

Maturity model as the tool for information/data literacy assessment

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Maturity and maturity models (MM)

- The term "maturity" is used to denote interest in the evolution of a studied phenomenon from its initial to the most advanced stage;
- Maturity models (MM) are tools that support the assessment of the current and future states of a selected process, person, or group. They contain the most important elements of process efficiency in one or more areas of interest and describe the path of their evolutionary progress;
- It is usually defined as a series of successive levels that together form the expected or desired logical path leading from the initial state to the final (desirable) state of maturity.

MM structure

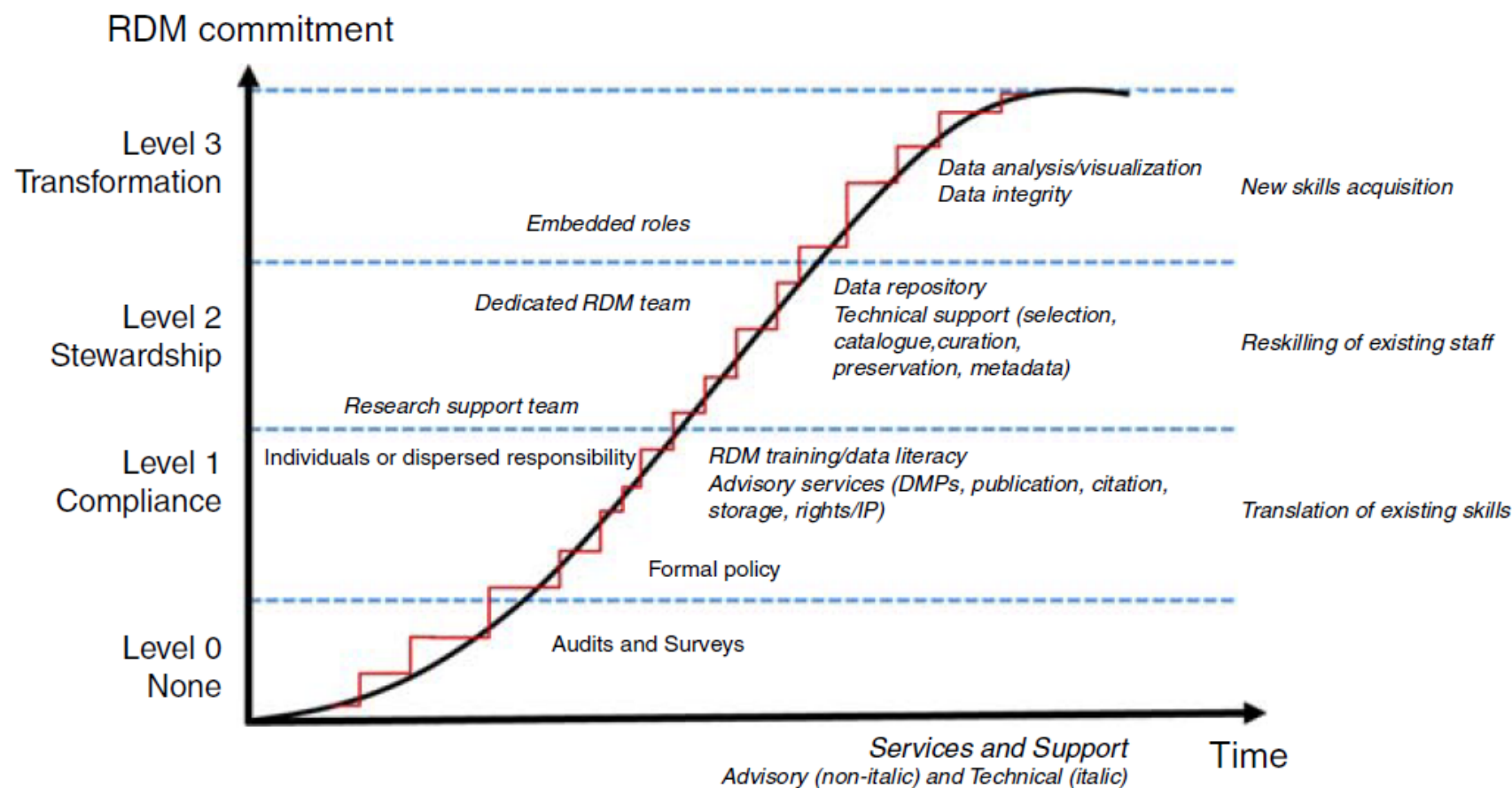
- MMs are usually presented in the form of a matrix, where the rows describe the dimensions of the maturity assessment, and the columns describe its levels;
- The levels define the stages of evolution of the assessed phenomenon;
- The intersection of dimensions with levels usually provides descriptions of areas for improvement that connect the assessed area with the maturity level;
- The structures of the MM created in this way present a path for the development of the organization and the process.

