler.com/articles/agileOffshore.html>

Transition

Once the architecture has been realised in the form of an operational system, that system is usually handed over to two organisations.

Transition into Operations. The production or run-time system is handed over to be run by some kind of managed operations organisation.

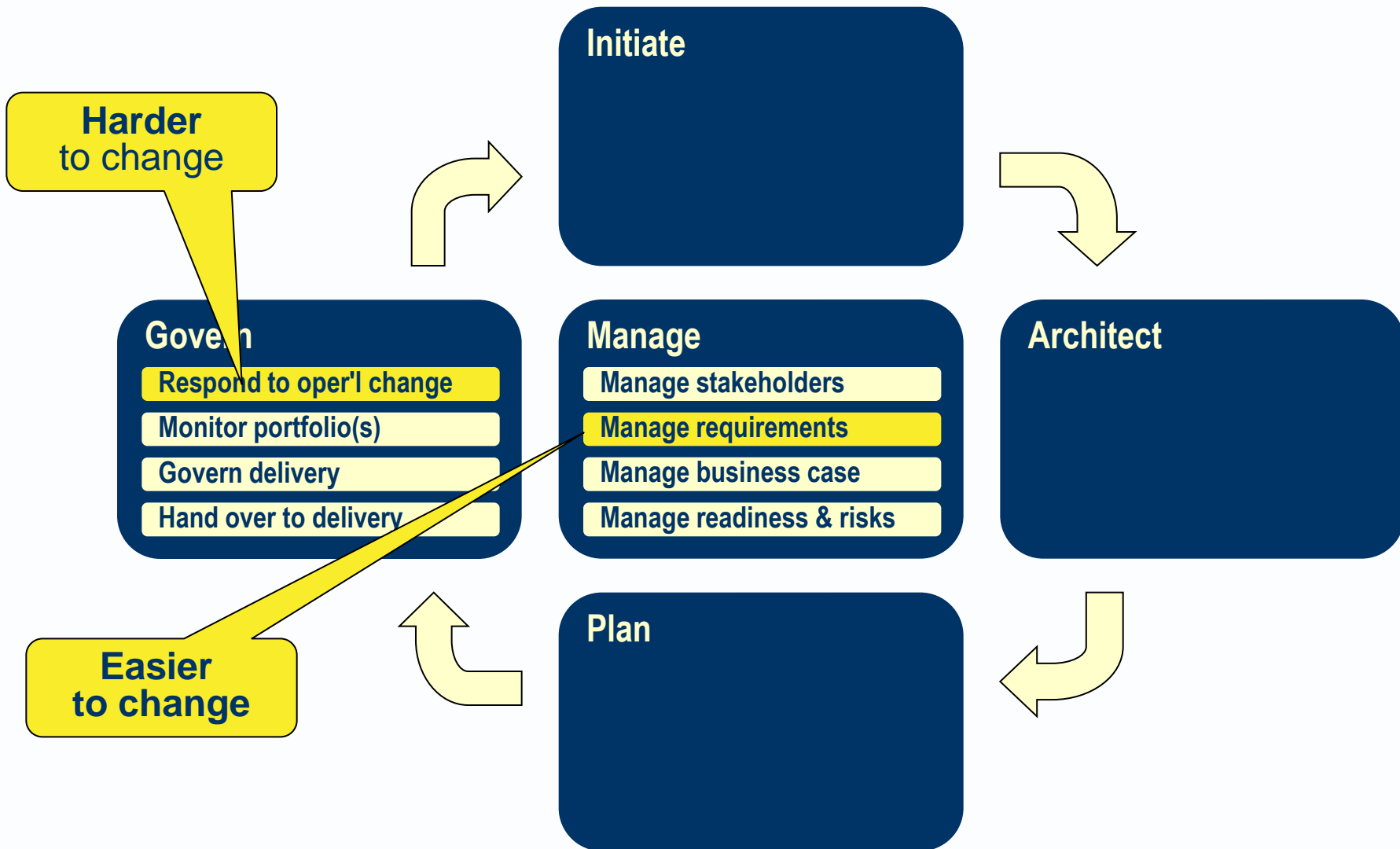
Transition into Maintenance: The design or compile-time system is handed over to be maintained and perhaps enhanced by some kind of maintenance organisation.

ISO9001

A standard in the ISO 9000 family for quality management systems; which includes:

- a set of procedures that cover all key processes in the business;
- monitoring processes to ensure they are effective;
- keeping adequate records;
- checking output for defects, with appropriate and corrective action where necessary;
- regularly reviewing individual processes and the quality system itself for effectiveness; and facilitating continual improvement.

Architecture change management - in the AM process



Change management

The organisation and processes needed to both

- exercise change control to a baseline, and
- perform configuration management.

