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# First results from the survey on metadata management in the educational sciences

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für Bildung
und Forschung

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# Agenda

- Introduction
- Metadata in the educational sciences
- PIAAC as an example for an educational survey
- Results from the first survey
- Meaning of the results for DDI
- Outlook into the future
- Q&A

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# Introduction

- Survey is part of my dissertation process at the University of Szeged (Hungary)
- Research was done during a sabbatical from August 2014 – February 2015
- Goals of the dissertation
  - Improve the metadata handling in computer-based assessment, especially in large-scale studies
  - Use the results to improve open source computer-based assessment platforms and item banks
- Focus only on computer-based assessment (not qualitative data)

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# Metadata in the educational sciences

- Research process in the educational sciences is very similar to the social sciences
- Models like the Generic Longitudinal Business Process Model (GLBPM) can also be applied here
- Most large-scale studies (e.g. PISA, PIAAC, PIRLS, TIMMS) use a mix of questionnaires and cognitive items
- Shift from paper-based assessment towards computer-based assessment
- Metadata standards (e.g. QTI, SCORM) exist, but only for very specific parts of the research process

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# Metadata in the educational sciences

- Specific challenges in computer-based assessment
  - Layout and screen size must be fixed to avoid changes in item difficulty
  - Scoring rules have to be implemented (and documented)
  - Very complex item types (e.g. simulations)
  - Mode effects (e.g. paper to computer, computer to tablet)
  - Use of logfile data analysis e.g. for diagnostic assessment
  - Statistical parameters (e.g. Cronbach‘s Alpha) have to be stored to support adaptive testing
  - Items are usually highly confidential (e.g. SAT, GMAT)

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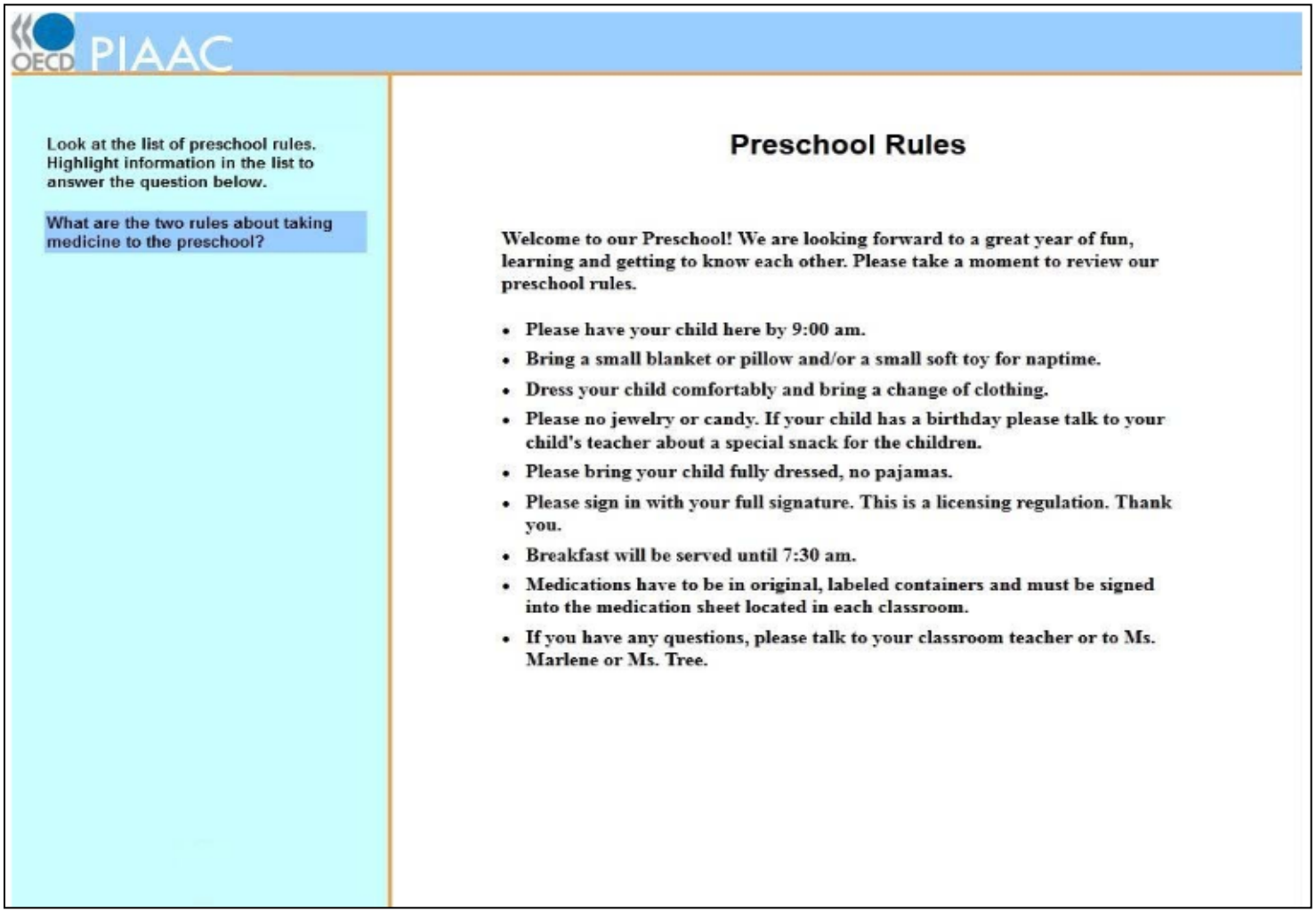
# PIAAC Literacy Item