Research Data Services Maturity Model

Maturity Levels Key Areas	Basic :: Foundation Building	Intermediate :: Organization and Standardization	Advanced :: Monitoring and Optimization
<i>Leadership (vision, strategy, culture)</i>	Response to mandates and external activities	Data strategies are coordinated with institutional strategic documents.	Data strategies guide service development and assessment.
<i>Services</i>	DMP assistance, consultations and instruction, best practices and information dissemination	Data deposit and repositories, archiving and preservation, collaboration and engagement, metadata, storage, data sharing and reuse	Permanent IDs for data and researchers, data curation, data processing and analysis, software and hardware, data citation
<i>Users and stakeholders</i>	Addressing individual requests	User strategy is based on needs assessment.	User needs are regularly evaluated, and services and needs shape each other.
<i>Research life cycle support</i>	Support on one end (upstream with DMP or downstream with data deposit)	Support broadens and formalizes for both upstream and downstream.	Support is embedded in the life cycle.
<i>Governance</i>	No policies, or reliance on institutional policies	Data mentioned in other policies or one general data policy	Set of policies from acquisition to storage to curation and dissemination
<i>Cost and budgeting</i>	Spending is a burden; each data-related expense needs to be requested and justified.	Spending brings benefits and creates opportunities.	Budgeting for growth and sustainability
<i>Cross-unit collaboration</i>	None, or ad hoc meetings and committees within institution	Joint initiatives with other units	Formal partnerships within and outside, support from university administration
<i>Human capital</i>	Other staff, such as subject librarians, assume data responsibilities, ad hoc training	Solo librarian or a working group, consistent professional training	Dedicated team with shared or specialized responsibilities, strong skills, continuous learning

MM structure (example: Kouper et al. 2017)

RDM MM (Cox et al. 2019)



Information/data literacy (I/DL) rubrics

- Oakleaf (2008): three methods for evaluating I/DL:
 - Fixed-choice tests,
 - Performance assessment;
 - **Rubrics.**
- In general, the primary task of rubrics is to facilitate the assessment of the quality of various objects and activities, in that information/data activities;
- Rubrics in I/DL assessment are descriptive scoring schemes that allow for consistent assessment of progress in I/D users' education, as well as for the analysis of their work and activities.

Information literacy rubrics (an example)

	Introductory	Developing	Mastery
Find appropriate sources of information for their question.	Accesses information randomly, retrieves information that lacks relevance and quality.	Accesses information using variety of search strategies and some relevant information sources. Demonstrates ability to refine search.	Accesses information using effective, well-designed search strategies and most appropriate information sources
Evaluates information and sources critically	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.
Uses sources ethically, according to established academic standards.	<p>Fails to properly identify sources of information and ideas according to the standards of ethical use of intellectual property.</p> <p>Does not include a functional bibliography and/or in-text citations.</p> <p>Uses source material as indirect quotes without adequate paraphrasing</p>	<p>Properly identifies all sources of information and ideas according to the standards of ethical use – may be minor mistakes.</p> <p>Includes a bibliography or in-text citations which may contain minor formatting errors or omissions.</p> <p>Attempts to paraphrase or summarize cited material but poorly worded/rephrased.</p>	<p>Properly identifies all sources of information and ideas according to the standards of ethical use and intellectual property. There are no noticeable mistakes.</p> <p>Bibliography and in-text citations are consistent with each other and in proper formatting for the subject area.</p> <p>Effectively paraphrases or summarizes ideas/information from the cited source materials using original language.</p>
Shares their findings through effective synthesis, analysis and interpretation of the information they have found.	<p>Does not develop insight, or does not include a range of sources and perspectives.</p> <p>Demonstrates little or no synthesis of arguments/ideas: unable to integrate sources with each other or with one's own argument.</p> <p>Misrepresents other positions on the topic, or fails to identify or acknowledge other views.</p>	<p>Develops some insights based on some sources and perspectives.</p> <p>Demonstrates some engagement with sources tending toward summary rather than higher-level synthesis.</p> <p>Represents some other positions, with varying degrees of accuracy – may fail to acknowledge some major perspectives</p>	<p>Develops meaningful insights based upon variety of sources and perspectives.</p> <p>Demonstrates sophisticated level of creative, critical analysis.</p> <p>Accurately represents major/leading positions on the topic.</p>

