Presentations MoRRI final event (D15)

Day 1 – Discussions on technical aspects
Presentations

• Welcome – Viola Peter
• The monitoring framework and the state-of-play of RRI in the EU28 – Niels Mejlgaaard
• Dimension 1: Public Engagement – Niels Mejlgaaard
• Dimension 2: Gender Equality – Angela Wroblewski & Susanne Bührer-Topcu
• Dimension 3: Science Literacy and Scientific Education – Thomas Teichler
• Dimension 4: Open Access – Ingeborg Meijer
• Dimension 5: Ethics – Erich Griessler
• Dimension 6: Governance – Ralf Lindner
Welcome

Viola Peter, Technopolis Group

Final Event – Discussion on technical aspects
Date: 6 March 2018
Location: Science14 atrium - rue de la science 14b, Brussels
Start of MoRRI late 2014

Looking back...

Scoping of the RRI dimensions (‘what do we mean by…’)

[logos]
### 4.2.2 Science literacy and science education

#### Information Item

<table>
<thead>
<tr>
<th>Indicator characteristics</th>
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<tbody>
<tr>
<td><strong>Name of indicator</strong></td>
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<tr>
<td><strong>Primary/secondary data</strong></td>
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<tr>
<td><strong>Need for supplementary data collection</strong></td>
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<tr>
<td><strong>Description</strong></td>
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<td><strong>Qual / Quant</strong></td>
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<td><strong>Source of data</strong></td>
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<td><strong>Time-series</strong></td>
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<td><strong>Potential time series data</strong></td>
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<td><strong>Measurement level</strong></td>
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<td><strong>Unit of analysis</strong></td>
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<td><strong>Coverage</strong></td>
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<td><strong>Attributes</strong></td>
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</tbody>
</table>

For member states without various regional curricula, country researcher please... 1. Validate whether there is a national body, which sets at basic rules for curricula (for instance the Kultusministerkonferenz in Germany). If so, proceed with the aforementioned steps on this level. If there is no such body, choose the regions to be considered together with the project team and follow the steps mentioned above.  

#### Assessment of RRI indicators

| **Analytical level** | Input |
| **Analytical level (aggregation)** | National |
| **Is indicator based on aggregation/disaggregation** | No |

#### Sub-categorisation from dimension typology (functional vocabulary)

| The indicator addresses the science education sub-category of the SLSE dimension. |

#### Interlinkages with other RRI dimensions

| n/a |

#### Data collection methods

<table>
<thead>
<tr>
<th>Data collection specifications</th>
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<tbody>
<tr>
<td>Primary data will be collected via desk research and validation interviews at education ministries or other responsible actors. Specifically, country researchers are provided with a set of questions to be answered, either by desk research or a combination of desk research and telephone interviews.</td>
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#### Representation issues

<table>
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<tr>
<th>Representation issues</th>
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<tbody>
<tr>
<td>In countries in which education policy it not decided at national but at regional level representation issues can arise if not all regions are covered by the desk research. In this case a small number of selected regions could be identified for which the data collection is conducted. The regions will be selected in cooperation with the project team.</td>
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#### Feasibility issues

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<tr>
<td>The feasibility is expected to be comparatively difficult, because a) it is not clear to what extent formalised national curricula for science (biology and physics in this case) exist in all countries in Europe and to what extent they are publicly available, b) the two topics (GMO and nuclear energy) are presumably taught in different years in the different member states. In case no information about GMO can be found, as an alternative the topic stem cell research can be analysed.</td>
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#### Additional points to pay attention to

<table>
<thead>
<tr>
<th>Comments/caveats</th>
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<tr>
<td>For a condensed overview, an indicator classifying countries depending on the role of societal aspects in science curricula could be constructed. For instance distinguishing countries depending on whether 1. societal aspects of science and technology play no role in curricula 2. societal aspects of science and technology play some role in curricula 3. societal aspects of science and technology play a considerable role in curricula. The classification into these three groups could be based on for 1: if there is no information available for 2 and 3: an classification of the project team member (in comparison to other countries) based on the qualitative statements of the country researchers.</td>
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<tr>
<td>RRI dimension</td>
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Core indicators