	People	Processes	Products
Change Management	Board Change reviewers Review administrators	Change control, Monitor events Record change requests Analyse impacts of change Determine actions Process changes Configuration management.	Baseline configurations Configuration items Requests for change (RFC), Impact statements

Change Control

The organisation and processes needed within change management to:

- Monitor the potential sources of change
- Record change requests
- Perform impact analysis
- Decide which changes should be made.

Identify sources of change

Identify potential change

Analyze change request

Evaluate and control the change

Plan the change effort

Implement change

Release review and close change

Request for Change (RFC)

“Form used to record details of a request for a change to any Configuration Item within an Infrastructure or to procedures and items associated with the Infrastructure.” ITIL

- ▶ New function: formulated as a requirement.
- ▶ Problem: formulated in a problem report.
- ▶ Change request: proposed in a change request.

Identify sources of change

Identify potential change

Analyze change request

Evaluate and control the change

Plan the change effort

Implement change

Release review and close change

Impact analysis

Analysis of the effects of a change (perhaps a new requirement or deliverable) to find the effects of that change.

How does it impact what has been done so far?

How does it constrain what is planned for the future?

Leads to an impact analysis report.

- ▶ Analyse change impact
- ▶ Determine technical feasibility:
- ▶ Update the business case

Identify sources of change

Identify potential change

Analyze change request

Evaluate and control the change

Plan the change effort

Implement change

Release review and close change

Configuration management

The organisation and processes needed within change management to establish a baseline configuration and apply changes to that baseline configuration.

Involves work to:

- ❖ Identify and document the characteristics of each item.
- ❖ Define dependencies between items.
- ❖ Control the introduction of new versions of items.
- ❖ Report the status of configuration items and changes to them.

Baseline configuration

A specification or product that has been formally reviewed and agreed upon.

E.g. a contract, a requirements catalogue, architecture documentation, or a hardware configuration.

The basis for further development.

Can be changed only through formal change management.

Configuration Item

An item in a baseline configuration.

Could be a requirement, a source code component or a hardware device. Can be at any level of granularity.

“Component of an Infrastructure under the control of configuration management. A configuration item can range from an entire system (hardware, software, documentation) to a single hardware component.” ITIL

Agile

Willing and able to speedily respond to change.

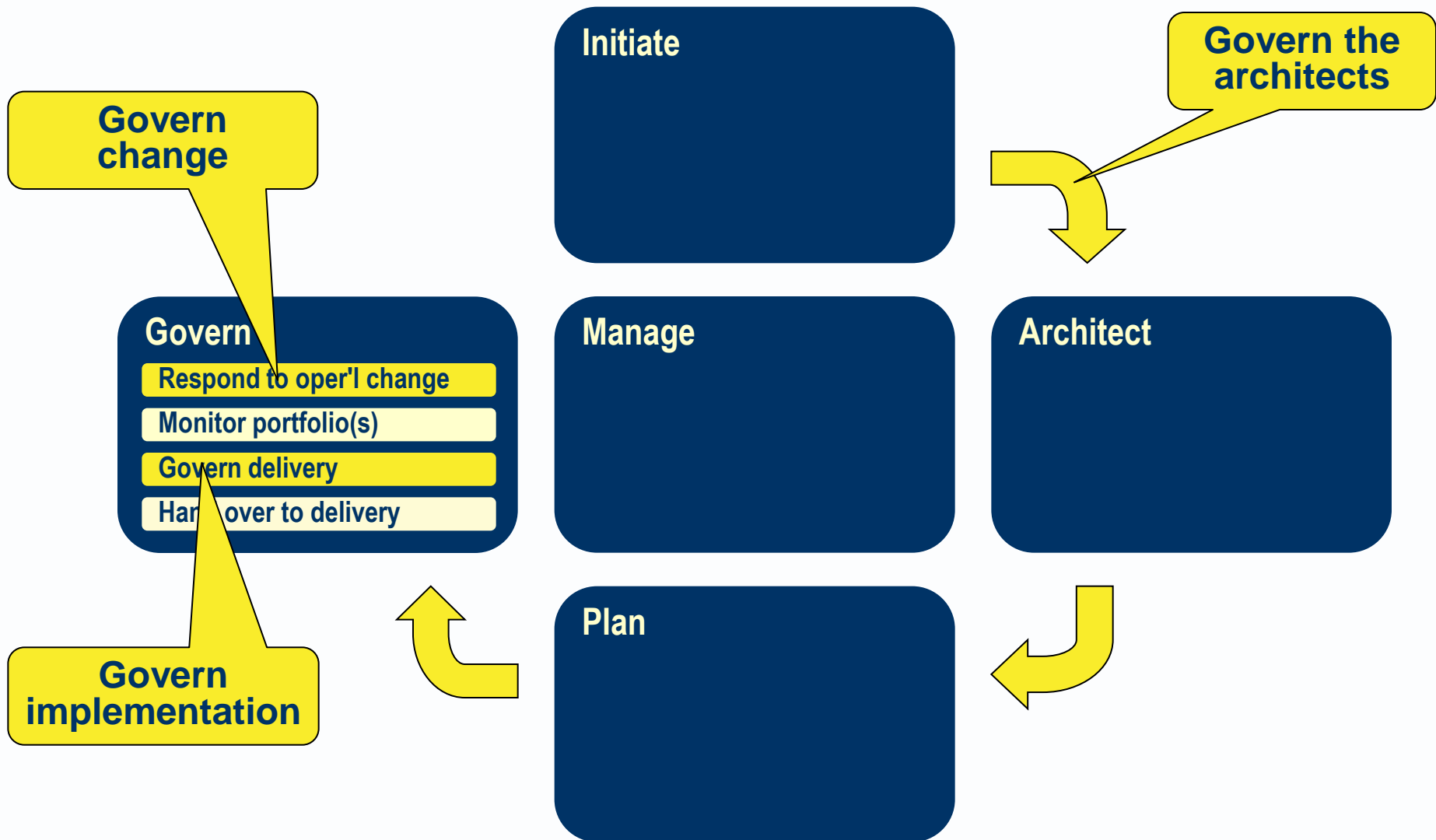
- ▶ Change management can turn into a bureaucracy that not only stifles change but also stifles progress
- ▶ Change management can be heavy or light
- ▶ The trick is to be agile without abandoning change control