Rubric based on: "Information Literacy in First Year Courses" designed by Trinity University. Provided by Project RAILS: http://railsontrack.info/rubrics_details.aspx?wkid=53&catid=7 and AAC&U Value rubric on Information literacy.

Rubrics for DL and IS MM comparison

- The information presented on DL rubrics and MMs suggests that the two tools are very similar;
- Similarity in structure: both tools have the form of a matrix;
- The matrix columns describe maturity levels or levels of understanding, and rows contain dimensions or objective indicators;
- Content similarity: DL rubrics are a type of MM that focuses on a specific entity: the user of information, who often requires training in DL;
- Rubrics refer to a part of the MM that describes the organization at each maturity level for a given assessment area. Therefore, DL rubrics can be considered a part of every IS MM.

DL in RDMS MM – research method

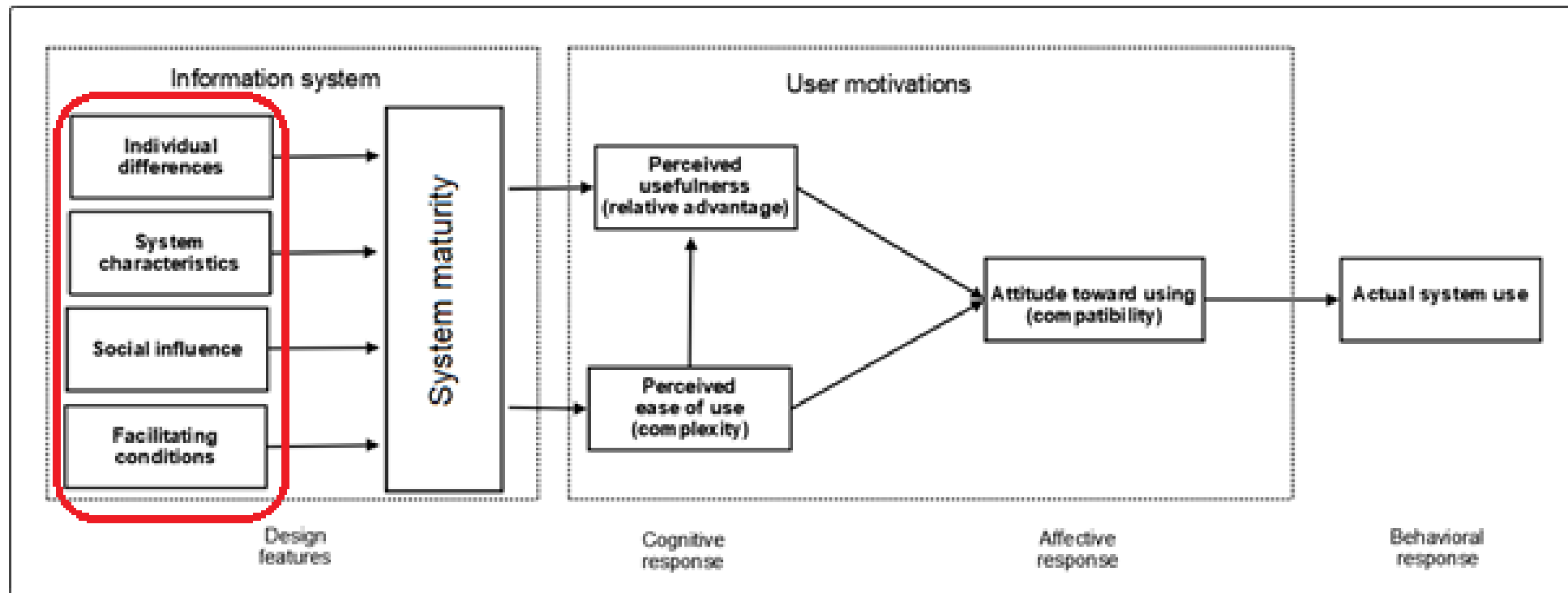
- Purpose of research: determining the place and role of DL problems in existing RDMS MM;
- Subject of the study: six selected RDMS MM, authored by Qin et al. (2014), Peng et al. (2015), Kouper et al. (2017), Cox et al. (2017, 2019), Fry et al. (2021) and DMM Rubric (2020);
- Every MM selected was described by its dimensions (overall 32 dimensions in six models) and their definitions;
- Two analyses were performed based on this material.

