Trusted Digital Repositories Maturity Model (TDR-MM)

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Everything matures....step by step

Humans

Butterflies

Birds

Digital Repositories
If we know maturity stages, we can...

- Understand current status
- Develop a vision of the desired future
- Establish a list of required improvement actions
- Prioritize these improvement actions
- Produce a plan to accomplish the actions
- Commit the resources to execute the plan
Trusted Digital Repository (TDR)

Definition of TDR

- “A critical component of digital archiving infrastructure is the existence of a sufficient number of trusted organizations capable of storing, migrating, and providing access to digital collections” (Task Force on Archiving of Digital Information, RLG, 1996)
- “A trusted digital repository is one whose mission is to provide reliable, long-term access to managed digital resources to its designated community, now and in the future” (RLG-OCLC report, 2002)

Major properties of TDR

- Responsible for the long-term maintenance of digital resources
- Have an organizational system that supports long-term viability
- Demonstrate responsibility and sustainability
- Design its systems in accordance with conventions and standards
- Establish methodologies for system evaluation
- Have policies, practices, performances that can be audited and measured
Efforts to establish TDR (1/2)

Components for TDR

- Fiscal Sustainability, Virtual Federation
- Policies & Functions
  - Trustworthy Repository Systems
  - Trustworthy Information Structure & Metadata
- Risk assessment, Audit, Certification
- Creator Relationship
- User’s Perception on trust
Efforts to establish TDR (2/2)

Audit & Certification for TDR
- ISO 16363 Audit and certification of trustworthy digital repositories
- Published in March 2012
- To objectively justify or prove trustworthiness of ‘OAIS-compliant’ digital repositories
- Defines a recommended practice for assessing the trustworthiness of digital repositories

Structure of ISO 16363
- Organizational Infrastructure, Digital Object Management, Infrastructure and Security Risk Management
- Sections (consist of) Metrics (that are satisfied by) Evidences
- Conformance to these metrics is a matter of judgment
- Audit result can be used to judge overall suitability of a repository or to identify possible weakness of the repository
Audit & Certification vs. Improvement

ISO 16363 provides:
- Compliance requirements to get certified as TDR.
- Examples and discussions describing the requirements.

ISO 16363 does not provide:
- How to control the performance of digital repositories
- How to improve organizational capabilities over time
- A step by step road map towards the goal
Organizational Capability

Resource-based view (from management filed)

- Source of competitive advantage or high performance:
  - Resources: capital equipment, skills, people, money

Organizational capability

- Ability of an organization in acquiring, bundling and utilizing its resources to perform activities to achieve goals
- Built based on an organization’s processes and routines that are practiced and internalized in the organization over time
- An organization can be viewed as comprised of a set of capabilities
Taxonomy of organizational capability

- **Governance capability**
  - Capability that can manage a TDR’s overall strategy, legal status, and risks in order to ensure its business continuity.

- **Business capability**
  - Capability that can properly operate a TDR’s business processes of digital object management
  - Capability that can manage cross-functional processes to control and improve quality of the business

- **Cultural capability**
  - Capability that can encourage a TDR’s organizational learning and innovation culture

- **Resource capability**
  - Capability that can properly manage a TDR’s resources
### Taxonomy of organizational capability

<table>
<thead>
<tr>
<th>Capability</th>
<th>Focus</th>
<th>Elements for DR (Example)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance</td>
<td>• Mandate • Strategy • Business continuity • Legal status • Organizational risk</td>
<td></td>
</tr>
<tr>
<td>Capability</td>
<td>• Visioning for DR’s goal and mandate • Strategic planning for DR operation • Succession planning • Contract &amp; license management • Risk management in DR operation and services</td>
<td></td>
</tr>
<tr>
<td>Business Capability</td>
<td>• Functional process</td>
<td>• Acquisition of content • Creation of AIP • AIP preservation • Access management • Information management • Preservation planning</td>
</tr>
<tr>
<td></td>
<td>• Cross-functional process (Control process)</td>
<td>• Project management in digital preservation • User needs assessment / requirement management • Process management (cross-functional processes) • Quality management in digital preservation &amp; access</td>
</tr>
<tr>
<td>Cultural Capability</td>
<td>• Organizational culture • Core values</td>
<td>• Organizational learning • Knowledge sharing • Innovative culture</td>
</tr>
<tr>
<td>Resource Capability</td>
<td>• Financial resource • Technical resource • Human resource • Social resource</td>
<td>• Financial management • Technical infra. / security management • HR management, HR development • Reputation management • Collaboration management</td>
</tr>
</tbody>
</table>
Structure of organizational capability

Organizational Capability

Goal

Process

Output

Performance Evaluation

Input

Organizational Structure

Work style & Culture

has

achieved by

requires

produces

performed under

determines

evaluated by

based on
Maturity levels of organizational capability

Basic assumptions
- OC is embedded in and expressed as an organization’s processes.
- OC can be developed and improved step by step over time.

5 levels of organizational capability
- Adopted from ‘CMMI (Capability Maturity Model Integration)’
- Originally developed to assess and improve software development processes. (by SEI at Carnegie Mellon University)
  → expanded as a general approach of assessing process maturity.

Level 1: Initial: The process is characterized as ad hoc and chaotic.

Level 2: Repeatable: Basic processes are established within a project.

Level 3: Defined: Processes are standardized across the organization.

Level 4: Managed: Productivity and quality are measured and controlled.

Level 5: Optimizing: Continuous process improvement is available.
# Measuring maturity

## Grid-based model

- Define and assess the maturity level of each process.
- Based on the prescriptive or descriptive cell text in each grid.
- Each cell describes goal, structured process, organizational structure, work style and culture.

<table>
<thead>
<tr>
<th>Level</th>
<th>Acquisition</th>
<th>AIP creation</th>
<th>AIP preservation</th>
<th>Access Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Optimizing</td>
<td>Description</td>
<td>Description</td>
<td>Description</td>
<td>Description</td>
</tr>
<tr>
<td>4. Managed</td>
<td>Description</td>
<td>Description</td>
<td>Description</td>
<td>Description</td>
</tr>
<tr>
<td>3. Defined</td>
<td>Description</td>
<td>Description</td>
<td>Description</td>
<td>Description</td>
</tr>
<tr>
<td>2. Repeatable</td>
<td>Description</td>
<td>Description</td>
<td>Description</td>
<td>Description</td>
</tr>
<tr>
<td>1. Initial</td>
<td>Description</td>
<td>Description</td>
<td>Description</td>
<td>Description</td>
</tr>
</tbody>
</table>
Measuring maturity

Stage-based model

- Define and assess the maturity level of the whole organization.
- Based on the priority of process implementation.
- According to the implemented processes, the organization can be assessed as Initial, Repeatable, Defined, or Optimizing.

1. Initial
   - Requirement management processes

2. Repeatable
   - Project planning processes
   - Project tracking processes

3. Defined
   - Process management processes

4. Managed
   - Quality management processes

5. Optimizing
   - Continuous improvement processes
Next steps

- **Combine two approaches**
  - Grid-based model for functional processes of Business capability (e.g. Acquisition, Preservation, Dissemination, …) and Governance / Resource capability
  - Stage-based model for cross-functional control processes (e.g. Project management, Quality management, …)

- **Multiple Case Study**
  - Document analysis: project reports, published articles, …
  - Describe each cell of the grid-based model.
  - Identify more cross-functional control processes for stage-based model.
  - Collect and describe good practices for each control processes

- **Apply & Evaluate the model**
Thank you

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