SLSE training

GE status

OA status

PE participation

GE action

OA action
Citizens’ participation in research and innovation (PE-DEM1)

New indicators

Training of researchers in public communication (PE-SOC1)

Proportion of research that includes a gender dimension (GE-DEM2)
Objectives

• Critical and open discussion on our approaches, methodologies and reasoning on RRI indicators;
• Provide feedback, thoughts and suggestions on indicators and future monitoring
The monitoring framework and
the state-of-play of RRI in the EU28

Niels Mejlggaard, Aarhus University
MoRRI objectives and research elements

• An extensive empirical research programme aimed at monitoring the evolution and benefits of RRI across 28 EU MS
• Provides opportunities for international learning by mapping the state-of-play and trajectories at national level
• Reports aggregated measures, but builds in part on data at the organisational- and individual level
• Includes reviews, visioning workshop, liaison activities, case-studies on benefits, EU researcher survey, manufacturing company survey, and development of multi-source indicators of RRI
• Today: focus on RRI indicators
Step-wise approach towards RRI indicators

**Review**
- Terminology
- Policy landscape
- Existing indicators
- Measurement gaps

**Conceptual sub-dimensions**
- Gender Equality (GE)
  - Participation in science
  - Structural change
  - Gender in content
- Public Engagement (PE)
  - Communication
  - Consultation
  - Deliberation
  - Participation
  - Activism
- Science Literacy / Education (SLSE)
  - Science education
  - Science communication
  - Co-production of knowledge
- Open Access (OA)
  - Open access
  - Open data

**Indicator development**
- Data collection:
  - SiS actor survey
  - RPO survey
  - RFO survey
  - Qualitative, desk research
  - Databases
  - Primary data
  - Secondary data

**Analysis**
- Statistical robustness
- Quality measures

**Empirical sub-dimensions**
- Gender Equality (GE)
  - GE action
  - GE status
- Public Engagement (PE)
  - PE participation
  - PE in assessment
- Science Literacy / Education (SLSE)
  - SLSE training
  - SLSE culture
- Open Access (OA)
  - OA status
  - OA action
- Ethics in science (ET)
  - Ethics in RPOs
  - Ethics in RFOs
- Governance (GOV)
Core questions related to RRI indicators

- Coverage
  - Countries and R&I actors
- Conceptual relevance
- Aggregation
  - Balance of macro, meso, micro
- Sustainability
  - Time series (historical and future)
- Feasibility
- Robustness
Assessment of RRI indicators

• Using a colour code system (Green, Yellow, Red) it provides for each indicator an assessment on the basis of three criteria:
  • **Availability of data**: Gives an indication on the data’s availability in terms of country coverage (non-response thresholds to exclude observations)
  • **Statistical Robustness**: When opportune, a series of statistical tests (validation procedure) have been conducted to assess the indicators’ robustness: internal consistency of composite measures; measurement adjustment effect for country ranking; within-country vs. cross-country variance
  • **Feasibility/Replicability**: Considers the complexity to obtain the data and to construct the indicator, and provides an interpretation on the degree of replicability of the indicator
## Assessment of RRI indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Availability of data</th>
<th>Statistical robustness</th>
<th>Feasibility/Replicability</th>
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### Assessment of RRI indicators

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<td>GOV3</td>
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## MoRRI surveys response rates

<table>
<thead>
<tr>
<th>Survey</th>
<th>Total contacts</th>
<th>Total responses (including partially completed)</th>
<th>Response rate</th>
<th>Countries below 10% response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science in Society survey</td>
<td>686</td>
<td>326</td>
<td>48%</td>
<td>/</td>
</tr>
<tr>
<td>Research Funding Organisations survey</td>
<td>275</td>
<td>122</td>
<td>44%</td>
<td>LV, LU, RO</td>
</tr>
<tr>
<td>Higher Education Institutions survey</td>
<td>1479</td>
<td>259</td>
<td>18%</td>
<td>CZ, FR, LU, PL, PT</td>
</tr>
<tr>
<td>Public Research Organisations survey</td>
<td>1486*</td>
<td>208</td>
<td>14%</td>
<td>BG, EE, DE, PL, UK</td>
</tr>
</tbody>
</table>
How many latent variables are captured by the 36 indicators?