The 1st analysis

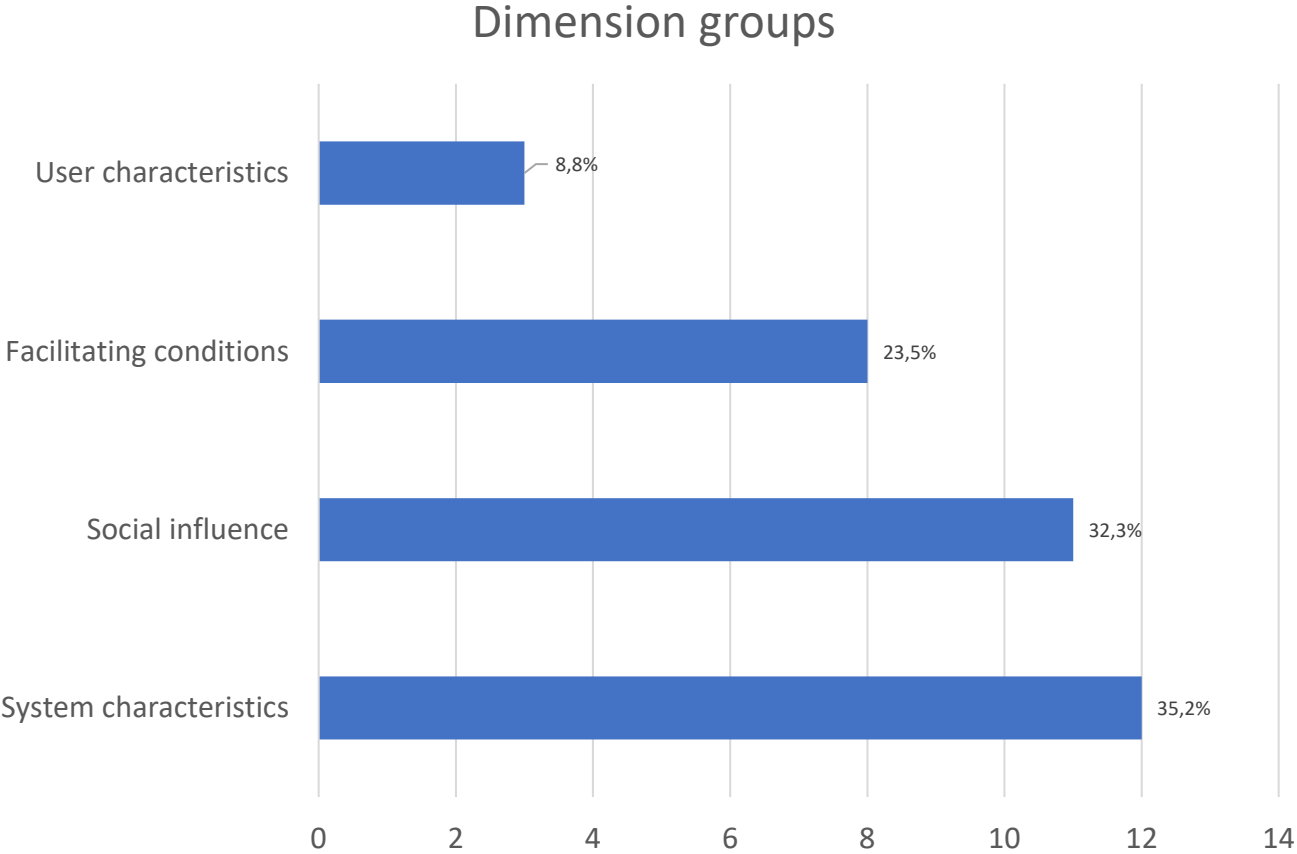
- The 32 distinguished dimensions were divided into the following four groups:
 - System characteristics: technical features of the RDMS,
 - Social influence: RDMS management, leadership, policies and collaboration at different levels,
 - Facilitating conditions: human resources, finance, support services,
 - Individual user characteristics: RDMS user problems.