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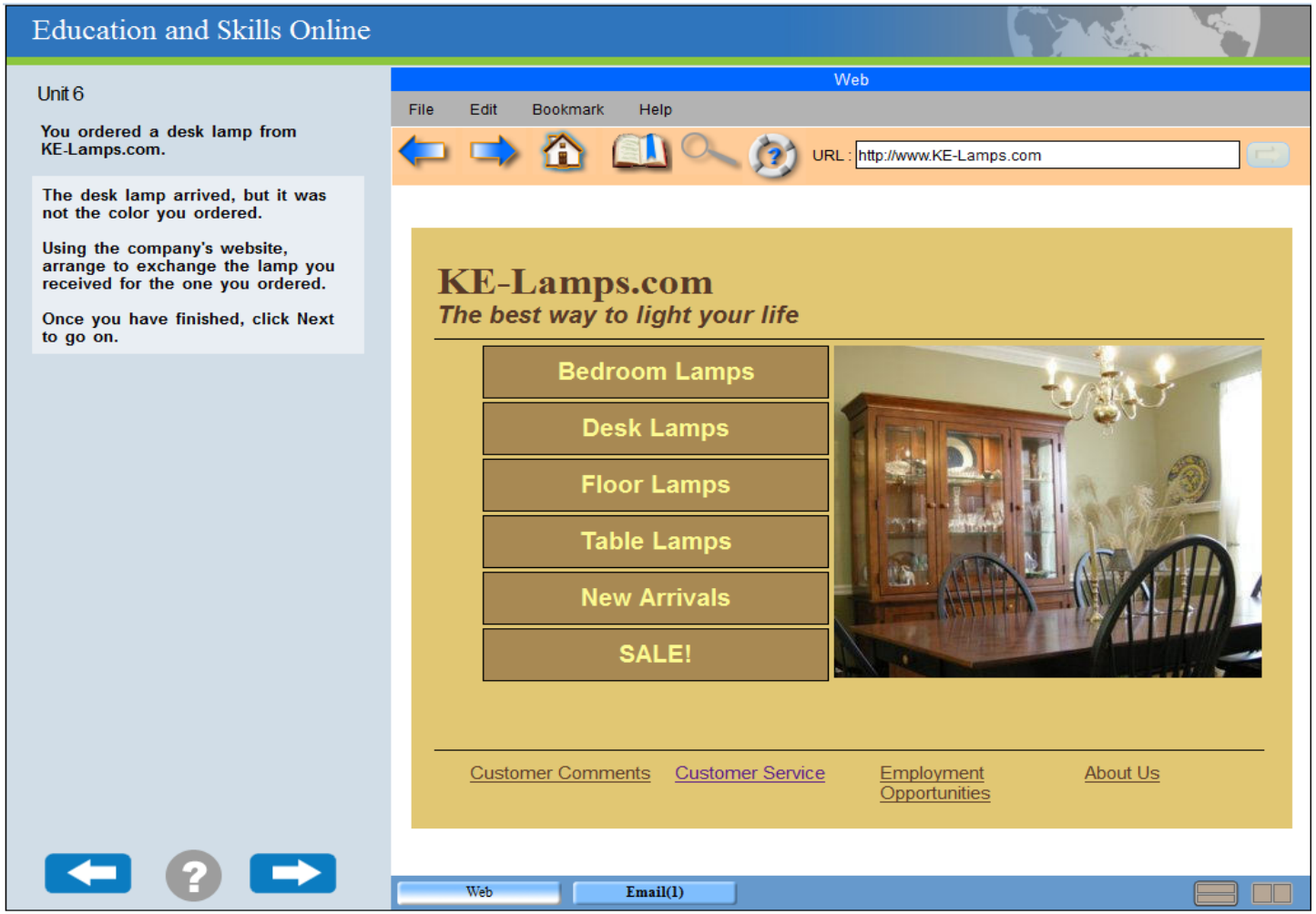
# PIAAC Problem Solving Item



