Risk Assessment of Digital Holdings

Angela Dappert

Digital Preservation Coalition

The TIMBUS Project

Overview

Risk management

In general

In Information Management

In Digital Preservation

Status of RM in Digital Preservation

- Examples
- Guidelines
- Applications
- Tools

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Motivation: Risk Impact

- Damage to or loss of our digital assets
- Loss of access, understandability and authenticity
- Statutory or regulatory breach
- Deterioration of product or service quality
- Damage to reputation
- Damage to financial viability
- On public well-being
- On repository staff
- Environmental damage

Risk

is uncertainty of outcome

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Digital Preservation

The series of managed activities necessary to ensure continued access to digital materials for as long as necessary.

Beagrie & Jones

How do you determine which action to take?

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Digital Preservation

to our digital assets

Keep risks from becoming issues

Proactive

preservation

Risk Management

Deal with issues when they arise

conservation

Reactive

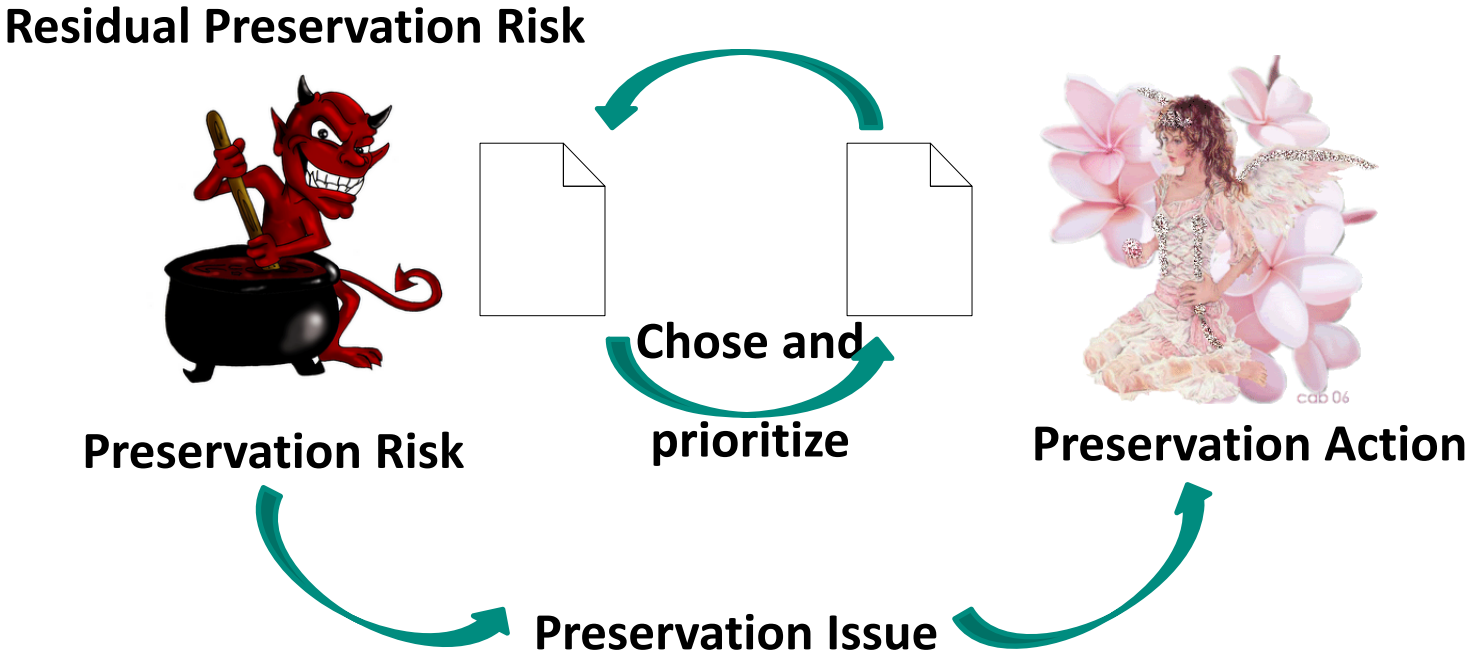
Risk: may happen

- ❖ negative impact - threat
- ❖ (positive impact - an opportunity)

Issue: has happened

Digital Preservation

- Central function: Risk Management



- A support function for the overall organization
- Integrated into the organizational flow

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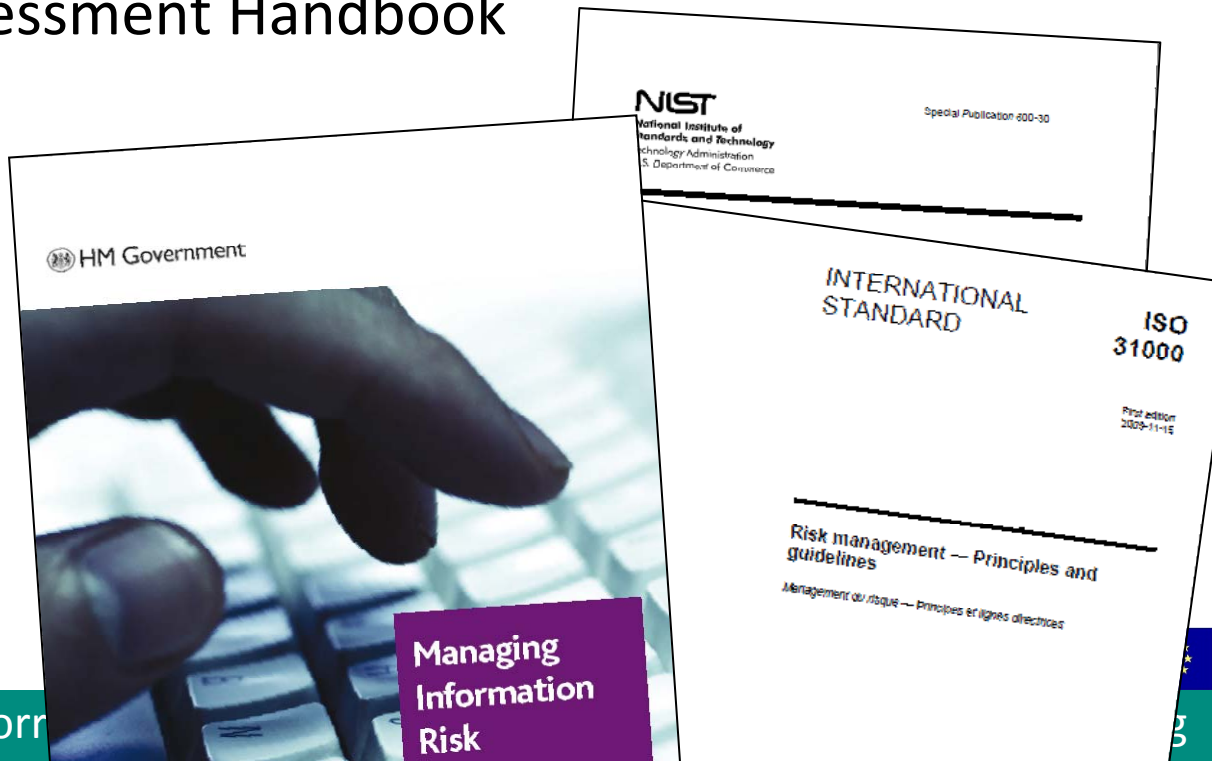
Risk Management – Familiar Terrain

