Control Objectives for DP: Digital Preservation as an Integrated Part of IT Governance

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FACULTY OF !NFORMATICS

Agenda

- **IT Governance**

- **Digital longevity and reference models for DP**

- **A capability-based Reference Architecture for DP**
  - Stakeholders, concerns, goals, influencers, capabilities

- **Control Objectives for DP**
  - How to integrate digital preservation into IT Governance
  - Processes as enablers for capabilities

- **How to assess and improve?**
  - A Capability Maturity Model for Preservation Planning

IT Governance and COBIT

- **IT Governance: decision making and communication within IT-supported organizations**

- **COBIT: Control Objectives for Information Technology**
  - "the leadership, organisational structures and processes that ensure that the enterprise's IT sustains and extends the organisation's strategies and objectives"
  - goal-driven, process-oriented and control-based
  - How to leverage resources to achieve desired ends?
  - Goals – processes - activities
    - *Ensure systems security*, *Acquire and maintain application software*, ….
  - Sophisticated, adaptable process model

➢ **We integrate digital preservation goals and processes with IT Governance processes**

Digital Longevity

- **Numerous reference models, frameworks and concepts**
  - OAIS and trust: TRAC, RAC (ISO 16363), NESTOR…
  - Records Management: MoReq, ISO 15489…
  - Risk: DRAMBORA…
  - Planning: PLATO
  - Economics: BRTF, LIFE….

- **Yet….**
  - Maturity of the field is unclear and evolving
  - Integration into Information Systems and Information Technology fields is unclear
  - How does Digital Preservation relate to, e.g., IT Governance?
  - How can we assess and improve organizational capabilities?

- ➤ **Integrate Digital Preservation into IT Governance**
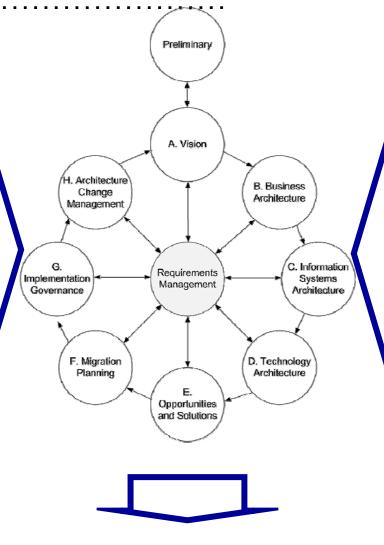 - ➤ Capability Model based on Enterprise Architecture approaches

A Capability-based Reference Architecture

Domain Knowledge
- SHAMAN-RA v1.0
- OAIS
- TRAC/RAC
- TDR 2002
- NESTOR
- Planets Planning method
- Planets Functional Model
- PREMIS
- BRTF Sustainability Report
- DRAMBORA
- PARSE.Insight
- …

Standards and Best-Practices
- OMG UML
- OMG BMM
- OMG SBVR
- OMG OSM
- ISO 27000: Security
- ISO 31000: Risk Manag.
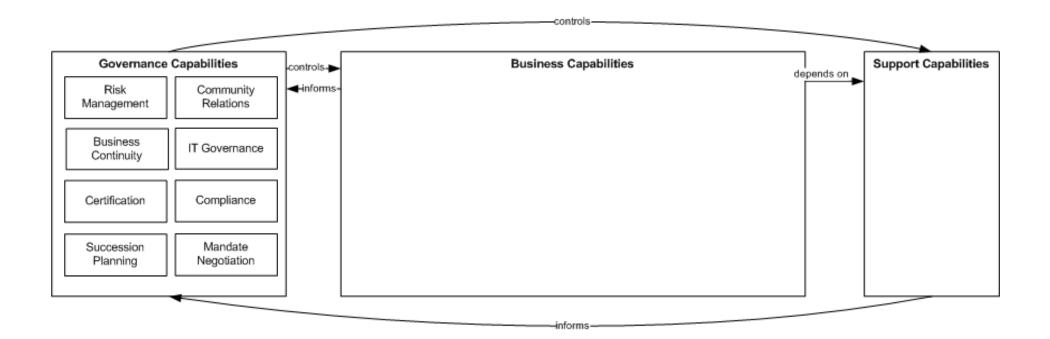- IEEE Std. 1471-2000
- Zachman Framework
- COBIT
- DoDAF
- …