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# CBA Itembuilder MicroFIN item

**INSTRUCTIONS**

Set the clock of the mobile phone to summer time.

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# The Survey

- Target group – researchers working in the fields of educational sciences and social sciences
- Questionnaire on data management and metadata standards
- Web survey using 45 questions in 30-35 minutes with complex branching (e.g. separate data users from data producers)
- Tool: Limesurvey V2.05 with SkeletonQuest responsive design template (optimization for tablets and mobiles)
- Data collection from November to December 2014
- Collection of 221 interviews with 120 fully completes (not sufficient)
- Second smaller survey will be needed in April/May 2015

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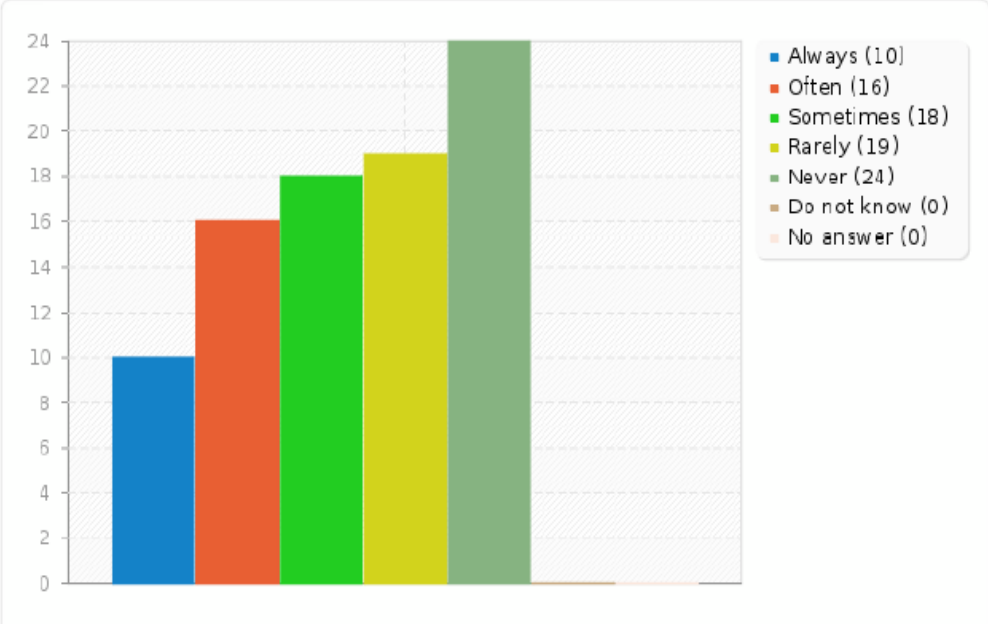
## Field summary for RO02

How often do you have to provide a data management plan (i.e. a plan that describes how to document or store the data for later usage)?