How can we characterise individual countries?

Which patterns emerges across countries?

Which of the 36 are the strongest indicators for the underlying dimensions?

EMPIRICAL STRUCTURE?
### (Empirical) Sub-dimensions and core indicators

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Core indicators</th>
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<tbody>
<tr>
<td>GE action</td>
<td>GE1, GE5</td>
</tr>
<tr>
<td>GE status</td>
<td>GE2.3, GE10.1</td>
</tr>
<tr>
<td>SLSE training</td>
<td>SLSE1, SLSE2</td>
</tr>
<tr>
<td>SLSE culture</td>
<td>SLSE3, SLSE4</td>
</tr>
<tr>
<td>PE participation</td>
<td>PE1, PE4, PE9</td>
</tr>
<tr>
<td>PE in assessment</td>
<td>PE7, PE8</td>
</tr>
<tr>
<td>Ethics in RPOs</td>
<td>E1a, E1b</td>
</tr>
<tr>
<td>Ethics in RFOs</td>
<td>E3a, E3b</td>
</tr>
<tr>
<td>OA status</td>
<td>OA1.1, OA1.2</td>
</tr>
<tr>
<td>OA action</td>
<td>OA3, OA4, OA6</td>
</tr>
<tr>
<td>Governance</td>
<td>GOV1, GOV2, GOV3</td>
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</table>
Clusters; based on 11 indices
Conclusions and discussion points

• A basket of 36+ fairly robust indicators forms a baseline for RRI monitoring
• 25 indicators seem to do a good job capturing 11 subdimensions
• Different RRI profiles across (clusters of) countries allow for international learning while avoiding an “RRI horserace”
• Underexplored: disaggregate data; ‘cross-dimensional’ properties of the data set
• Challenges related to survey-based data collection at meso-level
• Future priorities: Which are core indicators? Blind spots? Data collection at reduced cost? Responsible use of RRI indicators?
Dimension 1: Public Engagement

Niels Mejlgaard, Aarhus University

Final Event – Discussion on technical aspects
Date: 6 March 2018
Location: Science14 atrium - rue de la science 14b, Brussels
Citizen control
Dialogue
Consultation
Information
Manipulation

Rowe & Frewer 2005:255

Mejlgaard et al 2012

Bucchi & Neresini 2008

Arnstein 1969
MoRRI PE concept  
(see also PE2020)

<table>
<thead>
<tr>
<th>Categorisations</th>
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<tbody>
<tr>
<td><strong>Public communication</strong> – the aim is to inform and/or educate citizens. The flow of information constitutes one-way communication from sponsors to public representatives, and no specific mechanisms exist to handle public feedback (examples include public hearings, public meetings and awareness raising activities).</td>
</tr>
<tr>
<td><strong>Public activism</strong> – the aim is to inform decision-makers and create awareness to influence decision-making processes. The information flow is conveyed in one-way communication from citizens to sponsors but not on the initiative of the sponsors, which characterise the ‘public consultation’ category (examples include demonstrations and protests).</td>
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<tr>
<td><strong>Public consultation</strong> – the aim is to inform decision-makers about public opinions on certain topics. These opinions are sought from the sponsors of the PE initiative and no dialogue is implemented. Thus, in this case, the one-way communication is conveyed from citizens to sponsors on the initiative of sponsors (examples include citizens’ panels, planning for real, focus groups and science shops).</td>
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<tr>
<td><strong>Public deliberation</strong> – the aim is to facilitate group deliberation on policy issues, where the outcome may impact decision-making. Information is exchanged between sponsors and public representatives and a dialogue is facilitated. The flow of information constitutes two-way communication (examples include ‘mini publics’ such as consensus conferences, citizen juries, deliberative opinion polling).</td>
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<tr>
<td><strong>Public participation</strong> – the aim is to assign partly or full decision-making-power to citizens on policy issues. Information is exchanged between sponsors and public representatives and a dialogue is facilitated. The flow of information constitutes two-way communication (examples include co-governance and direct democracy mechanisms such as participatory budgeting, youth councils and binding referendums).</td>
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PE1: Models of public involvement in S&T decision-making