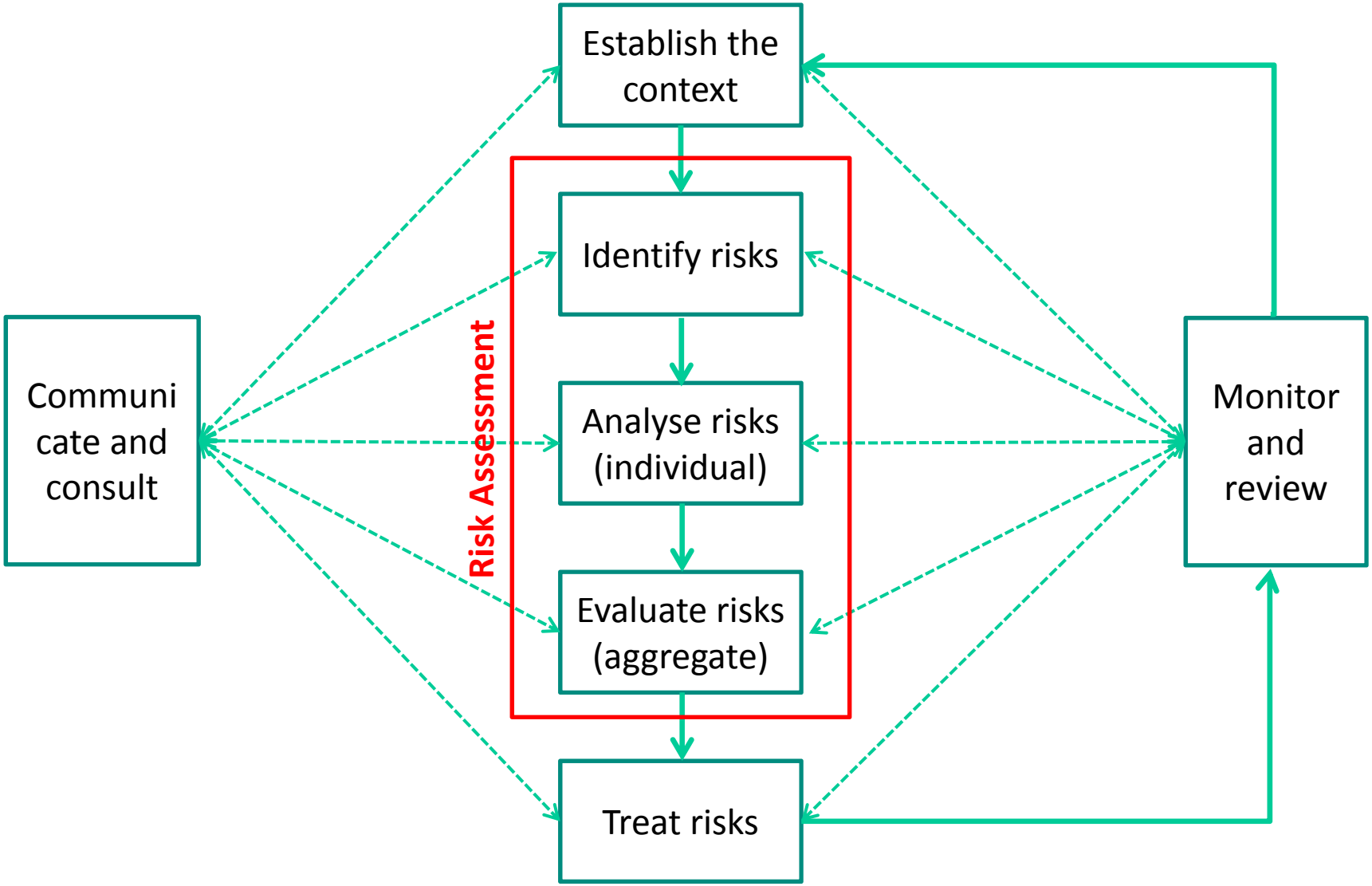
Risk Management – Principles and Guidelines: e.g. ISO 31000

Information Risk Management &
Information Assurance Maturity Model IAMM

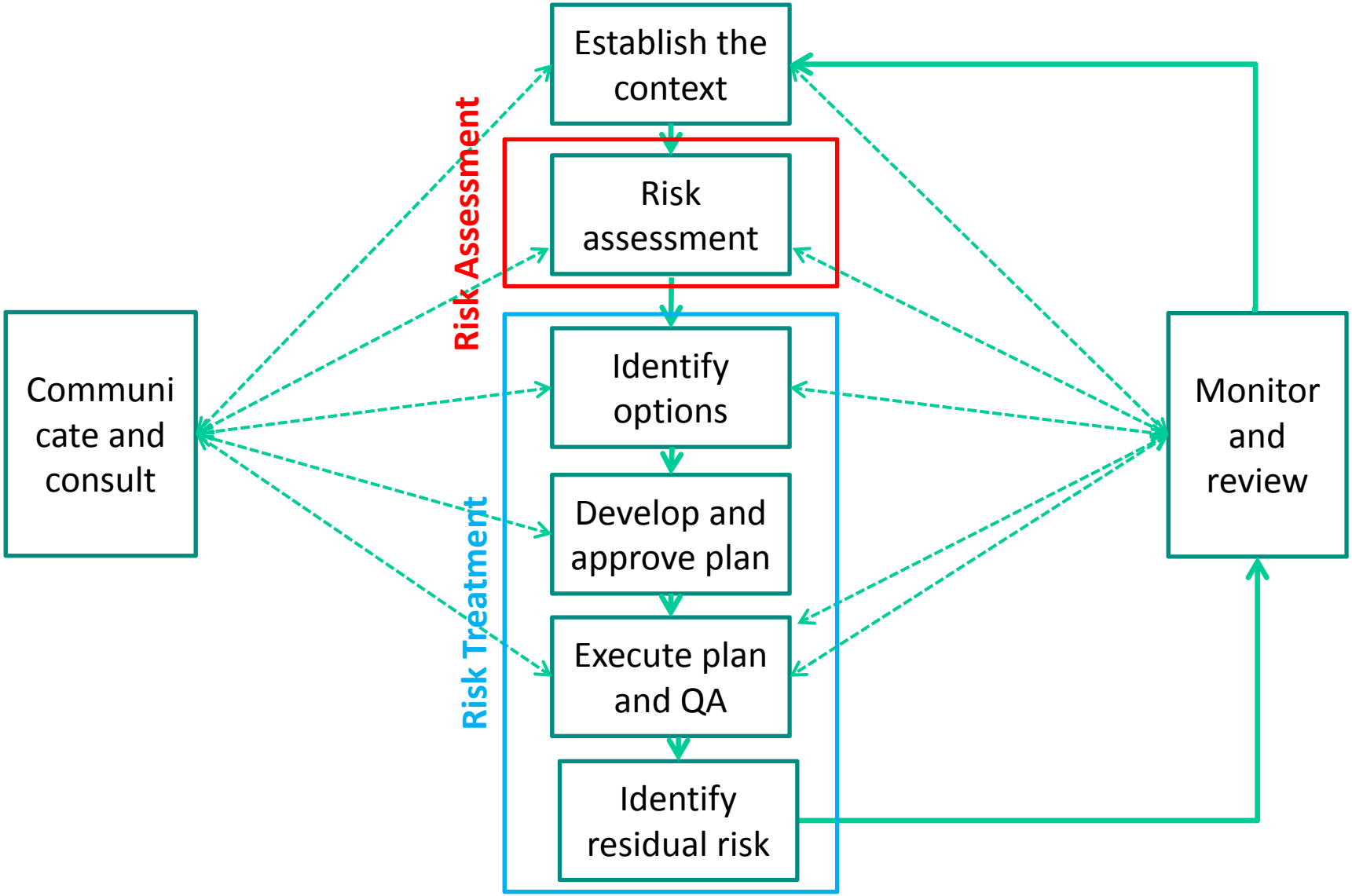
Digital Continuity
– e.g. TNA Risk Assessment Handbook