Architecture change management

The organisation and processes that are needed to manage changes to architecture descriptions, mostly stemming from changes to requirements or constraints.

- ▶ No difference in principle from general change management

Architecture governance in the AM process



What does a governor do?

- ▶ School?
- ▶ Building site?

	People	Processes	Products
Governance	Board Governing architect Compliance reviewers Review administrators	Directive adoption & review Compliance review Dispensation Monitor and report Business alignment Environment management	Principles, policies, standards etc. Reference models Contracts Review checklists Review reports Dispensations Process definitions

Governance

That facet of management concerned with ensuring an enterprise does what it is supposed to do - that is, achieves goals, follows rules and delivers what its stakeholders expect. It requires measurement and control of performance.

May be subdivided into

Corporate governance and principles: the responsibility of the enterprise's executive board.

IT governance and principles: the responsibility of an IT board.

(Enterprise) architecture governance and principles – for strategic design: the responsibility an architecture board.

- ▶ Corporate governance (SOX, Cadbury)
- ▶ IT governance (COBIT)
- ▶ Architecture governance

- ▶ Different but related
- ▶ All need processes, products and people

Architecture governance

The management of an architecture (in development or operation) so as to ensure it conforms to pre-defined architectural requirements, principles, policies and models.

Architecture board

The group of people who maintain architecture principles and governance processes, and appoint governing architects.