- MASIS 2012
- Formalisation/realisation
- Qualitative data, coded

- Green: formalised/high involvement
- Blue: formalised/low involvement
- Yellow: not formalised/high involvement
- Red: not formalised/low involvement
**PE2: Policy-oriented engagement with science**

- **EB 2010**
  - Do you attend public meetings or debates about science and technology?
  - Do you sign petitions or join street demonstrations on matters of nuclear power, biotechnology or the environment?
  - Do you participate in the activities of a non-governmental organisation dealing with science and technology-related issues?
PE3: Citizen preference for active participation

- EB 2013
  - citizens do not need to be involved or informed;
  - citizens should only be informed;
  - citizens should be consulted and their opinions should be considered;
  - citizens should participate and have an active role;
  - citizens’ opinions should be binding;
  - don’t know.
PE4: Active information search about controversial technologies (GM food)

- EB 2010
  - have heard and talked and/or searched for information;
  - have heard but not talked or searched for information;
  - have not heard.
PE5: PE mechanisms at the level of RPOs

- HEI & PRO surveys 2017
  - ‘Which mechanisms does your institution apply in order to interact with citizens and societal stakeholders?’ (14 answer categories provided)
  - ‘Which level of strategic priority has public engagement at your research institution?’ (high/moderate/no priority)

<table>
<thead>
<tr>
<th>Partnerships</th>
<th>NGO collaboration</th>
<th>Community representation in boards</th>
<th>Conferences for broader publics</th>
<th>Action plans for PE</th>
<th>Salary incentives for PE activities</th>
<th>Science Communication awards</th>
<th>PE as promotion criteria</th>
<th>Open days/festivals</th>
<th>Etc.</th>
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</table>

[Bar chart showing data over the years 2014, 2015, and 2016]
PE7: PE activities in RFO funding structure

- RFO survey 2017
- “PE activities supported by targeted funding schemes”
- “Extent to which the funding agency has engaged with citizens and societal actors when developing its funding strategies”
PE8: PE as evaluative criteria in assessment of proposals

- RFO survey 2017
- “Please indicate the extent to which public engagement has been a criterion for the appraisal of research applications”
PE9: R&I democratisation index

• SiS survey 2017
  • Extent to which CSOs are (1) informed, (2) consulted, (3) if their opinions had a significant impact on political decisions on research and innovation (R&I)
  • Extent to which their values and expectations played an important role in R&I agenda setting

Trend Q shows positive development in most countries
PE10: Infrastructure for citizen and CSO involvement

- SiS survey 2017
- CSO assessment of (1) access, (2) representation, (3) availability of multiple channels for interaction
Discussion points

• Have we identified and monitored the right indicators?
• What would be ideal collection means and in which interval should data/information be collected?
• How could the information serve in policy making? what can be recommended to the EC?
# Assessment of RRI indicators

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Dimension 2: Gender Equality

Angela Wroblewski, IHS
Susanne Bührer-Topcu, ISI Fraunhofer

Final Event – Discussion on technical aspects
Date: 6 March 2018
Location: Science14 atrium - rue de la science 14b, Brussels
Gender Equality – 3 dimensional concept

Based on literature on gender mainstreaming in research
• Increasing female participation in all fields and hierarchical levels
• Abolishment of barriers for female careers (structural change)
• Integration of gender dimension in research content and teaching

Compatible with ERA objectives (priority 4)
• Increasing share of women in R&I
• Increasing share of women in decision making
• Integration of gender dimension in research content
Gender Equality – Participation of women in R&I

• GE2 Share of female researcher by sector (2007, 2014; Eurostat)
• GE4 Dissimilarity Index (2009, 2012; SHE Figures)
• GE10 Share of female inventors and authors (Patstat, Scopus)
Gender Equality – Structural change

• GE1 Share of research-performing organisations with gender equality plans (2014-16, RPO survey)
• GE6 Glass Ceiling Index (2010, 2013; SHE Figures)
• GE7 Gender Wage Gap (2010, 2014; Eurostat)
• GE8 Share of female heads of research-performing organisations (2014-16, RPO survey)
• GE9 Share of gender-balanced recruitment committees at research-performing organisations (RPO survey)
Gender Equality – Gender dimension in content