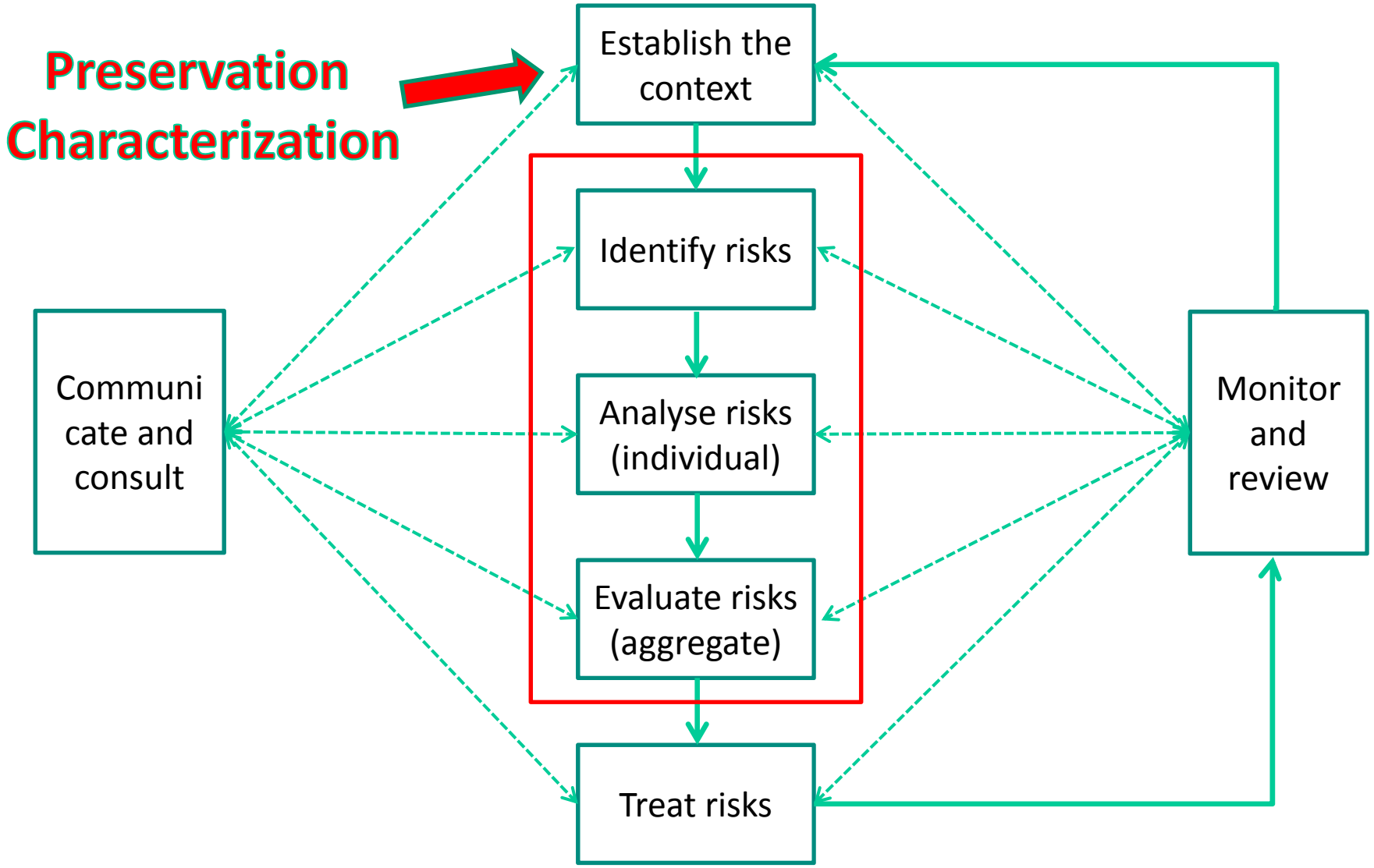
Risk Management Process



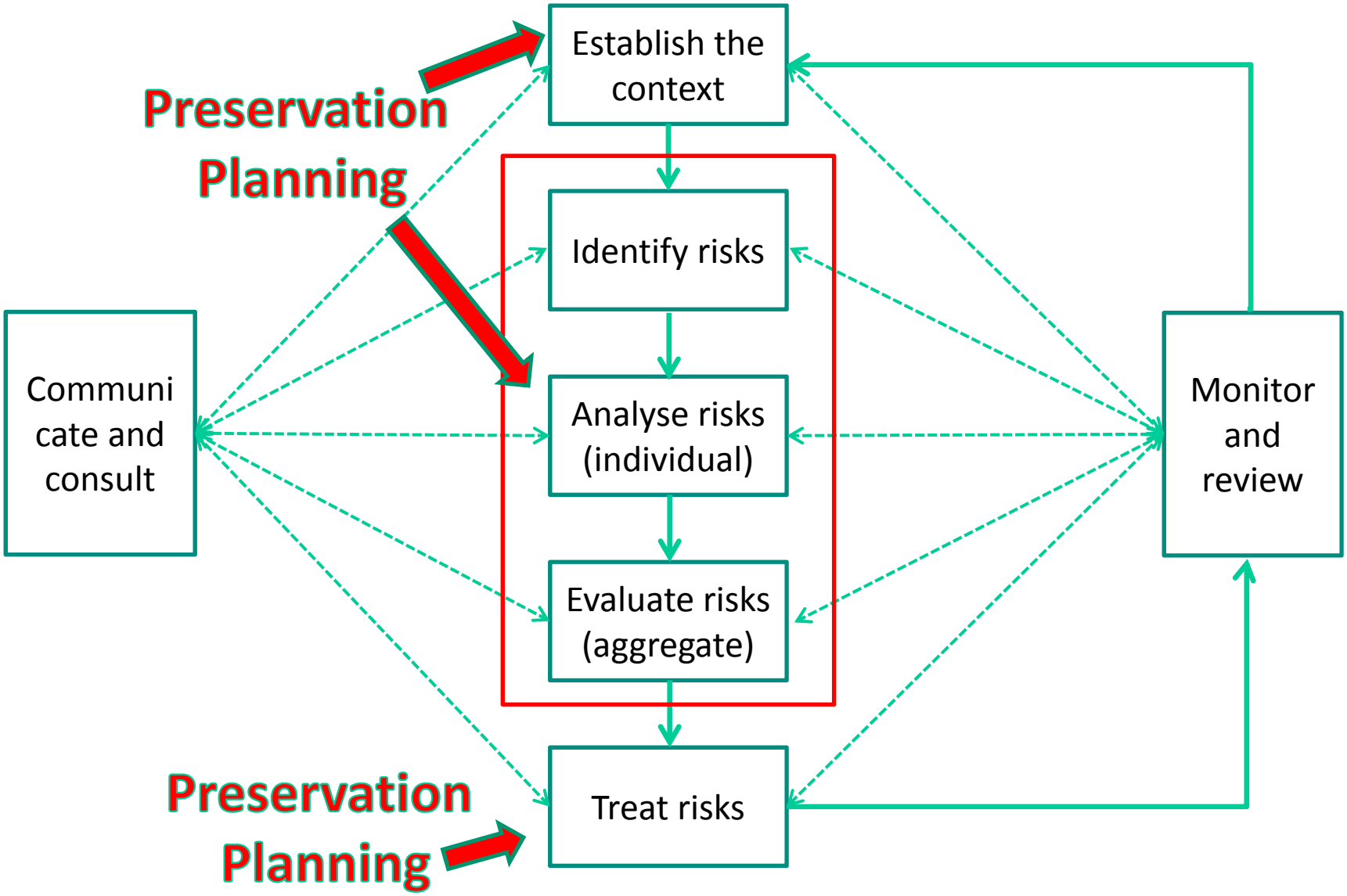
Risk Management Process



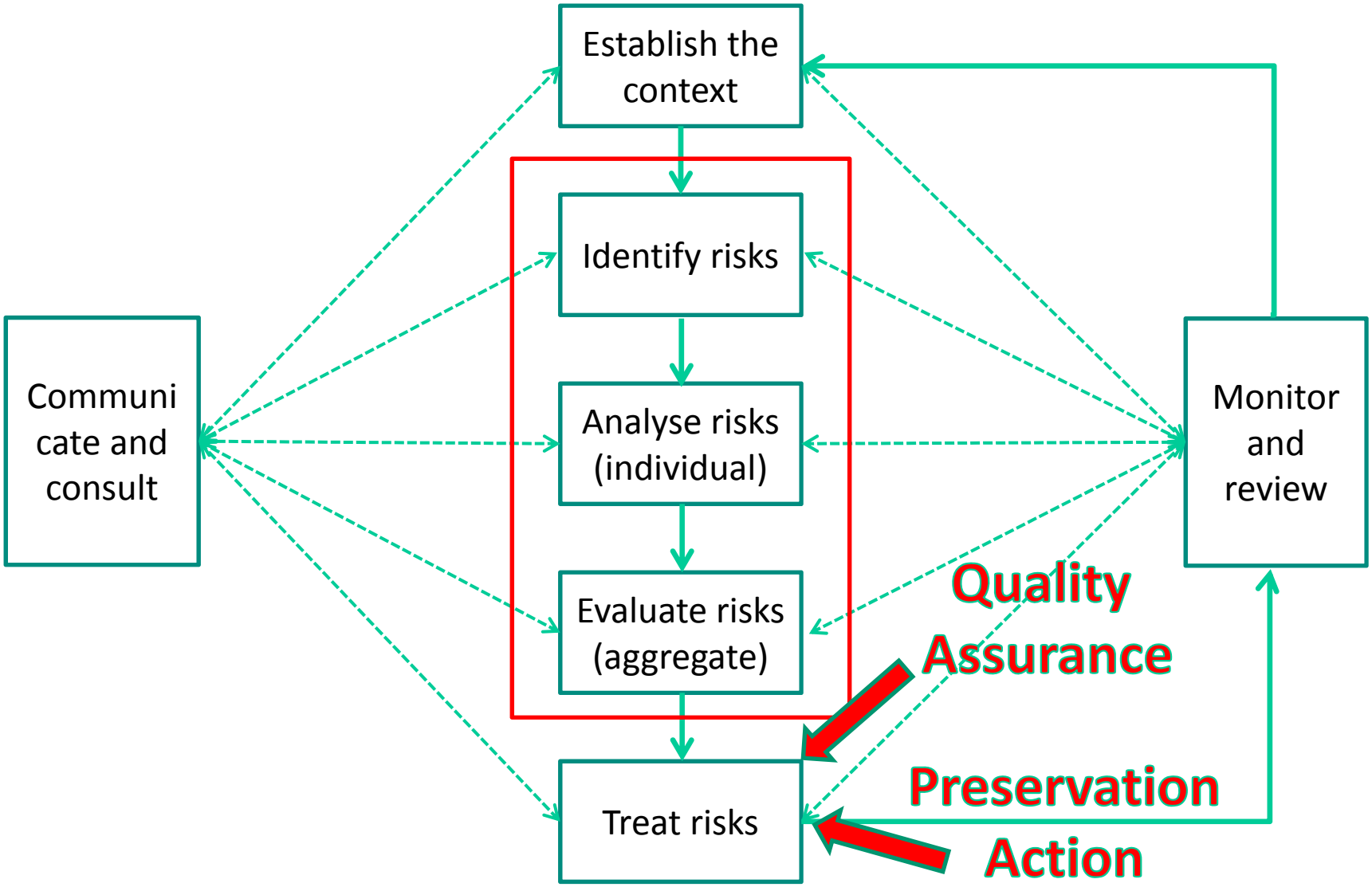
Risk Management Process



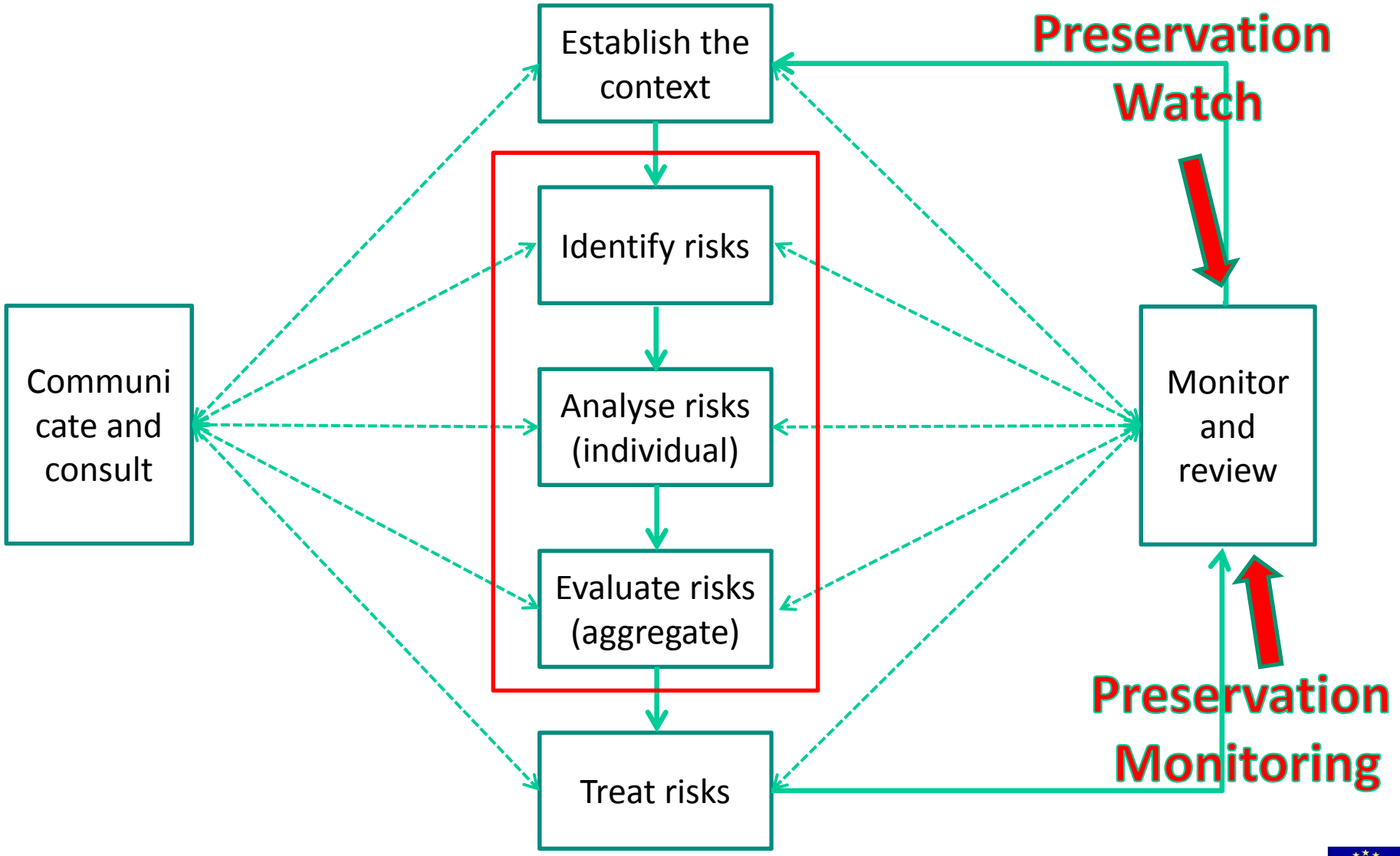
Risk Management Process



Risk Management Process



Risk Management Process