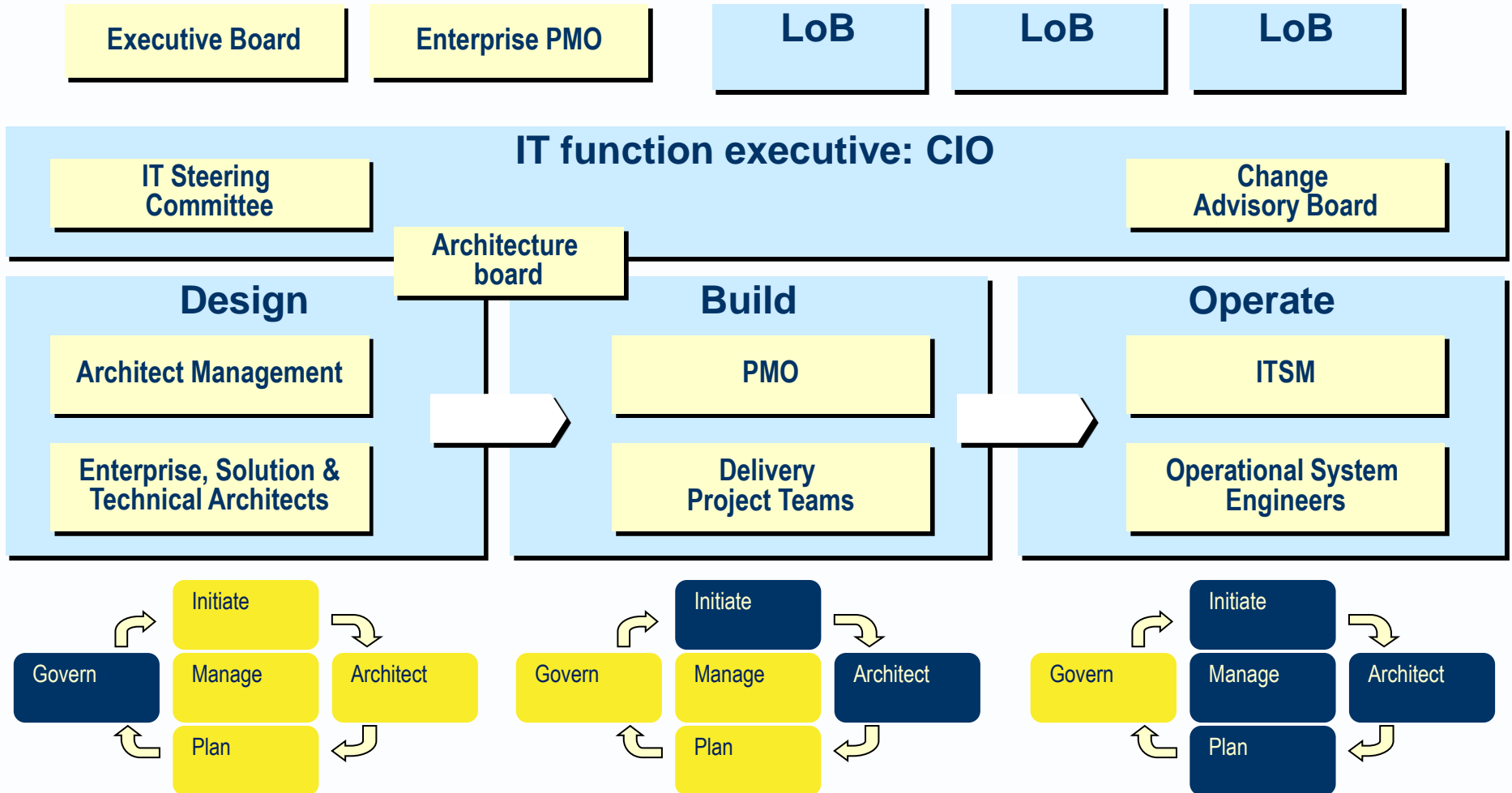
Architecture contract

A document that defines those architectural requirements, principles, policies and models that a system should conform to as it is built and when it runs. Also defines any architecture stakeholder rights and interests that must be met.

Governing architect

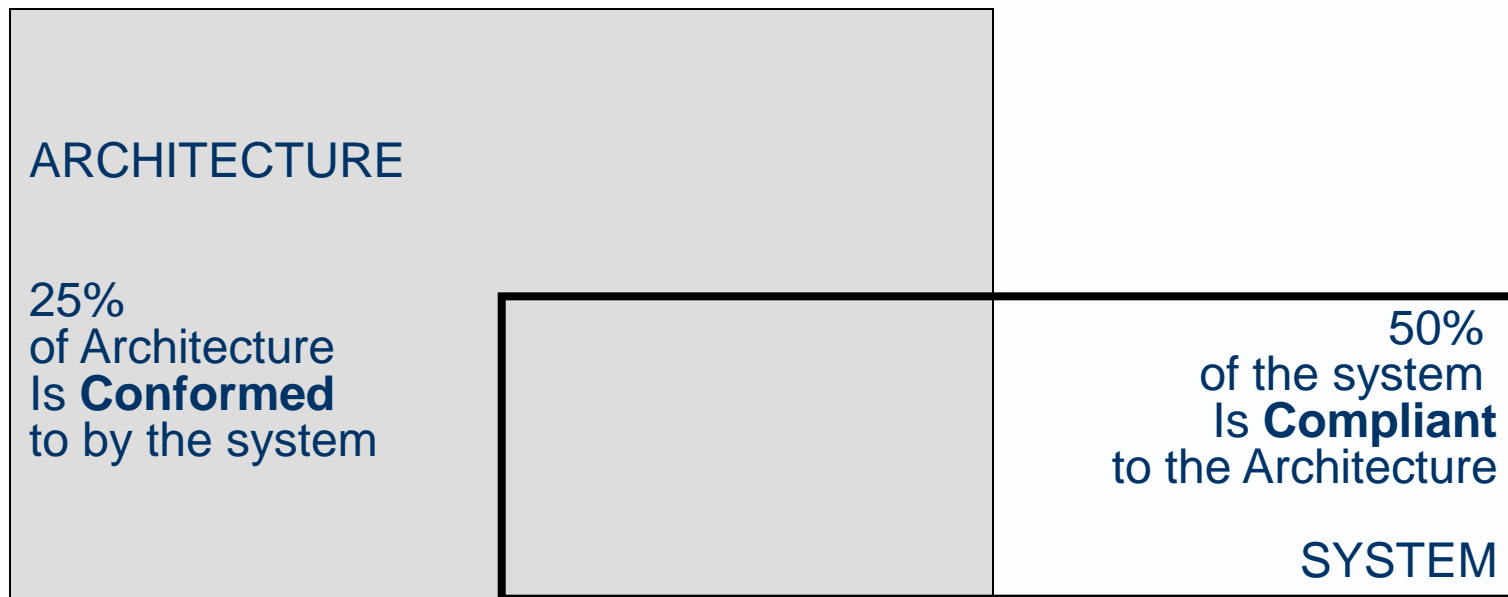
The architect who has been nominated by the governance organization to ensure a system is built and/or run in accord with its architecture contract, to manage risk and to ensure the value of the system to its stakeholders.
Aka chief architect or design authority.