- GE3 Share of research-funding organisations promoting gender content in research (RFO survey)
- GE5 Share of research-performing organisatoins with policies to promote gender in research content (RPO survey)
Conclusions

Reflection on indicators

• Solid data base on 2 dimensions (female participation, structural change) – especially for indictors based on Eurostat or SHE Figures
• Survey data: validity depends on survey design
• Lack of data for indicators on gender in research content

Open questions

• Weighting of subdimensions and development of an index
• How are dimensions interlinked? Which mechanisms cause change?
• Gendering of other RRI dimensions
Dimension 3: Science Literacy & Science Education

Dr Thomas Teichler, Lead to Trust
Background & objectives of the panel on SLSE

Indicators Report

• Focus on technical aspects such as indicator building, data collection, conceptual thinking
• No discussion of policy implications

Objectives of session

• Critical reflection
• Improvements
• Comments on data collection
• Links to policy making
• Recommendations to the Commission
What is SLSE?

• Science literacy as the ability of citizens to comprehend science and science policymaking, to express opinions about the two and to contribute to them.

• SLSE are activities that aim to provide citizens with a deeper understanding of science, to shape their attitudes towards science and to develop their abilities to contribute to science and science-related policymaking.

• 3 mechanism to build capacity
  • Science education
  • Science communication
  • Co-production of knowledge
What are the MoRRI SLSE-indicators?

**SLSE1:** Importance of societal aspects of science in science curricula for 15 to 18-year-old students

**SLSE2:** RRI-related training at higher education institutions

**SLSE3:** Science communication culture

**SLSE4:** Citizen science activities in RPOs (ECSA membership; No. of publications)

Illustration: European Commission; Heyko Stöber
SLSE1 – Critical science in curricula

Importance of societal aspects of science in science curricula for 15 to 18-year-old students

• No EU Member State covers societal aspects and the various impact areas of critical sciences in their curricula substantially.

• A majority of countries covers some aspects (shades of green)

• AT, IT, LU, NL, RO (red) do officially not cover any aspects

• No data available for DE (grey)

• **Source:** Desk research & interviews conducted in 2016 by MoRRI country correspondents
SLSE1 – Data collection & indicator building

**Qualitative assessment** based on responses to:

1. ‘Does the curriculum address the controversial character of either one of the two topics? “yes” “no”

2. Which of the following issues is addressed by the curriculum in relation to the controversial topic (GMO, nuclear energy)?
   - social aspects, such as consequences for the society or agriculture
   - environmental aspects, such as the effects of monocultures or resistances etc.
   - ethical aspects, such as development issues like the „golden rice” etc.

3. To what degree are they covered? “substantial” vs. “mentioned in passing”? Please briefly explain the reasons for your assessment.’

- Each response received 1 point if
  - ”Yes"
  - ”✓” or
  - ”substantially covered"

- Results from 0 to 5

- Indicators for Belgium and the UK are constructed with a weighted aggregation (based on population) of regional scores.
  - Weight of Wallonia and Brussels = 42,5%
  - Weight of England, Wales and N. Ireland = 91,7%
RRI-related training at higher education institutions

- **2016:**
  - In 9 MS RRI-training was available in half of the responding HEI.
  - In 16 MS RRI training was available in at least one third of HEI.
  - Progress over time in DK, SK, SI, ES and FI.
  - Insufficient responses (<10%) from CZ, FR, LU, PL and PT.

---

SLSE2 – Critical science in curricula
SLSE2 – Data collection & indicator building

- Data collected through HEI survey

- Q25: “Did PhD students’ trainings include RRI-related aspects (such as ethical, economic, environmental, legal and social aspects) in 2014, 2015 and 2016?”

- Scores of individual organisations are based on:
  - Yes (mandatory) = 1pt
  - Yes (voluntary) = 0.5pt
  - No/ Not App = 0pt
  - Don’t Know = not considered

- Country scores are the average of the individual scores of each organisation.

- Country scores range from 0 to 1
SLSE3 – Science communication culture

- East-West divide:
- Almost all old EU MS have a consolidated science communication culture (green), with the exception of AT, IE, LU and EL
- 10 MS have a developing science communication culture (orange)
- 4 have a fragile (red) one in place.

