A Standardized Digital Maturity Index (DMI) and the Application to Higher Education

Dr. Markus von der Heyde

EUNIS Congress 2023, Vigo, Spain
Motivation

• Doing the right things – doing things right

• Measuring is key to the successful change

• Guiding the Digital Transformation (Dx) requires continuous monitoring

• How to measure the maturity of a changing organization
What’s wrong about the „state of the art”

• Digital Maturity by Capability Maturity Model Integration (CMMI)
  → no indication what to do next
  → no relative weight on how to improve

• EDUCAUSE Self-Assessment
  → no comparison between HEIs
  → requires major effort, when done for multiple area

• Four stage model by HIS HE
  → coarse and unspecific
  → oriented towards transport media (paper vs. database)
How to develop a new Digital Maturity Index (DMI)?

- Collect requirements
- Generic idea and robust mathematical model
- Design data acquisition
- Collect data
- Find relative weights of items
- Validate results with additional data
What would we expect of an DMI?

• General features
  - Simple: Clear and concise coverage of the relevant scope.
  - Generic: Measurable items while maintaining a level of abstraction.
  - Flexible: Adaptable to specific sectors through the choice of parameters.
  - Robustness: Missing items or values should not result in major changes.

• Requirements as digital index
  - Relevant: Mixture of Dx-related items.
  - Objective: Derived from facts rather than judgements.
  - Unspecific: Independent of specific technologies

• Requirements to an index suitable for measuring maturity
  - How, not what: Measure how things are done
  - Applicable: To any process or capability in institutions.
Technological qualities of digital processes

- **Reliability**: The ability to ensure the reliability and availability of systems and applications and minimise downtime and disruptions.

- **Usability**: The ability to design systems and applications that are user-friendly and intuitive, and meet user needs and expectations.

- **Flexibility**: The ability to adapt systems and applications to changing business requirements and processes.

- **Standardisation**: The extent to which digital processes are standardised and documented to ensure consistency in execution.

- **Security**: The ability to ensure the security and privacy of data and systems, and protect against cybersecurity threats.

- **Scalability**: The ability to scale systems and applications up or down to meet changing business needs and demands.

- **Integration**: The ability to integrate different systems, applications, and data sources to streamline operations and improve data management.

- **Continuous Improvement**: The level of commitment to continually improving digital processes to optimise performance and meet changing business needs.

- **Performance**: The ability to optimise system and application performance to ensure they meet performance requirements and deliver a seamless user experience.

- **Automation**: The ability to automate tasks and processes to increase efficiency and productivity. Requirements to an index suitable for measuring maturity
Selected items in questionnaire

- **Paper**: The use of printed paper as a data carrier is necessary for the processes.
- **Help**: Professional information and help are available online and can be found through search engines.
- **Exceptions**: It is always possible to intervene in the process to take circumstances into account.
- **Online forms**: Can be digitally processed by users after downloading (e.g., using embedded full text, XML and signatures).
- **Roles and rights**: Responsibilities are mapped digitally.
- **No media discontinuity**: The process is entirely electronic.
- **Persistent data**: Existing data (e.g., from forms and databases) can be reused by users.
- **Data quality**: Data is enhanced and checked for plausibility as it is entered and processed.
- **Interfaces**: Data is linked to other processes via standardised interfaces.
- **Parallel processing**: In some cases, the processing of a case is carried out by several people in parallel.
- **Sampling**: Processing is largely automated, with manual random checks only carried out on a case-by-case basis.

X

- Time scale: Current status (now), intended development during next 5 years (5y), long term perspective (long term), and item is not a goal.
DMI calculation

DMI = (sum\{n=1; n≤MaxSelection\} of biggest n item weights at point in time) / MaxSelection

- Assessment of 11 items across 3 time scales (now, 5y, long-term)
- Weight optimisation to range of 10-100 by Monte Carlo Simulation
- Stable and robust results for 9 to 11 items (MaxSelection)
- High correlation with overall Digital judgement (data from survey)
**Application**

- **Higher Education Reference Model (HERM) - V2.6**
- **205 Ratings from the Digital Survey of Business Capabilities in German HEIs**
- **Yellow – past 5 years**
  - Blue – next 5Y
  - Red – ongoing mix
- **Intensity ~ DMI**
Summary

• Assessment of status of 11 items across 3 time scales (now, 5y, long-term) suffice adaptation of sector specific DMI.
• Judgement of current situation requires 11 yes/no questions of same items.
• DMI is calculated as average accross subset of weights.
• DMI is generic and can be used to compare multiple institutions.
• DMI is independent of organisational changes, size, or type of institution.
• DMI can be applied to generic models like the HERM.
Sources concerning Dx survey in Germany (2022)

Data, tools and questionnaire of the original Dx survey: DOI 10.5281/zenodo.6383770

Description of procedures and methods: DOI 10.5281/zenodo.6383774

Results of the survey (German): DOI 10.5281/zenodo.6948103