Where does Architecture Board sit in an IT organisation?



Conformance v compliance

- ▶ Your chance of remembering the difference is 50/50!



Architecture compliance review	A process for monitoring the compliance of work done to architecture principles, policies and models. Reviews of various kinds may be carried out at various points in the specification and development of a system. Only some of these require a governing architect or use an architecture review checklists.
Architecture review checklist	A standard checklist of questions to be asked in an architecture compliance review. The questions are general ones, not necessarily mentioned in the architecture contract.
Architecture conformance level	How well or how much of an architecture contract is met by a system, or an architecture description is realized in a system.
Architecture compliance level	How well or how much of a system corresponds to its architecture contract and/or description.
Dispensation	A time-bound waiver from the terms of an architecture contract, granted by a governing architect, and to be reviewed after the specified time.

Capability maturity model

A reference model for evaluating the maturity of an organisation and its processes.

First and best known is the maturity model is the CMM for software processes, from the Carnegie Mellon University Software Engineering Institute.

There are now maturity models for architecture organisations and processes, such as those included in the list of references.

- ▶ See also the GAO EA management maturity framework.
- ▶ <http://www.gao.gov/new.items/d03584g.pdf>

The standard levels in a “maturity model”

Formally

- 5 Optimizing: Focus on process improvement**
- 4 Managed: Process measured and controlled**
- 3 Defined: Process characterized, fairly well understood.**
- 2 Repeatable: Can repeat previously mastered tasks**
- 1 Initial: Unpredictable and poorly controlled**
- 0 Missing: Does not exist**

Processes are

- 5 – continuously improved**
- 4 – measured**
- 3 – documented & followed**
- 2 – repeated**
- 1 – ad hoc (hero-level)**
- 0 - irrelevant**

6 maturity levels

- ▶ 1. None
- ▶ 2. Initial
- ▶ 3. Under development
- ▶ 4. Defined
- ▶ 5. Managed
- ▶ 6. Measured

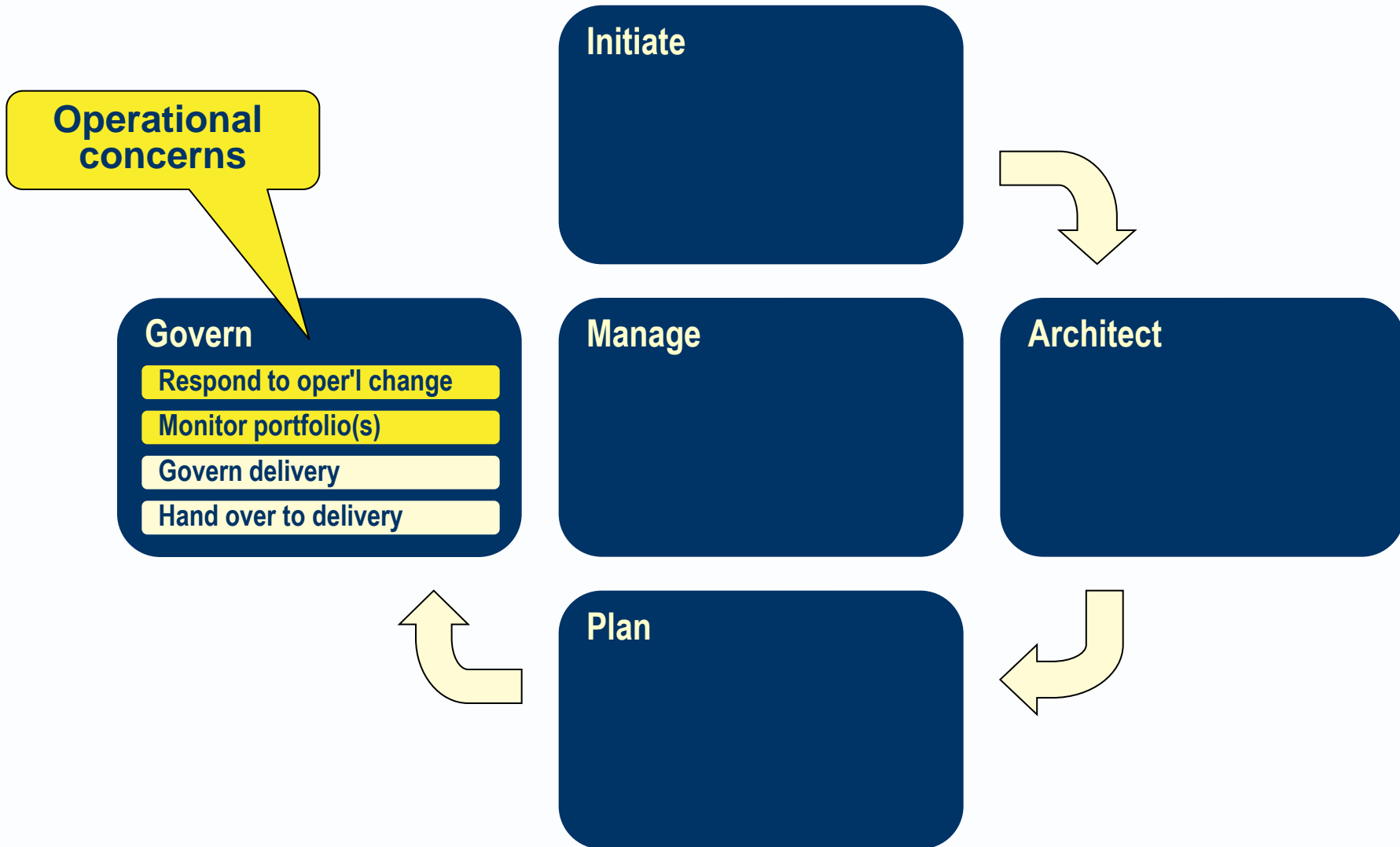
9 architecture characteristics:

