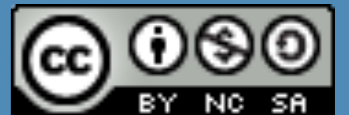


A Capability Development Model for Assessing and Improving Distributed Infrastructures and their Services.

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Background: Objectives

- SaW: CESSDA Strengthening and widening the European infrastructure for social science data archives
 - “State of play evaluation of social science data archives and services in EEA countries, identifying gaps and bottlenecks in existing services, and produce national development plans.”
 - “...a development model for describing the status of the data infrastructure in the social sciences at the national level.”



Background: Starting Points

CMM for services examples

FitSM

CMMI-SVC

CARDIO

Reference Architectures

SSH-RM

OAIS

European Framework for Audit and Certification

DSA-WDS

DIN 31644

ISO 16363

CESSDA

CESSDA Statutes

CESSDA Annex 2



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Background: Capability Maturity Modelling

- Evaluation of processes & activities that an organisation undertakes to provide a product/service.
 - To what degree are these are optimised.
 - Align to strategic goals and/or high-level principles.
- Stepwise progression through levels to optimisation.
 - Depending upon goals, not every process needs to be fully optimised.
 - Context & environment are important.



Capability Development Model

- The CESSDA-CDM is a structured collection of elements that identify and describe the characteristics of effective preservation processes and activities. The model is hierarchical and has three levels.
- Each of the levels in the model is dependent on the configuration of the lower level elements; lower level elements work as indicators for the evaluation of the higher level processes and capabilities.



Capability Development Model

- *Level 1: Capability Requirement Areas* (describe on a high-level, the main objectives and principles).
- *Level 2: Capability Process Areas* (each has its own purpose and specific process).
- *Level 3: Objectives and associated Required or Expected Activities* (activities defined to achieve the objective(s) of that CPA).
- **Generic Objectives & Activities** can be included in other CPAs (e.g. Documentation or Communication.)



Capability Completeness

- Each Capability Process Area has a measure of completeness for the capability purpose in 3 levels:
- (1) *Initial*: There is some awareness of the need for this capability. There is an intent to meet the specific objectives but there is no plan or strategy in place to do so.
- (2) *Partial*: There is at least one required activity that is not present (or not at a prescribed level.) There is evidence that the direction the organisation is taking will lead to a complete capability in this area.
- (3) *Complete*: All required activities are at a prescribed level. The organisation has evidence to confirm this.



Activity maturity levels

- To achieve an objective within a CPA, there need to be one or more activities present.
- To measure the maturity of an activity, each activity is scored on a 6-point scale.
- For each activity specific descriptions for the different levels of maturity are defined.
- There are some generic properties that characterise each level.



Activity maturity levels

(0) Not defined: There is no awareness, no activity, no evidence.

(1) Initial: There is some awareness of the processes; activities are uncontrolled, disorganised and *ad hoc*. There is a reactive approach. There is no or little institutional commitment to processes and activities; there is no or little evidence on actions; nothing is written down. Roles and responsibilities are not defined.



Activity maturity levels

(2) Repeated/partial: There is a more active approach; tasks and actions are repeated. Processes and functions follow a regular pattern; different people are repeating the same tasks (subject to variation & possibly error-prone). Some documentation and process descriptions may exist, but they are incomplete.



Activity maturity levels

(3) Defined: The organisation has a calculative approach – systems and processes are in place; tasks are defined and are connected to processes and process descriptions. Roles and responsibilities are defined and connected to tasks; functions and mechanisms has been recognised, standardised and are being communicated to relevant stakeholders. Institutional commitment is significant.



Activity maturity levels

(4) Managed: The organisation has a proactive approach - staff training mechanisms and procedures are in place. Processes and activities are monitored and quantitatively assessed. Inconsistencies and incidents are recorded for quality and assessment purposes. Tasks and processes are integrated into high level policies and objectives, i.e. tasks/activities are institutionalised.



Activity maturity levels

(5) *Optimised*: The organisation has a proactive and predictive approach of systemised optimisation, based upon regular reviews of policies, procedures, and monitored activities. Outreach towards designated communities and other relevant stakeholders also contribute to the review process. The review and update processes are institutionalised.



REQUIREMENT AREA

PROCESS AREA

REQUIRED OR EXPECTED ACTIVITIES

Organisational Infrastructure

Digital Object Management

Technical Infrastructure / Risk

Acquisition and Ingest

Preservation: storage, curation and planning

Access / Provisioning

Discoverability and accessibility

Access control and handling of anomalies

Access interfaces

Searchable and indexed content

Downloadable data holdings

Data formats

Metadata formats

Metadata harvesting

Capability Completeness

Level of Maturity

- 1: Initial
- 2: Partial
- 3: Complete

- 0: Not defined
- 1: Initial
- 2: Repeated/partial
- 3: Defined
- 4: Managed
- 5: Optimised



REQUIREMENT AREA

Digital Object Management

PROCESS AREA

Acquisition and Ingest

Preservation: storage, curation and planning

Access / Provisioning

Purpose: to provide access to research data in an effective and secure way, ensuring that data can be understood, used and re-used in the long-term perspective.

ACTIVITIES

Objective: Access control and handling of anomalies.

Objective: to enable users to discover, access and download data and metadata.

Metadata harvesting

Activity 2

Activity 3

..

“The repository enables the harvesting of all their resource discovery metadata and relevant preservation metadata”

0: No metadata harvesting enabled

1: Initial: metadata is unstructured - limited accessibility

2: Repeated /partial: most metadata can be harvested, but protocols are not implemented (or are only partly implemented).

3: Defined: all metadata are harvestable; OAI-PMH / Dublin Core implemented.

4: Managed: metadata harvesting is measured and monitored; regular reviews of metadata protocols

5: Optimised: outputs of monitoring are formally reported; reporting are aligned to technology watch and communication with users..

How to use the CDM

- It is a model, not an assessment tool.
 - need to derive tailored assessment instrument.
- Cannot cherry-pick activities - select capabilities.
- Can be extended.
- In-built development progression.
 - Can be used to aid development of bespoke roadmaps.
- **<http://cessda.net/CESSDA-Services/Projects/CESSDA-SaW/Work-Packages/WP3/CESSDA-CDM>**



Next Steps

- First version - still needs improvements.
 - Concentration on the (data) service providers & data repositories.
 - Some harmonisation.
 - Integrate comments & feedback from SaW.
- Minimum & ideal capability completeness levels need to be set for each usage.
- Minimum/ideal maturity levels need to be set for each usage.
- A model to be used for long-term service improvement self-assessment?



Future Steps

- Integrate research community into model.
- Broadening scope to cover (inter)national context (research projects, funding, data creation, and data re-use).
- Lengthening number of capabilities and activities.
- Deepening with examples.
- Generalisation beyond CESSDA.



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CESSDA SAW

Thank you for your attention
Any questions?

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