Preliminary

A. Vision

H. Architecture Change Management

B. Business Architecture

G. Implementation Governance

Requirements Management

C. Information Systems Architecture

F. Migration Planning

E. Opportunities and Solutions

D. Technology Architecture

| Stakeholders | Concerns | Influencers | Goals | Capabilities |

Digital Preservation Capabilities

A **capability** is an "*ability that an organization, person, or system possesses. Capabilities are typically expressed in general and high-level terms and typically require a combination of organization, people, processes, and technology to achieve*"
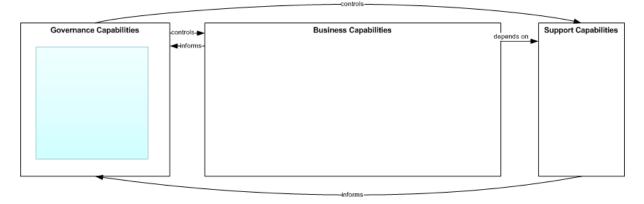
A capability can control, inform, include, or depend on another capability

DP Governance Capabilities

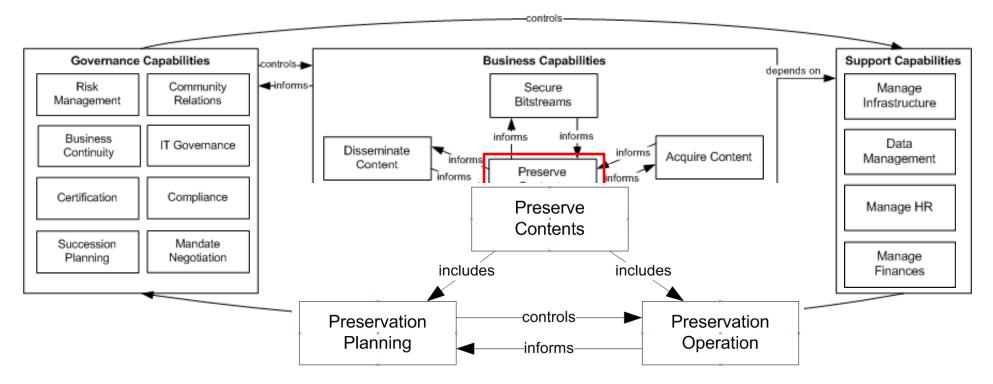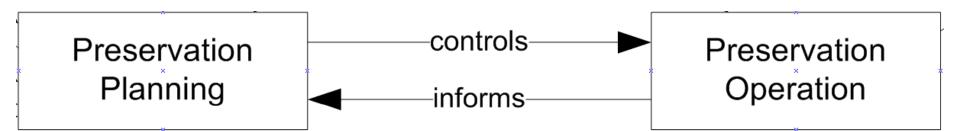| Capability	Key goals
Compliance	Verify and report compliance
Community Relations	Engage with designated community
Certification	Obtain and maintain certification status
Mandate Negotiation	Negotiate with governing institutions
Business Continuity	Assure mission-critical operations and manage capabilities
Succession Planning	Negotiate formal succession plans
IT Governance	Manage services, processes, technology solutions
Manage Risks	Control strategic and operational risks and opportunities

Digital Preservation Capabilities

A **capability** is an "*ability that an organization, person, or system possesses. Capabilities are typically expressed in general and high-level terms and typically require a combination of organization, people, processes, and technology to achieve*"

Preserve Contents is the ability to maintain content authentic and understandable to the defined user community over time and assure its provenance.
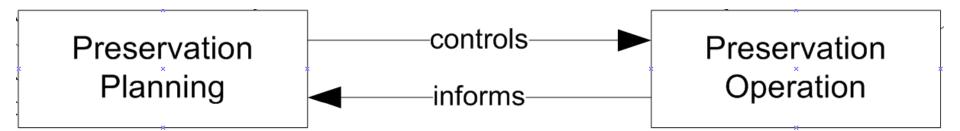
Core Preservation Capabilities

Preservation Planning	Preservation Operation
Monitor, steer and control the preservation operation of content	Control the deployment and execution of preservation plans.

Core Preservation Capabilities

Preservation Planning — controls → Preservation Operation

Preservation Operation — informs → Preservation Planning

Preservation Planning	Preservation Operation
Monitor, steer and control the preservation operation of content	Control the deployment and execution of preservation plans.
•Influencers and Decision making •Options diagnosis •Specification and delivery •Monitoring	•Analyze content •Execute preservation actions •Ensure adequate provenance trail •Handle preservation metadata •Conduct Quality Assurance •Provide reports and statistics