- ▶ 1. IT architecture process
- ▶ 2. IT architecture development
- ▶ 3. Business linkage
- ▶ 4. Senior management involvement
- ▶ 5. Operating unit participation
- ▶ 6. Architecture communication
- ▶ 7. IT security
- ▶ 8. Architecture Governance
- ▶ 9. IT investment and acquisition strategy

2 kinds of maturity rating.

- ▶ a weighted mean IT architecture maturity level.
- ▶ the percentage achieved at each maturity level for the nine architecture characteristics.

Architecture in Operations in the AM process



Architecture in operations

The organisation and processes that are needed to manage the architecture description of an operational system.

- ▶ Public companies subject to the U.S. Sarbanes-Oxley Act of 2002 are encouraged to adopt
- ▶ COSO and/or
- ▶ COBIT

- ▶ Many more appear to have adopted ITIL

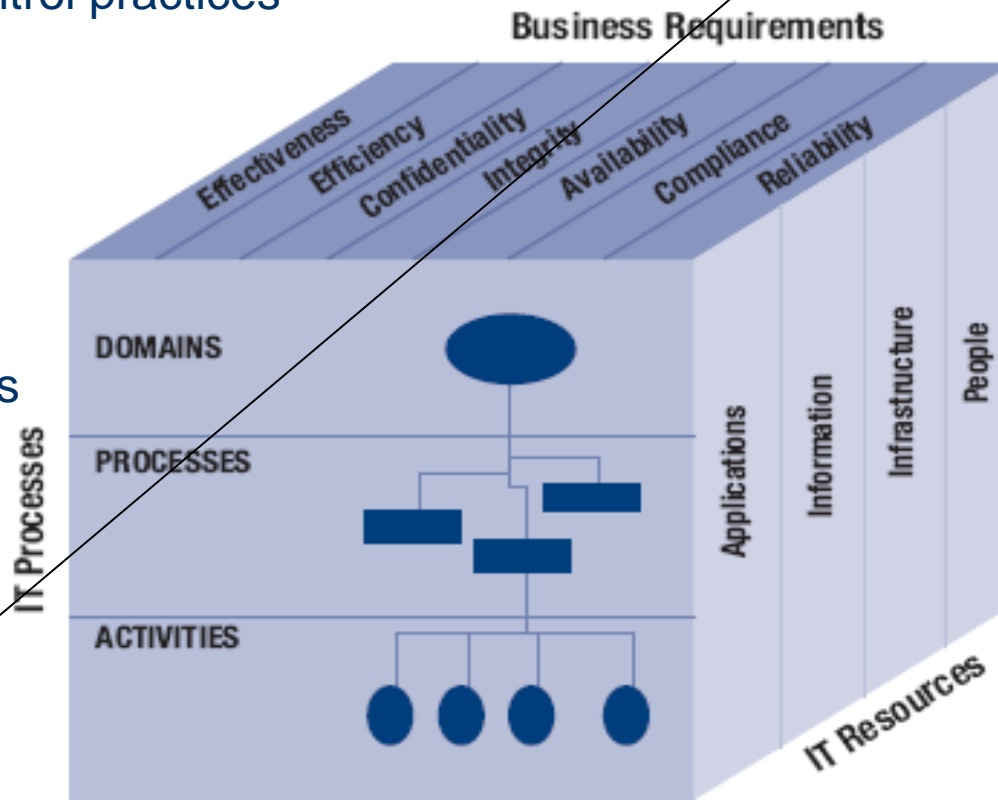
COBIT

Control Objectives for Information and related technology, controlled by Information Systems Audit and Control Association (ISACA).