Risk Context - Dimensions

Scope

Assets

Stakeholders

Activities

Quality Expectations

Objectives

Functions

Mandate

Assumptions

Constraints (PESTLE)

Policy and Strategy

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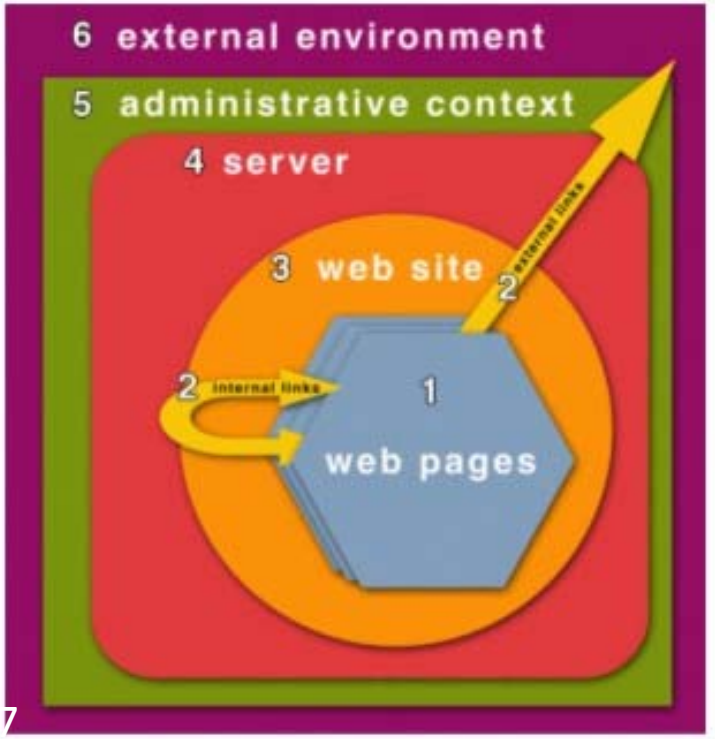
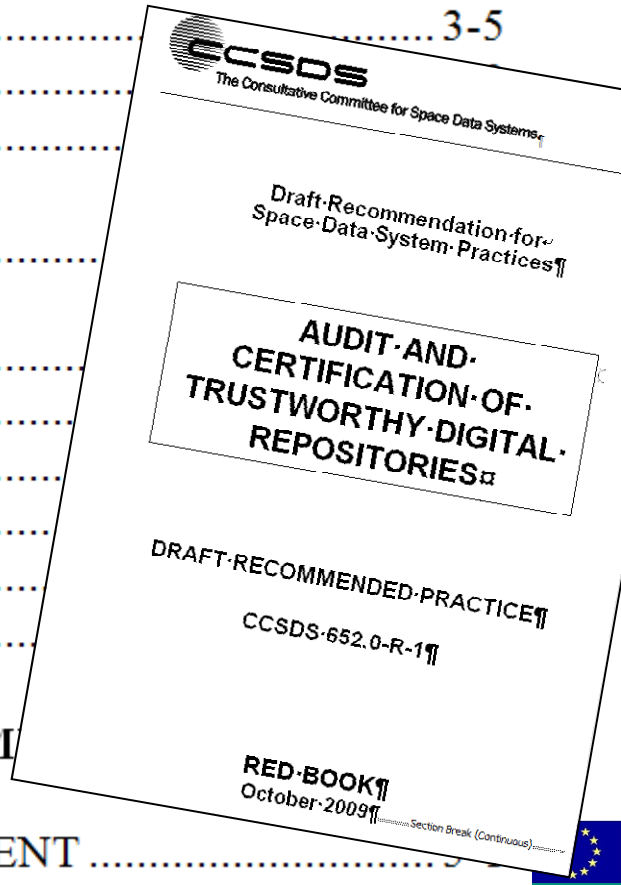
Risk Context: Scope