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| Rank | Standard | Usage “often” | Usage “rarely” |
|---|---|---|---|
| 1 | Data Documentation Initiative (DDI) | 18 | 12 |
| 2 | Dublin Core | 9 | 13 |
| 3 | Questionnaire and Text Interoperability (QTI) | 5 | 3 |
| 4 | Machine Readable Cataloguing (MARC) | 3 | 7 |
| 5 | Statistical Data and Metadata Exchange (SDMX) | 2 | 5 |
| 6 | Learning and Test Interoperability (LTI) | 2 | 1 |
| 7 | Learning Object Model (LOM) | 1 | 4 |
| 8 | Shareable Content Object Reference Model (SCORM) | 0 | 8 |
| 9 | Metadata Encoding and Transmission Standard (METS) | 0 | 4 |
| 9 | Text Encoding Initiative (TEI) | 0 | 4 |
| 11 | QueDex | 0 | 0 |

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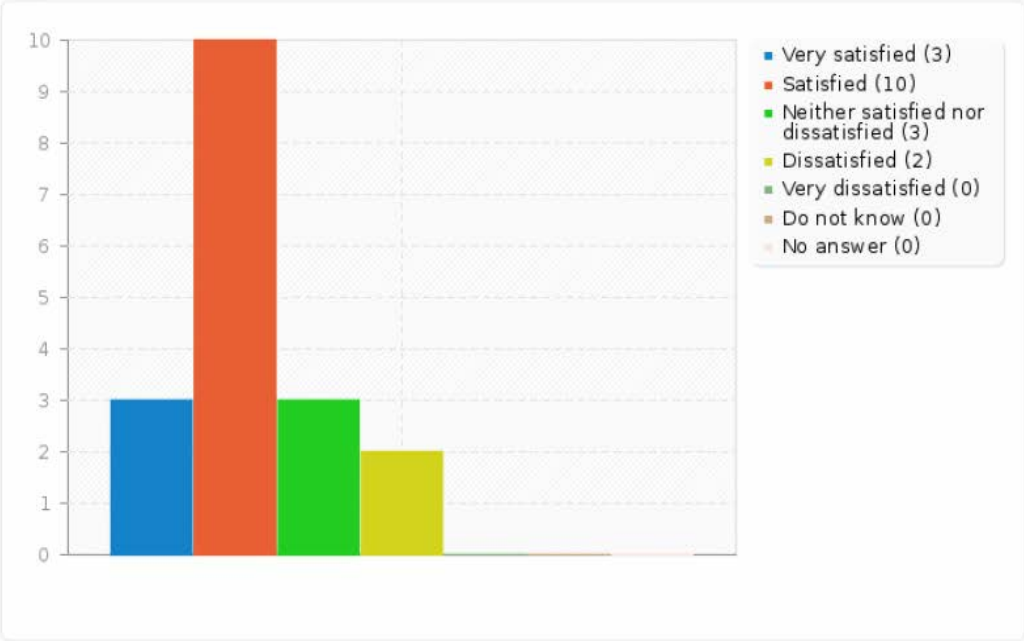
## Field summary for MS02

How satisfied are you with the metadata standard Data Documentation Initiative (DDI)?



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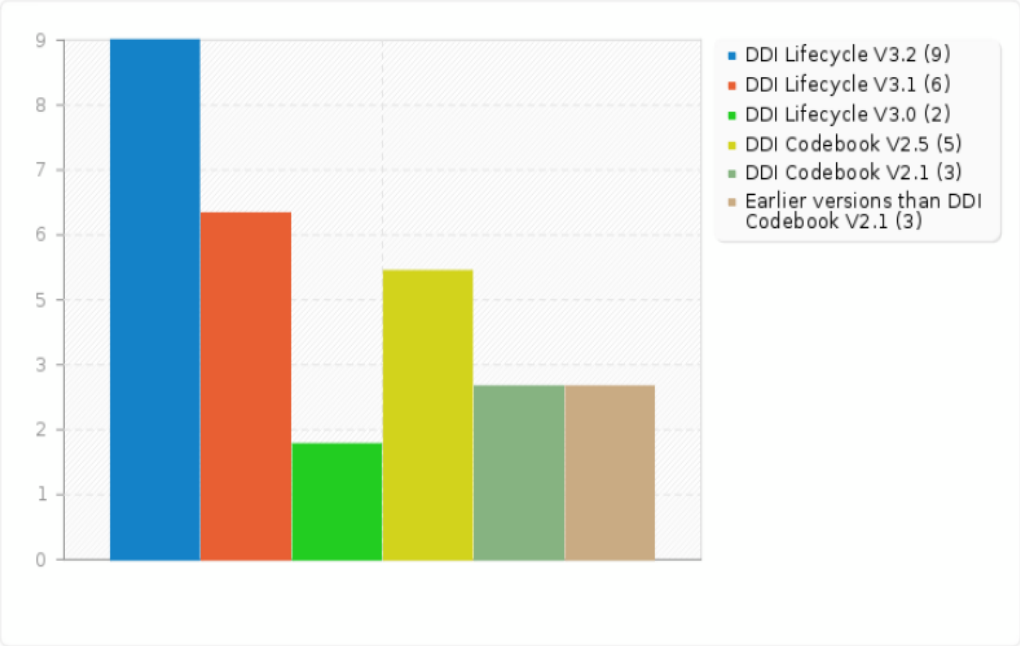
## Field summary for MS03