- ▶ useful for IT management, users, and auditor
- ▶ four COBIT objective domains
 - **Plan and Organize**
 - **Acquire and Implement**
 - **Deliver and Support**
 - **Monitor and Evaluate**
- ▶ control looks at information needed to support business requirements and the associated IT resources and processes
- ▶ 238 specific, detailed control objectives throughout the
- ▶ 34 IT processes

- ▶ The control of IT processes
- ▶ Which satisfy business requirements
- ▶ Is enabled by control statements
- ▶ Considering control practices

Information criteria
Business managers



IT processes
Process owners, IT specialists and users

IT Resources
IT managers.

The three dimensions of COBIT

Information criteria

- ▶ Quality
 - Product Quality, Right Cost, Timely Delivery
- ▶ Fiduciary Control
 - Effectiveness & efficiency of Operations
 - Reliability of Information
 - Compliance with laws & regulations
- ▶ Security
 - **Confidentiality, Integrity, Availability**

IT processes

- ▶ 4 Domains
 - Planning & Organising
 - Acquisition & Implementation
 - Delivery & Support
 - Monitoring
- ▶ 34 Processes
- ▶ Activities
 - Activities have a life cycle, with a need for ongoing control.
 - Tasks are discrete units of work

IT Resources

- ▶ Data
 - Information in the widest sense
- ▶ Application Systems
 - manual & programmed procedures
- ▶ Technology
 - hardware, operating systems, middleware, networking, databases, multimedia
- ▶ Facilities
 - environmental resources including power, buildings & water.
- ▶ People
 - staffing, skills & productivity plans

IT services management (ITSM)

The organisation and processes for managing the IT infrastructure and the services it provides.

	People	Processes	Products
Service Management	Board Service managers Service administrators	System administration Problem/help desk Event monitoring Service level monitoring Exception reporting Exception handling	Service level requirements Service level agreements Service level reports

ITIL 2011 has five parts

▶ **1. ITIL Service Strategy**

- understands organizational objectives and customer needs.

▶ **2. ITIL Service Design**

- turns the service strategy into a plan for delivering the business objectives.

EA frameworks
focus here

▶ **3. ITIL Service Transition**

- develops and improves capabilities for introducing new services into supported environments.

▶ **4. ITIL Service Operation**

- manages services in supported environments.

▶ **5. ITIL Continual Service Improvement**

- achieves services incremental and large-scale improvements.

IT Infrastructure Library (ITIL)

A large and globally-recognised body of advice from the UK government Office of Government and Commerce on how to manage an IT services organisation.

ISO/IEC 20000

An international standard for IT Service Management (based on the earlier British Standard, BS 15000). It promotes integration of processes to deliver managed services to meet the business and customer requirements.

Processes include Planning & Implementing New or Changed Services, Service Delivery Process, Relationship Processes, Control Processes, Resolution Processes and Release Process.

It was originally developed to reflect best practice guidance contained within the ITIL (Information Technology Infrastructure Library) framework, although it equally supports other IT Service Management frameworks and approaches (after Wikipedia).

IT service

A service provided an IT operations department. E.g.

- ▶ management of user roles and identities,
- ▶ client device configuration,
- ▶ storage administration,
- ▶ network provision, monitoring and analysis,
- ▶ server provision, monitoring and analysis,
- ▶ business activity monitoring,
- ▶ virtualisation,
- ▶ back up & restore,
- ▶ incident and problem management.

Locate Service Offerings by Category



Application Services

Hosting, support and maintenance and enhancement of existing and new applications.

- [Application Hosting](#)
- [Enterprise Application Management](#)



Consulting Services

Advisory and hands-on functions performed by specialized IT staff at a fraction of the cost quoted by outside vendors.

- [Business Process Reengineering](#)
- [Project Consulting](#)



Workplace Services

Service offerings for the end user environment, including desktop computing, devices and remote end user experience.