Virtual Remote Control for web archiving

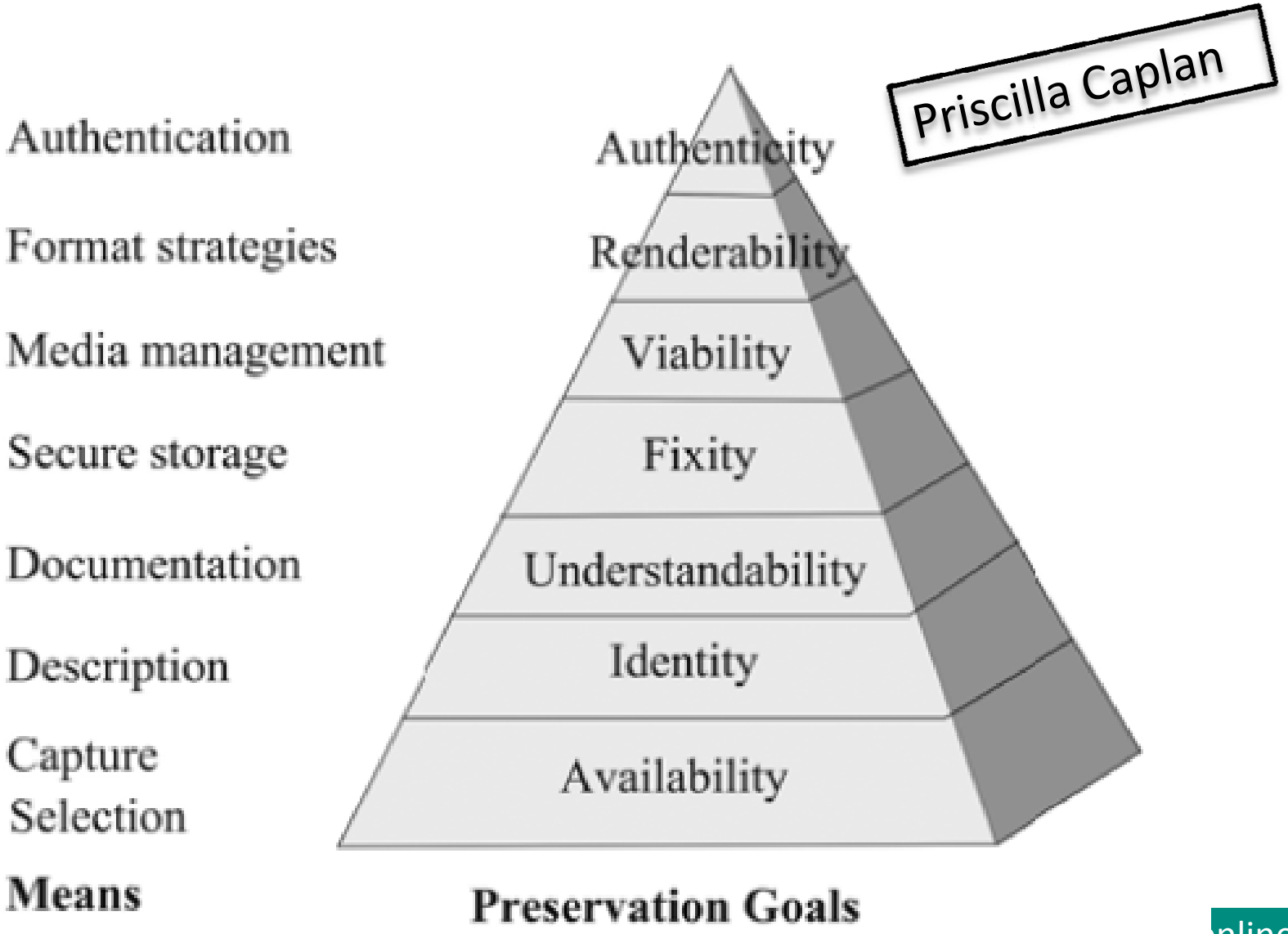
- A web page as a stand-alone object
- Considering the links into it and out from it
- A semantically coherent set of linked web pages
- A digital entity residing on a server
- A website as an entity within an administrative setting
- A website as part of an external environment



The Context: The Bigger Scope



The Context:
Preservation Goals => Objectives



The Context: Preservation Functions

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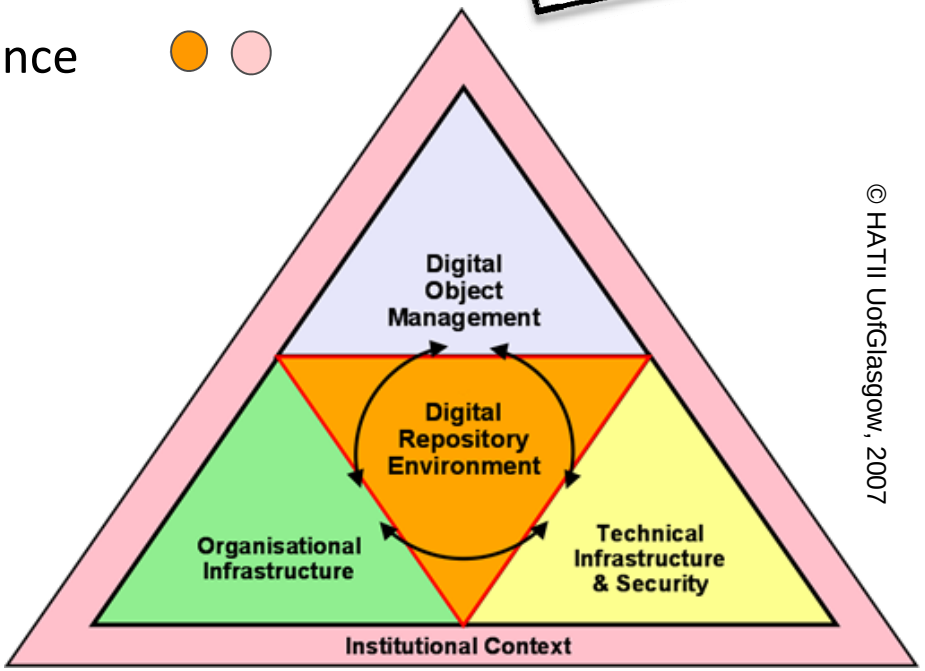
An intellectual context for the work:

- Commitment to digital object maintenance
- Organisational fitness
- Legal & regulatory legitimacy
- Effective & efficient policies
- Acquisition & ingest criteria
- Integrity, authenticity & usability
- Provenance
- Dissemination
- Preservation planning & action
- Adequate technical infrastructure



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(CRL/OCLC/NESTOR/DCC/DPE meeting, January 2007)

Risk Identification: Breakdown Structures and Prompt Lists

- Technological
- Physical
- Organisational
- Socio-cultural
- Legal
- Economic
- Financial
- Political
- Contractual
- Environmental