Core Preservation Capabilities

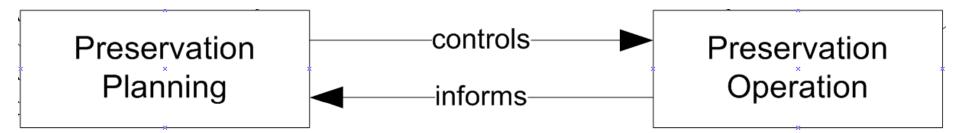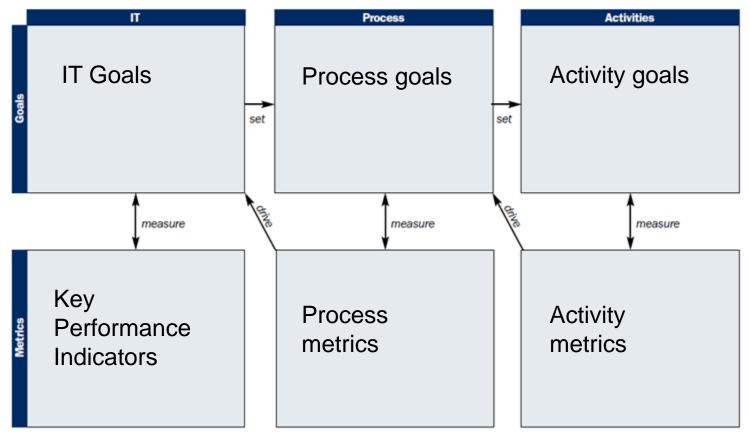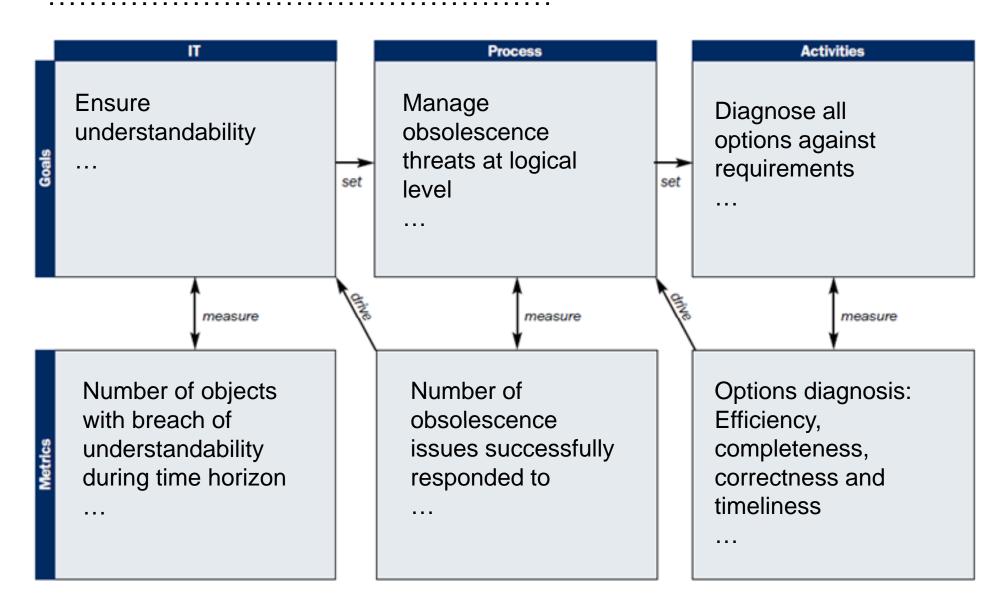| Preservation Planning	Preservation Operation
Monitor, steer and control the preservation operation of content	Control the deployment and execution of preservation plans.
•Influencers and Decision making •Options diagnosis •Specification and delivery •Monitoring	•Analyze content •Execute preservation actions •Ensure adequate provenance trail •Handle preservation metadata •Conduct Quality Assurance •Provide reports and statistics
"Migrate this set of images (in TIFF-5) to JP2 using ImageMagick 6.3 with parameters a,b,c"	*•Analyse original* *•Migrate, analyse output* *•Conduct quality assurance* *•Provenance, metadata, Reporting*

COBIT processes...

- Driven by specific goals and controls
- Organized into activities with assigned responsibilities
- Related to other processes
- Measured on all levels: Internal vs. external goals and metrics

Preservation Planning example

Preservation Planning Process

IT — Goals
Ensure that all operations are monitored for compliance and alignment to goals

Steer preservation operations to ensure authenticity and understandability for the specified time horizon

Maximize efficiency of operations and

set →

Process
Ensure authenticity and understandability of content

Manage obsolescence threats at the logical level

Ensure timely detection and reaction to changes in the environment

Minimize operational costs of preservation

set →

Activities
Document all relevant influence factors of the context
Select content to be covered by an action plan
Specify requirements
Select options to be considered
Diagnose all options against requirements
Assess the performance of options and select best one
Specify and deliver concrete courses of actions to be deployed
or correspondence of operations to ives
or external influencers of relevance

measure

...ements Traceability to influencers
...ements Measurability
...n Traceability, Repeatability,
...ness, Completeness, Efficiency
...s diagnosis: efficiency, completeness,
...tness and timeliness
...nderstandability, completeness,
...tness, timeliness
...oring completeness, correctness,
...ness