Factors influencing IS acceptance

- The division into the four groups mentioned was taken over from the Technology Acceptance Model (TAM) (Venkatesh, Bala, 2008).



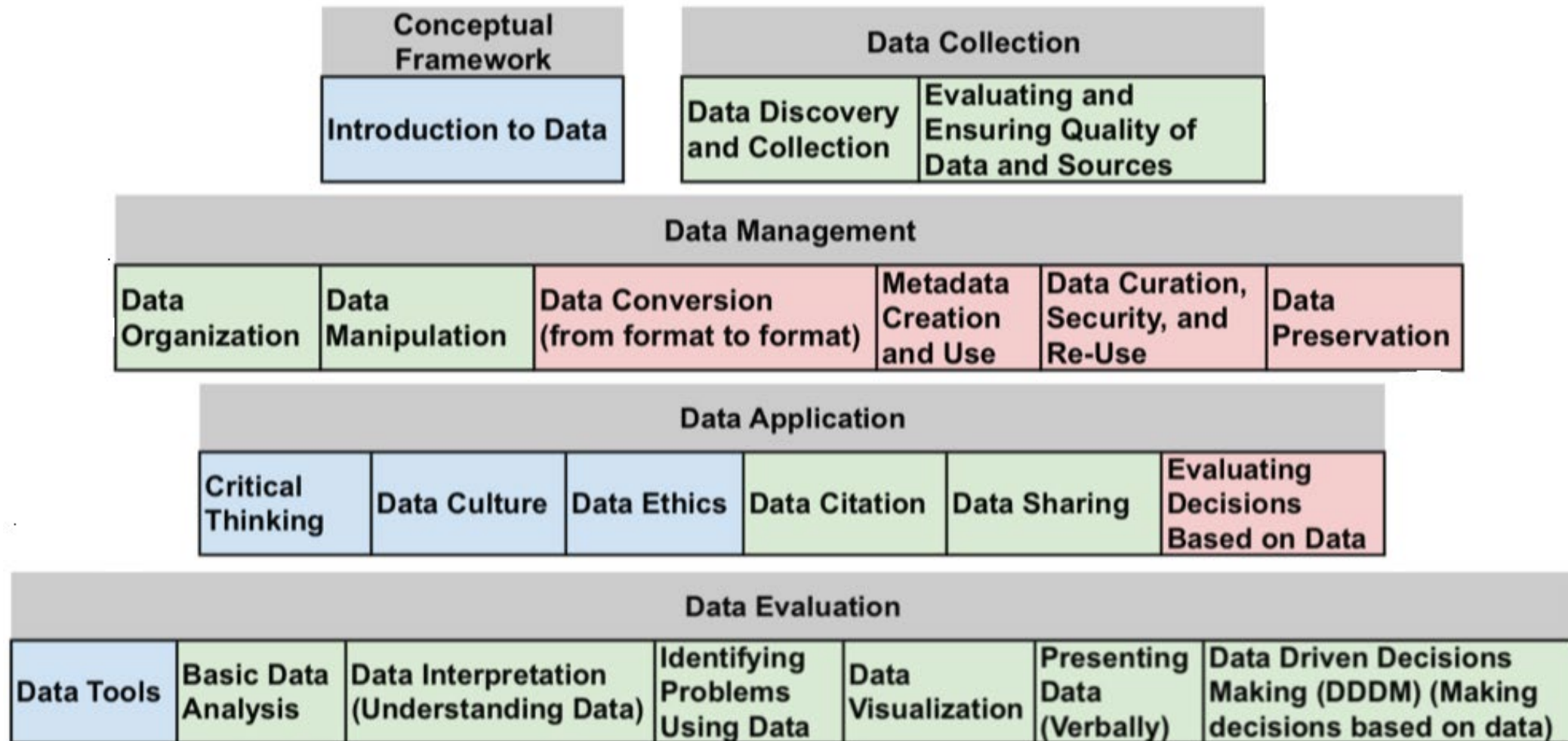
The 1st analysis results



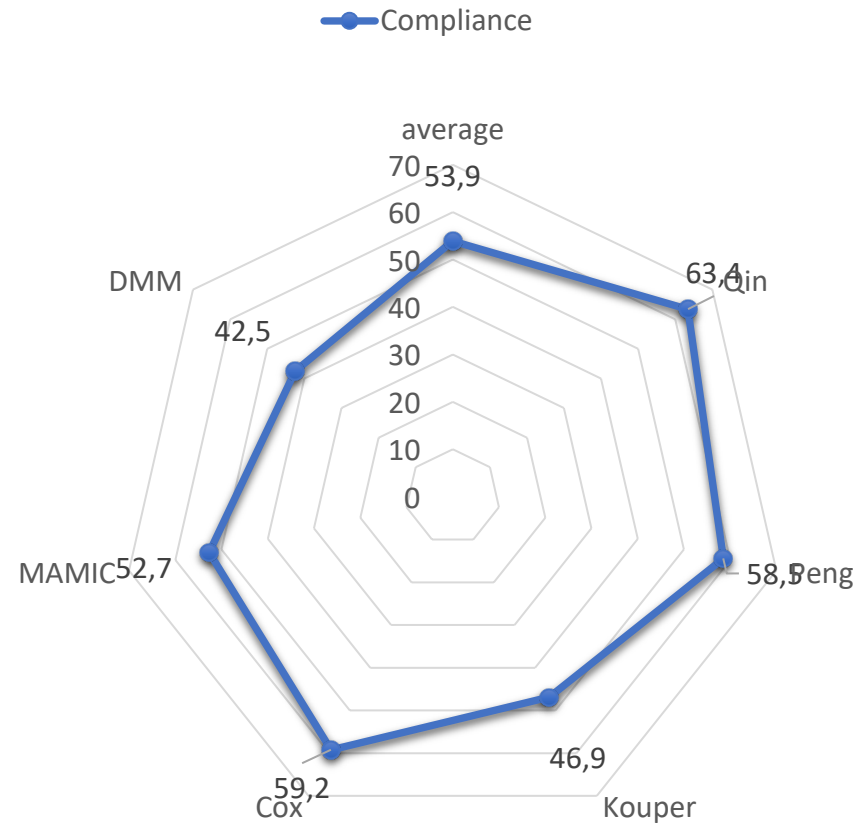
The 2nd analysis

- Comparison of the dimensions and definitions of the six RDMS MMs with the DL competency matrix by Ridsdale et al. (2015);
- This matrix consists of five knowledge areas, 23 competencies and 64 DL tasks/skills;
- These are organized hierarchically in relation to the top-level elements (data, collect, manage, evaluate, apply) and categorized as conceptual competencies, core competencies, and advanced competencies;
- A text profile was created for each of the six RDMS MMs to describe the content of the model;
- In this way, seven text files were obtained: one for the DL competency matrix and six for the RDMS MMs;
- Using ToolsAday the percentage of similarity of files indicating similar and dissimilar elements was calculated.

Data literacy competencies model (Ridsdale et al. 2015)



The 2nd analysis results: compliance of RDMS MMs with DL competency matrix



Conclusions

- One of the indicators of IS maturity is the I/DL of its users;
- Therefore, greater integration of I/DL rubrics with IS MMs is necessary;
- RDMS developers should take into account the level of DL of users of these services at each maturity level, as it determines their ability to use RDMS;
- Creators of RDMS MM should pay more attention to the needs and place of information user in these services. Technical issues, although important, should be more subordinated to information needs, and RDMS MM designers should start their work by examining these needs;
- The maturity of RDMS is not only about their extensive functionality and technological innovation but also about ensuring that users can use these tools effectively.

Thank you for your attention!

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