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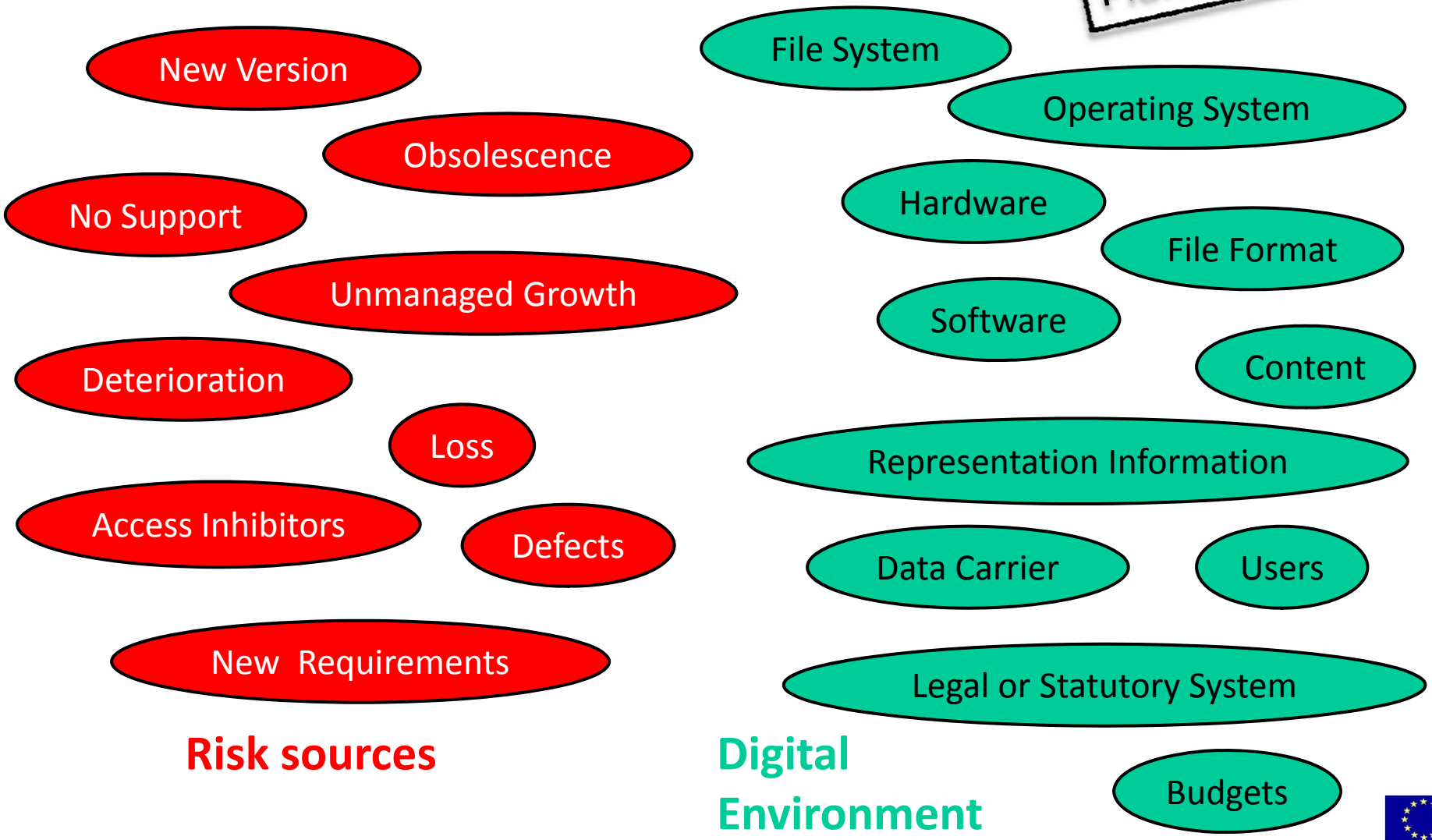
Risk Identification: Sources

Planets Project



Risk Identification: Vulnerabilities and Sources

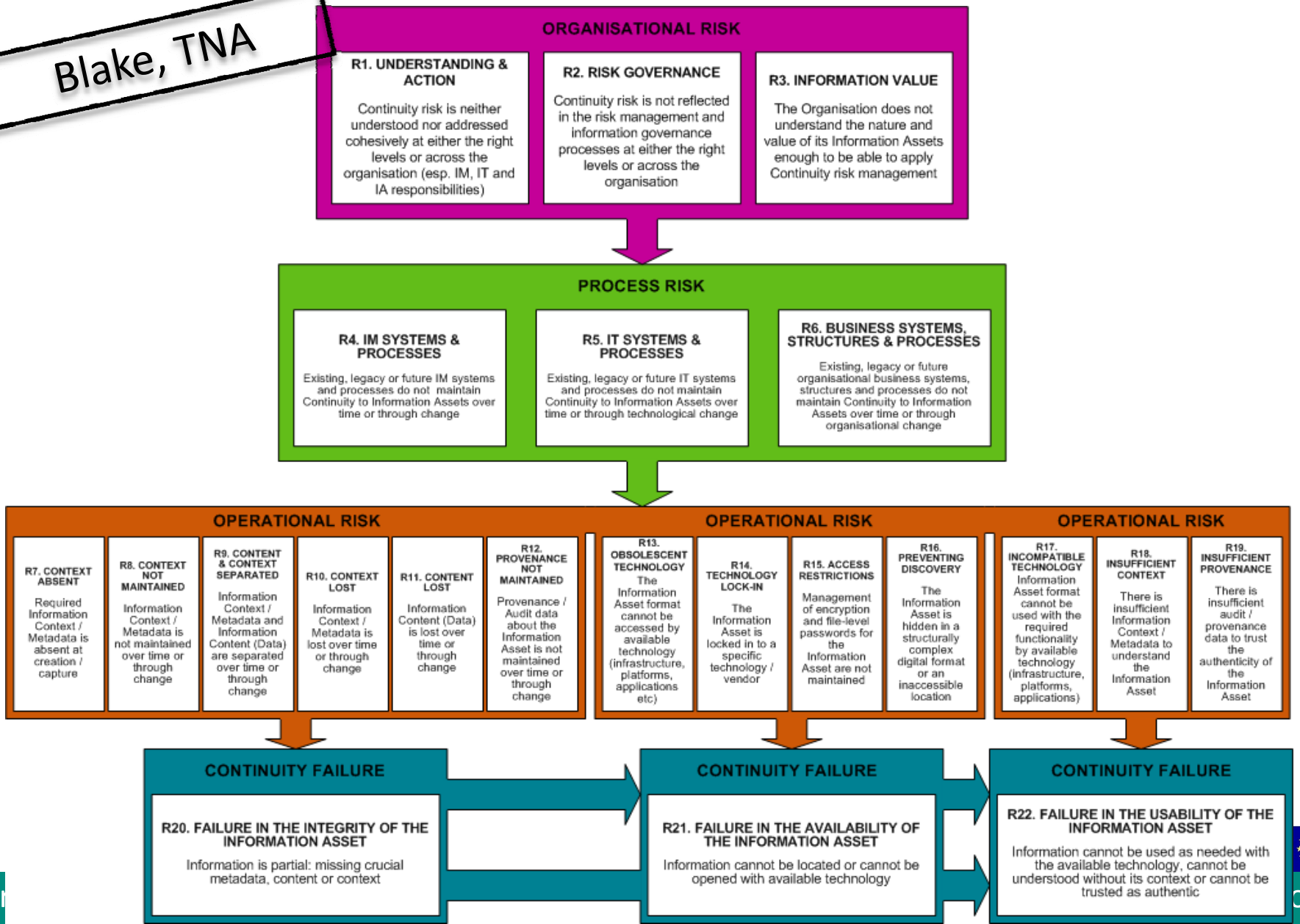
José Barateiro, et al.

Vulnerabilities	Process	Software faults Software obsolescence
	Data	Media faults Media obsolescence
	Infrastructure	Hardware faults Hardware obsolescence Communication faults Network service failures
Threats	Disasters	Natural disasters Human operational errors
	Attacks	Internal attacks External attacks
	Management	Economic failures Organizational failures
	Legislation	Legislative changes Legal requirements

Table 1. Taxonomy of vulnerabilities and threats to digital preservation.

Risk identification

Blake, TNA



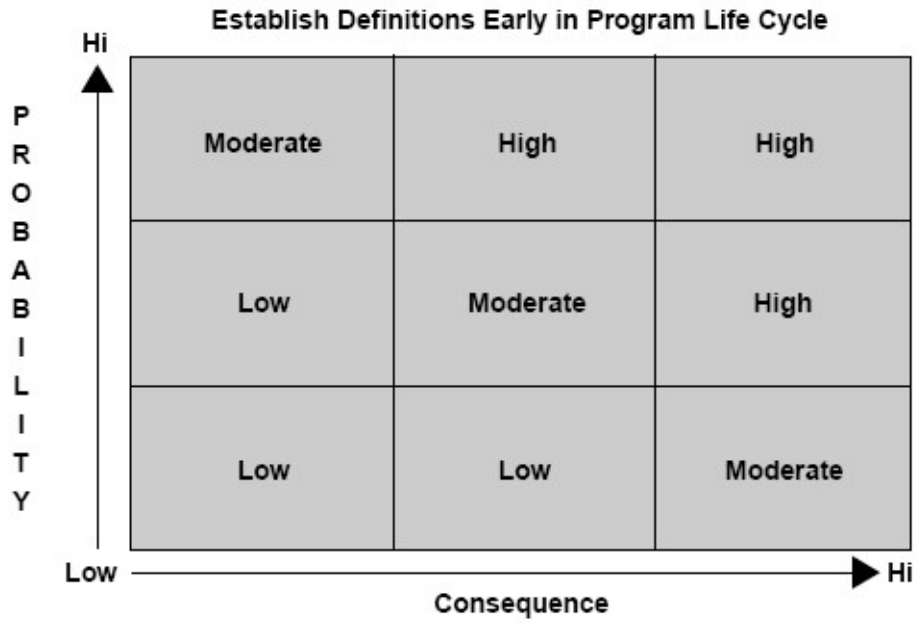
Risk Analysis

Determine

- Probability
- Impact
- (Proximity)