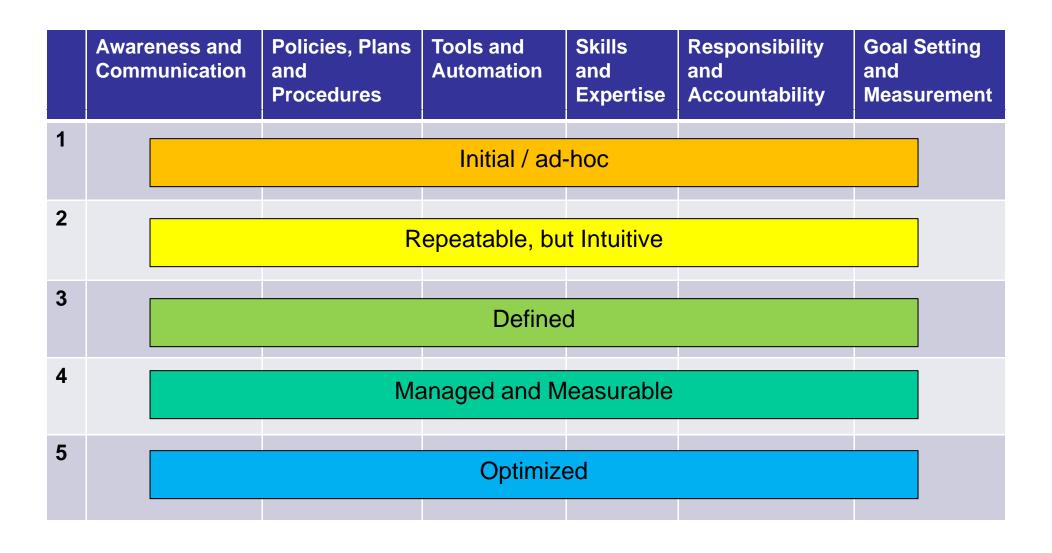| Activities	Producer/Depositor	Consumer	Executive Management	Repository Manager	Technology Manager	Operational Manager	Regulator	Auditor	Repository Operator	Technology Operator	System Architect	Solution Provider
Document context: Collect and describe all influence factors of interest and relevance; i.e., all drivers, constraints, goals and regulations applicable.			A	C	C	R	C	I				
Define scope of interest: Select a range of content for requiring a common treatment, to scope the decision making activities and ensure focussed planning.			A	R		I		I	C			
Define requirements: Make drivers and goals operational, i.e. define objectives and constraints represented by decision criteria			A	C	C	R		I	I	I		
Select options: Select a (minimal relevant) set of options potentially fulfilling requirements			I		C	A		I	R	C		C
Diagnose options: Gather information about available options, i.e. measures corresponding to a set of criteria.				C	C	A		I	R	C		C
Assess options: Assess options against requirements, i.e. specified criteria, to deliver efficient decisions and operational plans			A	C	C	R		I		C		
Specify preservation plan: Specify actions and directives in understandable form	I	I	A	C	C	R		I	I	I		
Deliver preservation plan: Deliver plan to operations (to prepare plan deployment)			I	I	C	A		I	R	C	I	
Internal Monitoring: Monitor operations specified by plans and operational attributes of the system, i.e. internal influencers.				C	C	A		I	R	R	I	
External Monitoring: Monitor external influencers (regulations, technological opportunities; user community shifts; etc.).	C	C	A	R	R	I	C	I		C	I	C

A Capability Maturity Model for Preservation Planning

Coming from Software Engineering, the CMM has been shown to be a powerful instrument for assessment and improvement

	Awareness and Communication	Policies, Plans and Procedures	Tools and Automation	Skills and Expertise	Responsibility and Accountability	Goal Setting and Measurement
1	Initial / ad-hoc					
2	Repeatable, but Intuitive					
3	Defined					
4	Managed and Measurable					
5	Optimized					

	Awareness and Communication	Policies, Plans and Procedures	Tools and Automation	Skills and Expertise	Responsibility and Accountability	Goal Setting and Measurement
1	Some recog-nition of the need for control	Disorganised ad-hoc decisions	…	Not defined		Unclear goals, no measurement
2	Management recognizes the need for controlling and communicates issues	Planning process emerges, but informal and incident-driven	Sporadic tool usage without Systematic integration.	Some awareness of required skills, hands-on experience	People take ownership of issues based on their own initiative on a reactive basis.	…
3	Importance of a planning approach is understood, accepted and communicated.	Formal planning process in place, some strategy takes place	Automated tools, but processes defined by available services	…	Responsibilities assigned, documented and clearly communicated.	…
4	Systematic planning is part of the organization's culture	Planning fully supported by well-specified methods; inter-nal best practice	Automated planning system + operational monitoring	…	…	…
5	Continuous improvement	Industry best practice	…	…	…	…