### Which versions of DDI are you using?



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| Rank | Metadata Standard | Usage "Do not know" |
|---|---|---|
| 1 | QueDex | 95 |
| 2 | Learning and Test Interoperability (LTI) | 87 |
| 3 | Shareable Content Object Reference Model (SCORM) | 85 |
| 3 | Text Encoding Initiative (TEI) | 85 |
| 5 | Machine Readable Cataloguing (MARC) | 82 |
| 5 | Metadata Encoding and Transmission Standard (METS) | 82 |
| 7 | Questionnaire and Text Interoperability (QTI) | 81 |
| 8 | Learning Object Model (LOM) | 80 |
| 9 | Statistical Data and Metadata Exchange (SDMX) | 78 |
| 10 | Dublin Core | 66 |
| 11 | Data Documentation Initiative (DDI) | 43 |

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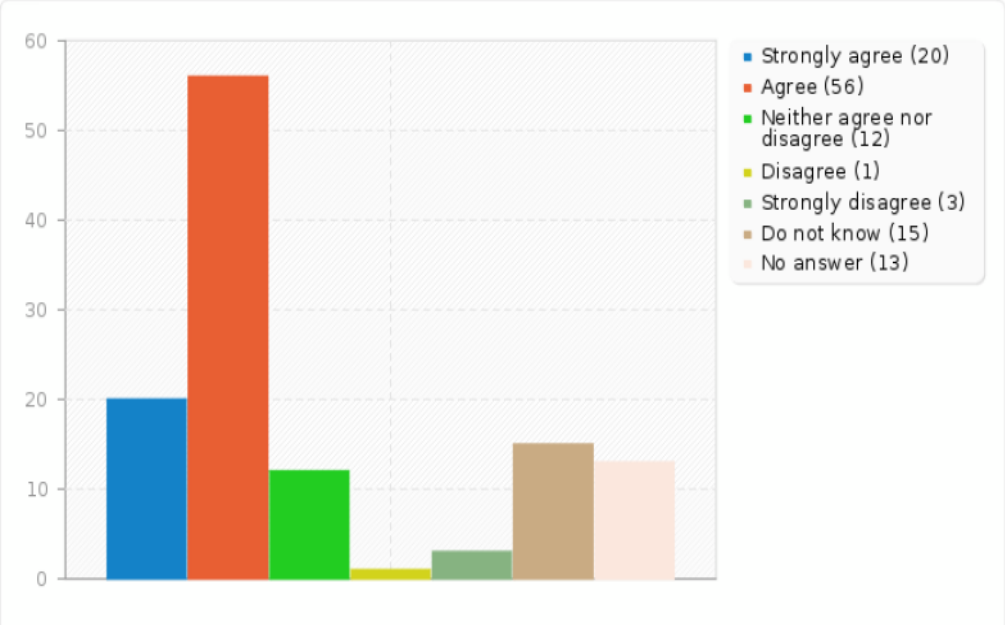
## Field summary for MS06(MS603)

How much do you agree on the following statements regarding metadata standards? [There are a lot of benefits in using metadata standards.]