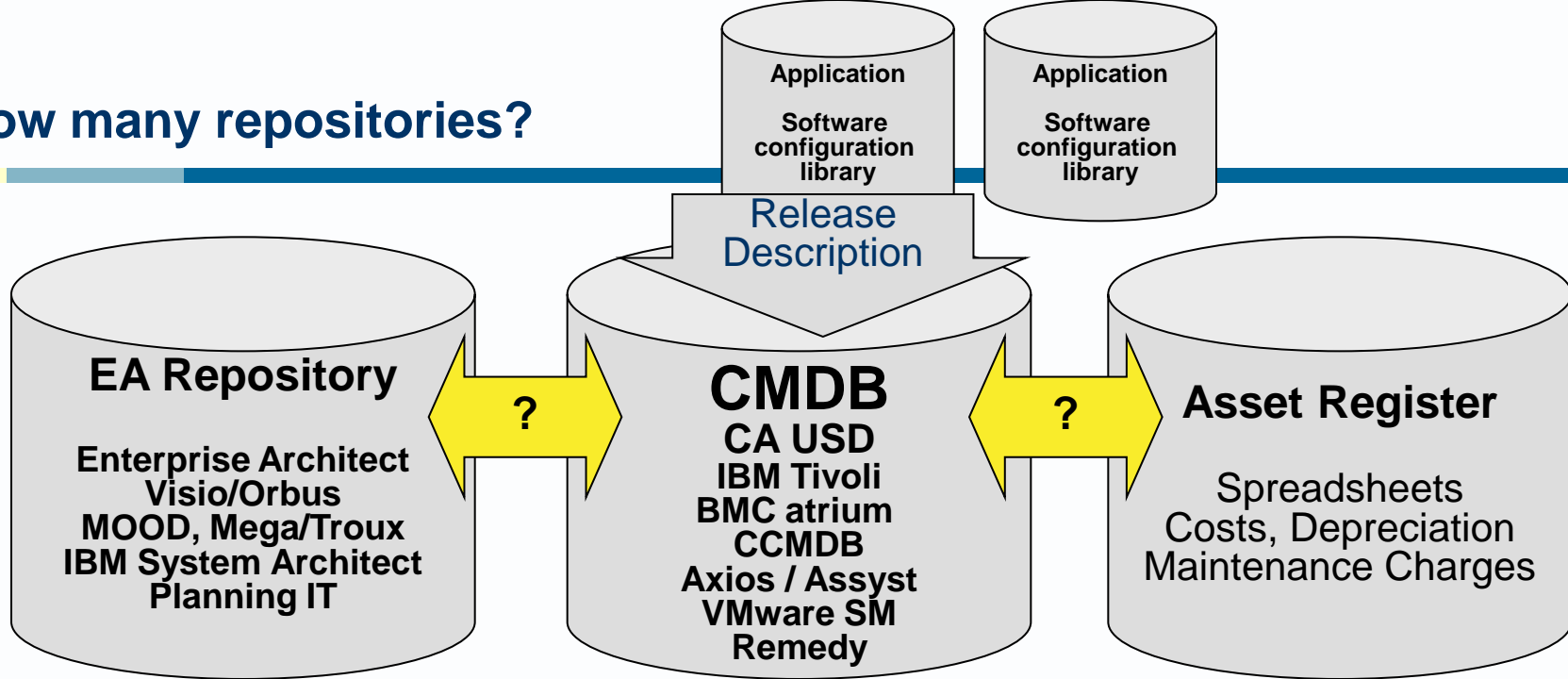
- [Desktop Computing](#)
- [Email and Calendaring](#)



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How many repositories?



- ▶ In theory at least, all these configurations are related
- ▶ “Integrating IBM Rational System Architect with other IBM Rational solutions and solution delivery products such as IBM Tivoli CCMDB can provide vital support for this pragmatic approach.
- ▶ It facilitates efficient creation and maintenance of the IT architecture by importing auto-discovered application and technology portfolios.”

IT configuration management database (CMDB)

“A database of record of configuration item specifications including relationships among configuration items.” (ITIL).
The authorised configuration of the significant IT components - vital to a configuration management process.
Should relate to any enterprise architecture repository.

Asset management system

A record of IT assets.
Sometimes focused on end user devices.
Should relate to any CMDB.

Common Information Model (CIM)

A standard that defines how the elements in an IT environment can be represented as a common set of objects and relationships in a CMDB.
“a common definition of management information for systems, networks, applications and services”
(Distributed Management Task Force, Inc.).

Problem and help-desk management.

The organization and processes (usually based on call centre operations) for logging problems (usually notified by telephone calls), evaluating problems, allocating work, resolving problems and closing calls. Often works hand in hand with change management and release management. Often incentivized by measures of short duration and high throughput, which can frustrate full problem resolution.

Systems management

The organization and processes for managing technologies deployed and running on the infrastructure. May involve network analysis, technology performance monitoring and analysis, and business activity monitoring.