of the identified risks

Calculate severity



Factors Influencing Risk Impact

Risk of loss

- Future rarity
- Alternative storage provision
- Heritage value

Mandatory requirement

- Legal deposit obligation
- Existing external commitment

Strategic considerations

Opportunity & timing

- Size & rate of growth

Opportunities for access

- Alternative access provision
- Revenue

User need

- User demand
- Risk to physical collections
- Remote access

British Library

Doability

- Effort
- Freely available

Operational improvements

Risk Impact Influenced by

Virtual Remote Control for web archiving

- relevancy to the organization's collection(s);
- significance (essential, desirable, ephemeral);
- archival role (primary archives for resource, informal agreement for full or partial capture, other);
- maintenance (key indicators of good site management);
- redundancy (captured by more than one archive);
- risk response (time delay and action based on test notifications);
- capture requirements (complexity of site structure, update cycle, MIME types, dynamic content, and behaviour indicators);
- size (number of pages, depth of crawl required, etc.).

Risk Evaluation

- **Look at all risk as an aggregate**

Determine

Probability

Impact

(Proximity)

Calculate severity

Cost

Objectives

Policy and Strategy

Organisational risk threshold and appetite

Identify need for action

Risk Treatment Options

Accept

accept the potential risk

Reduce

implement controls to lower probability or impact of the risk

Avoid

eliminate the risk cause and/or consequence

Fallback

Put in place alternative action for when the risk materializes

Transfer

compensate for loss, such as purchasing insurance

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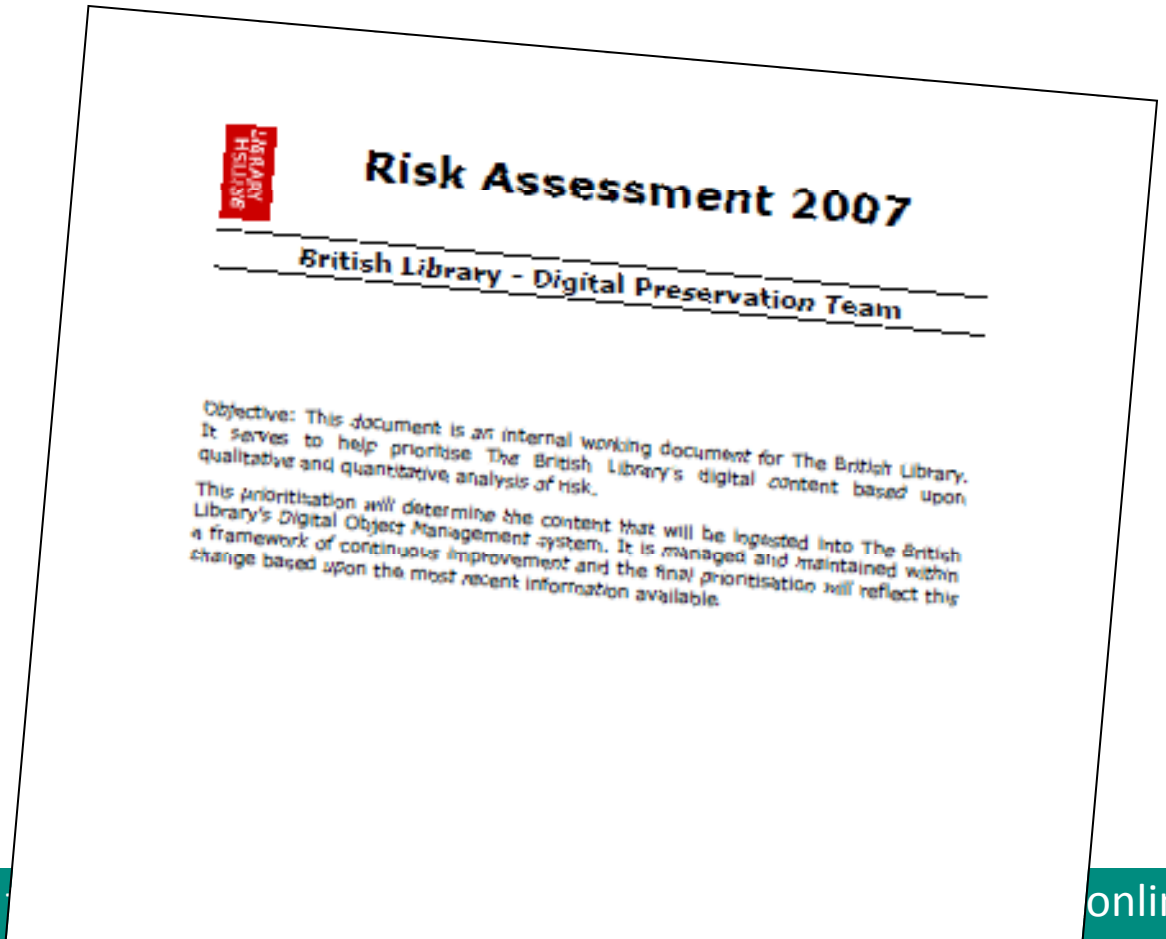
Example Risk Assessment: The British Library 2007

Available online



Risk Assessment 2007

British Library - Digital Preservation Team

Objective: This document is an internal working document for The British Library. It serves to help prioritise The British Library's digital content based upon qualitative and quantitative analysis of risk.

This prioritisation will determine the content that will be ingested into The British Library's Digital Object Management system. It is managed and maintained within a framework of continuous improvement and the final prioritisation will reflect this change based upon the most recent information available.

How much information do we need?

Unsatisfactory storage	Bit stable storage	Content stable storage	Archival storage
Hand-held carriers	Images have been transferred on managed hard disk storage Storage is backed up	Content has been QA'ed Metadata has been produced and QA'ed File formats have been identified Representation Information has been deposited	Automatic check for corruption via checksums Automatic replication over remote locations Digital signatures Integration with Primo / ILS

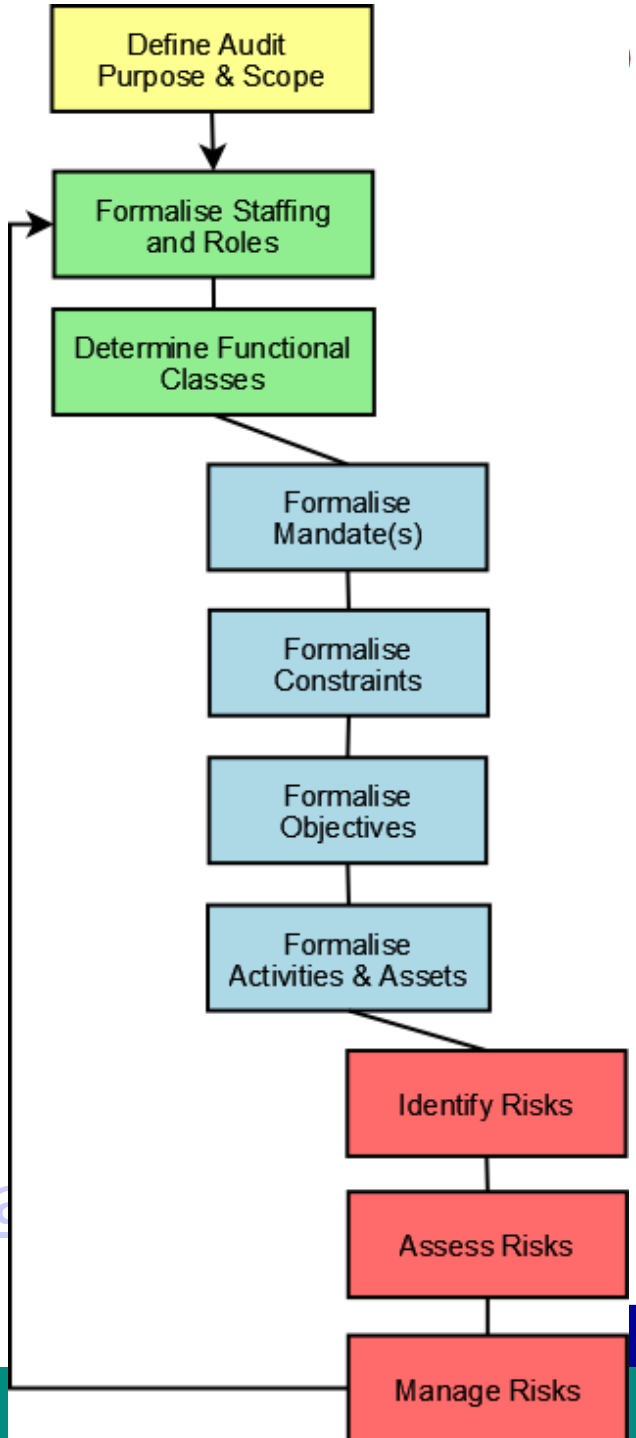
Tools to Help

- Risk management:
  - Drambora (The Digital Repository Audit Method Based On Risk Assessment) : self-certification