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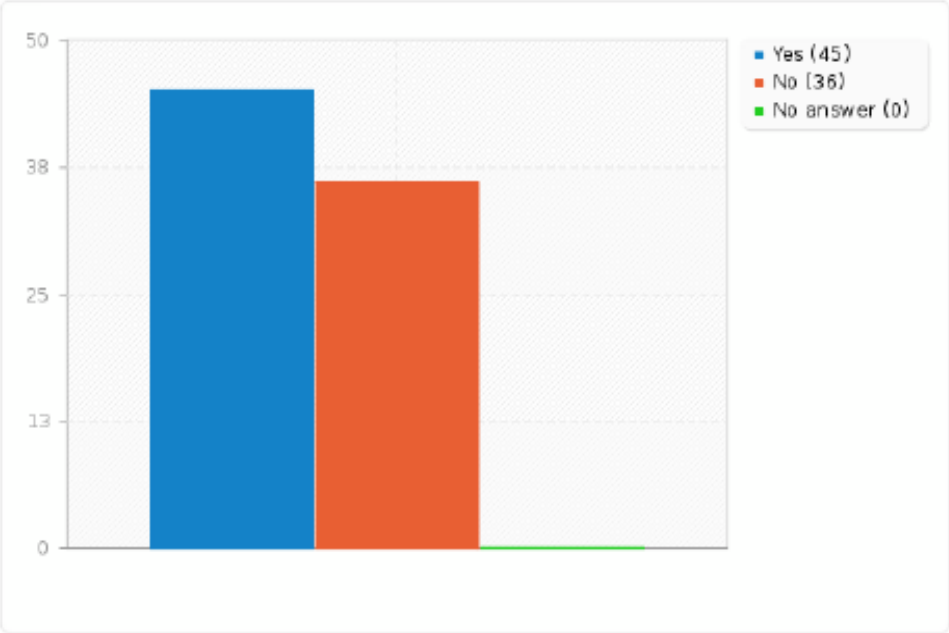
## Field summary for PU03

Do you share the metadata, paradata or data from your research with others?



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| Rank | Opinion | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree | No answer |
|---|---|---|---|---|---|---|---|
| 1 | Preparation of data needs to much effort | 8 | 15 | 8 | 1 | 2 | 2 |
| 2 | I have no resources or support from my employer to hand in the data | 8 | 14 | 10 | 2 | 1 | 1 |
| 3 | My organization or I have security concern | 5 | 10 | 9 | 4 | 7 | 1 |
| 4 | I do not know where to hand in my data for archiving | 3 | 8 | 14 | 4 | 6 | 1 |
| 5 | Somebody could misinterpret my results | 3 | 5 | 12 | 7 | 7 | 2 |
| 6 | Somebody could use my data before me | 1 | 14 | 5 | 8 | 6 | 2 |

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| Rank | Category | Very important | Important | Neither important nor unimportant | Not that important | Not at all important | No answer |
|---|---|---|---|---|---|---|---|
| 1 | Data is cited as secondary publication | 30 | 34 | 7 | 4 | 2 | 4 |
| 2 | Support from the employer | 26 | 31 | 10 | 6 | 4 | 4 |
| 3 | Co-authorship in secondary publications based on the data | 17 | 35 | 12 | 5 | 8 | 4 |
| 4 | Archive provides list of publications based on the data | 15 | 43 | 13 | 2 | 5 | 3 |
| 5 | Archive informs data producer who accessed the data | 12 | 31 | 24 | 7 | 4 | 3 |
| 6 | The data producer receives a financial compensation | 7 | 12 | 28 | 16 | 13 | 5 |

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# Meaning of the results for DDI

- DDI can be extended to support computer-based assessment platforms
- Educational scientists know DDI better than their native educational metadata standards like QTI or SCORM
- As expected layout, scoring rules and logfiles have a higher importance for educational scientists than for social scientists
- If the DDI Alliance wants to extend DDI4 for the educational sciences two further modules might be needed in the long run:
  - „Simple cognitive item“ (e.g. hotspot, point&click, multiple choice, cloze test)
  - „Complex cognitive item“ (e.g. simulations, MicroDYN, MicroFIN)
- More research needed…..

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# Outlook into the future

- Data management as an academic research topic in its own right

Am Fachbereich Elektrotechnik und Informatik der Fachhochschule Lübeck ist zum nächstmöglichen Zeitpunkt folgende Stelle zu besetzen:

**Professur W 2**
**für Datenmanagement**
**Kennziffer 357**

Von der Bewerberin/dem Bewerber werden fundierte Kenntnisse und praktische Erfahrungen in Technologien zum Management großer Datenbestände erwartet, einschließlich relationale und nicht-relationale Datenbanksysteme, Datenintegration, Metadatenmanagement, Data Warehousing und Datenanalyse. Kompetenzen in Informationssicherheit sind erwünscht.

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# Any Questions?

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