SLSE3 – Data collection & indicator building

• Data collection method and indicator was originally developed by the MASIS project.

• Data collection is based on country reports produced by a network of national experts, following a common guideline and template.

• **Composite indicator** with six parameters:
  1. the degree of institutionalization (e.g. the presence of popular science magazines, regularity of science section in newspapers, dedicated science communication in television),
  2. political attention to the field,
  3. scale and diversity of actor involvement,
  4. traditions for popularization within academia,
  5. public interest in science and technology,
  6. the training and organizational characteristics of science journalism in the country.

• **Categorisations** based on qualitative assessment of “consolidated”, “developing” and “fragile”
SLSE4 – Citizen science activities in RPOs

Number of member organisations in the European Citizen Science Association (ECSA)

- ECSA is an umbrella organisation set up in 2013
- Majority of its members are located in DE and UK (19 in 2016)
- Followed by NL, IT, ES
- 12 Member States were not represented in ECSA and several others had 1 or 2 members

Source: ESCA, Annual Reports
SLSE4 – Citizen science activities in RPOs

Number of scientific publications concerning ‘citizen science’

- UK with almost 100 publications in 2015 and in 2016
- Other large publishing countries DE, FR, NL, ES, IT and SE follow suit.
- In many smaller MS, the publication numbers are rather small or zero.

- **Source**: Scopus, calculations by TG
SLSE4 – Comment

• Citizen science activities are currently in an emergent phase of development across Member States.

• There is some progress noticeable, with more scientific publications being produced that deal with the topic and a growing number of organisations that are organised in a relevant citizen science association.
SLSE4 – Data collection & indicator building

1. Absolute numbers: member organisations and publications

2. Relative numbers: (1) relative to No of 1,000 researchers
   - Numbers are still too small

3. Composite indicator: average of the 2 figure of (2)

• Number of member organisations in the European Citizen Science Association (ECSA) from ECSA annual reports 2015 and 2016

• Number of publications in Scopus with “citizen science” in their title or abstract in 2015 and 2016
Discussion

1. Did we identify and monitor the right indicators?
2. What would be ideal means to collect the relevant data?
3. In which interval should data/information be collected?
4. How could the information serve policy making?
5. What recommendations could be made to the EC?
Recommendations to the Commission

• ...
Kontaktdaten Dr Thomas Teichler

Dr Thomas Teichler
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M: +49-151-551 65 250
SLSE: Alternative indicators

- Interest, informedness and textbook knowledge about science and technology – Eurobarometer most recent 2013, 2013 and 2005
- Competence of general population with regard to numeracy – PIAAC 2013
- Share of STEM graduates – OECD Education Statistics 2012
- Science competence of primary school pupils – TIMSS 2011
- Science competence in subject matters of secondary school pupils – PISA 2015
- Importance of science communication as an evaluation criterion – MAISS 2011
- Research funding on CS projects by main Funding Organisation in Member States in Euro – Question 20 of the RFO survey
- Number of articles in ISI Web of Knowledge that are based on contributions from CS. Identified by an acknowledgement in the text/abstract/list of sources - Scopus
Dimension 4: Open Access

Ingeborg Meijer, CWTS
In the analytical report (D2_4) the Open access Dimension was reviewed as consisting of 3 elements:

• The general concept of open science from a policy perspective
  • “Greater societal benefits may result from the fact that OA reduces the digital divide, increases transparency and accountability, levels disparities and facilitates participation and results in better informed citizens”
  • Open Access pilot initiative in FP7 in 2008 > OpenAIRE infrastructure

• The Open Access publication model
  • Gold Open Access: Open Access journals
  • Green Open Access: Self archiving in repositories

• Developments in Open data
  • Global Open Data Sharing Initiative, FAIR principles, mainly policy driven
  • Data sharing practices at researcher and institutional level: mainly cultural barriers
## Open Access Indicators