DRAMBORA

- Digital Repository Audit Method Based On Risk Assessment
- Online interactive tool
- Developed by the Digital Curation Centre (DCC) and Digital Preservation Europe (DPE)
- Identify, assess, manage, and mitigate risks
- Risk ontology

http://blogs.ecs.soton.ac.uk/keepit/tag/drambora/



Register for DRAMBORA

Logged in: Andrew McHugh
- Auditor
- Business Manager
- Data Liaison Officer

at: Florida Digital Archive at University of Florida

Last Login: 28 Nov 2008

Log Out

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The DRAMBORA Team
Dissemination
DRAMBORA Users

DRAMBORA Online Tool :: Assessment Centre :: View Risk

| Audit Home | Mandate View | Constraints View | Objectives View | Activities View |
| **Risks, Risk Assessment and Risk Management View** |

Use this page to navigate between the various related characteristics of this single risk. You can select alternative risks using the selection panel on the right hand side of the screen.

Risk Name:	Budgetary reduction
Identified*:	8th October 2008
Potential Impact*:	Medium (to Organisational Viability)
Probability:	High
Severity:	48%
Risk Description:	Repository's operational budget is reduced
Risk Vulnerability:	Local recession provokes budgetary reduction of government financed repository
Risk Relationships:	Budgetary reduction to Enforced cessation of repository operations (Contagious)
Nature of Risk:	Physical Environment: ✗
	Personnel, Management & Admin Procedures: ✓
	Operations & Service Delivery: ✗
	Hardware, Software or Communications Equipt & Facilities: ✗
Risk Owner(s):	Repository Management
Functional Class(es):	**Supporting Functional Classes** Mandate & Commitment to Digital Object Maintenance, Organisational Fitness
Linked to :	
Management Strategy(ies):	

identified risks
- **Budgetary reduction** (Repository's operational budget is reduced)
- **Enforced cessation of repository operations** (Repository is forced to cease its business activities.)

defined activities

defined objectives

defined constraints

defined mandate

assessment progress

saved snapshots
Quarter 3, 2008 (8th Oct 2008)

Tools to Help

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  - TIMBUS project: ERM (Enterprise Risk Management) tools extended to digital preservation

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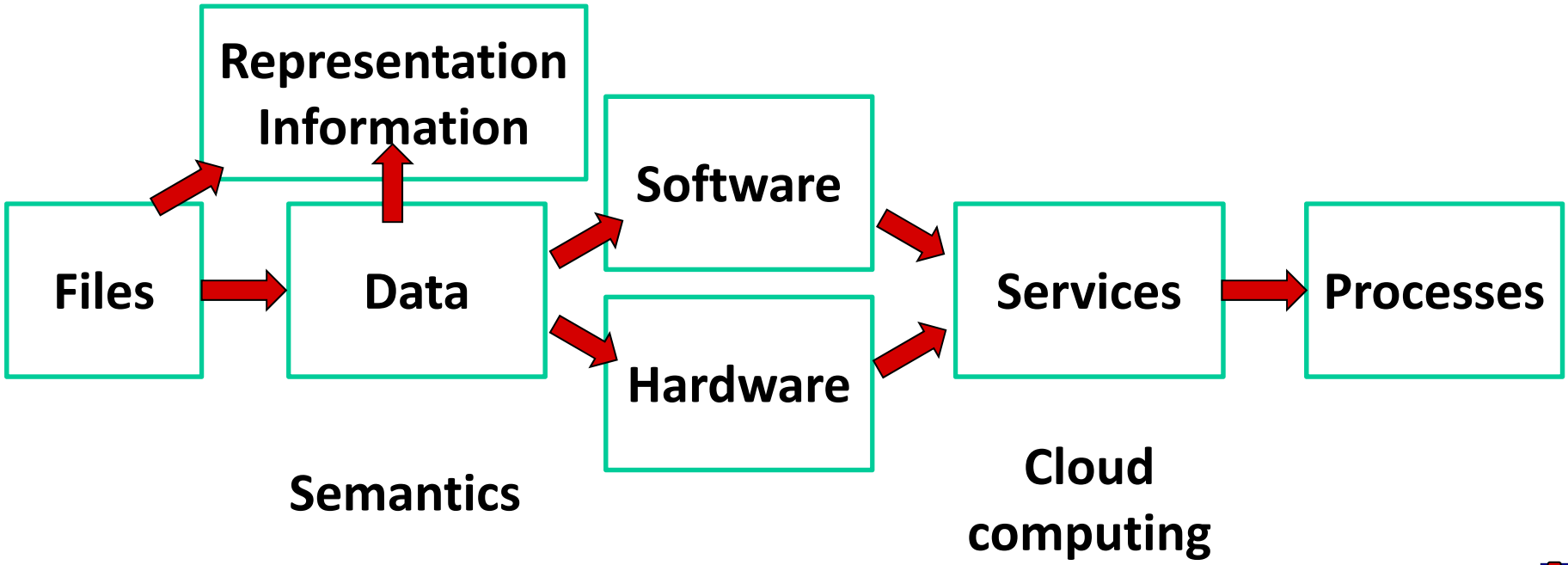
Risk and Business Continuity Management



TIMBUS Task 4.1 ERM

- Intelligent Risk Management
  - Learning from previous situations
  - Reasoning from context
  - Automating risk detection and response
- Complete business modelling, including IT systems, legal constraints, etc.

  Rather than DP focus alone

Tools to Help

- Risk management:
  - Drambora (The Digital Repository Audit Method Based On Risk Assessment) : self-certification
  - TIMBUS project: ERM (Enterprise Risk Management) tools extended to digital preservation
  - TRAC/TDR: framework for establishing certified trustworthiness

4.4.1 The repository shall have specifications for how the AIPs are stored down to the bit level.

Supporting Text

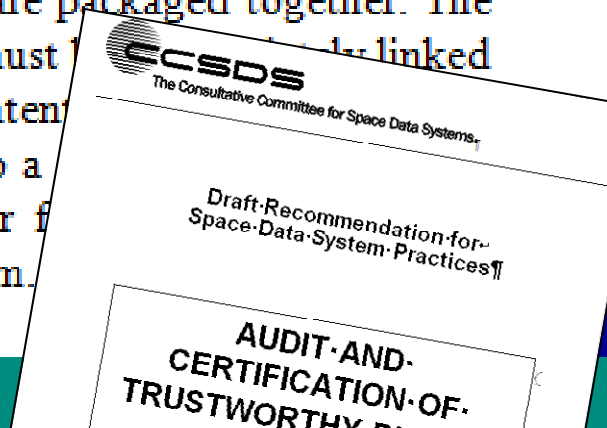
This is necessary in order to ensure that the information can be extracted from the AIP over the long-term.

Examples of Ways the Repository Can Demonstrate It Is Meeting This Requirement

Documentation of the format of AIPs; EAST and DEDSL descriptions of the data components (see references [B6] and [B7]).

Discussion

The repository should specify the Representation information down to the bit level of each AIP component and must specify how the separate components are packaged together. The Representation Information must be available for each AIP and must [illegible] linked to the AIP. Often, repositories are tempted to describe AIP content [illegible] where a program will then be used to convert the information to a [illegible] their Designated Communities. However, if those programs ever [illegible] information would be lost in all the AIPs that relied on that program.



Tools to Help

- Risk management:
  - Drambora (The Digital Repository Audit Method Based On Risk Assessment) : self-certification
  - TIMBUS project: ERM (Enterprise Risk Management) tools extended to digital preservation
  - TRAC/TDR: framework for establishing certified trustworthiness
- Context identification: DROID, JHOVE, FIDO, FITS, file, …
  - Assess the characteristics of your digital assets
  - Profile your collections
- Risk treatment planning: Plato
- Risk treatment: A variety of preservation and QA tools

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Thank you