<table>
<thead>
<tr>
<th>Number</th>
<th>Name of indicator</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>OA1</td>
<td>Open access literature</td>
<td>Developed by CWTS within the MoRRI consortium.</td>
</tr>
<tr>
<td>- OA1.1</td>
<td>Share of Open Access publications</td>
<td></td>
</tr>
<tr>
<td>- OA1.2</td>
<td>Citation scores for OA publications</td>
<td></td>
</tr>
<tr>
<td>OA3</td>
<td>Social media outreach/take up of OA literature</td>
<td>Developed by CWTS within the MoRRI consortium.</td>
</tr>
<tr>
<td>- OA3.1</td>
<td>Ratio of OA and non-OA publications used in Twitter</td>
<td></td>
</tr>
<tr>
<td>- OA3.2</td>
<td>Ratio of OA and non-OA publications used in Wikipedia</td>
<td></td>
</tr>
<tr>
<td>OA4</td>
<td>Public perception of open access</td>
<td>Unchanged indicator based on Eurobarometer (2013).</td>
</tr>
<tr>
<td>OA5</td>
<td>Funder mandates</td>
<td>Unchanged indicator based on EC data (2011).</td>
</tr>
</tbody>
</table>
OA1 Method

• WoS database (CWTS version)
• Find Open Access *evidence* by coupling journals/publications to:
  • DOAJ list (Directory of Open Access Journals) > GOLD
  • PMC (PubMed Central)
  • the ROAD list (Directory of Open Access scholarly Resources)
  • CrossRef
  • OpenAIRE
• Coupling of publications on a combination of bibliometric characteristics
• Gold & Green are mutually exclusive
• Database is sustainable & legal
OA1.1 Open access publishing evolution

- Increase in OA publishing from 21% to 30%
- Relative increase in gold OA: ranges from 8-14%
OA1.1 Open Access publishing EC MS

• EC MS range from 15% till 46% OA publishing
OA1.2 Impact scores

MNCS of OA publications per MS
>1,2 above world average
<0,8 below world average

Western Europe has higher citation counts, but this may reflect citation practices.

High MNCs almost completely linked to green OA (in line with Archambault (2014))
OA3 Method

• The indicator is built on data retrieved from altmetric.com on Twitter and Wikipedia mentions.
• The coupling between (open access) publications and altmetric data depends on digital object identifiers (DOIs).
• Twitter and Wikipedia measure different aspects of outreach but they share a crucial caveat: their use is limited to people with digital access, which is skewed mainly by countries and age groups.
• This is outreach coupled to publications only
• Frequencies low to very low
OA3 Twitter and Wikipedia mentions

- Twitter has a much broader outreach function but it captures a lower engagement between the users and publications.

- Wikipedia articles are consulted by the ‘average’ user (and thus not only researchers). It indicates a direct, wider benefit.
OA4 an OA5 Public Perception & Funder mandates

OA4 Public perception (Eurobarometer 2013)

• Within Europe, the spread between almost fully agreeing to the statement (90 % in Cyprus and Finland) and the least favourable ones (66 % in both Bulgaria and Romania) is nevertheless quite high. The EU average is 79 %.

OA5 Funder mandates (OpenAIRE, 2011)

• It signals whether or not national funders are disposed to open access publishing. Depends on the number of national funding structures. High in the United Kingdom with its many Research Councils. Not updated, but part of Open Science Monitor
OA6 Method

This is a composite indicator built from three questions of the HEI and PRO surveys (MoRRI, 2017). The questions were:

(1) Which of the following policies apply in your institution:
   • Your institution has explicit open data management regulations,
   • Your institution chooses to follow funder- or field-specific incentives for open data and publication sharing?

(2) Which of the following open data sharing practices apply in your institution:
   • Repositories are provided by your institution/ by departments?

(3) Which of the following support (in kind and in funding) options with regard to open access publishing and data sharing apply:
   • IT support for FAIR data practices,
   • budget for the implementation of Open Data sharing,
   • online communication on publication and data sharing practices, and
   • training in research data sharing.
Support structures average score of 0.43, UK being the highest. The absence of several Member States and the rather low shares of structures suggest that the concept of data sharing needs to be developed further.
OA2 Open Data - challenge

• Where to find ‘open’ data (irrespective of reuse)
  • Repositories
  • Data journals
  • Data deposited alongside publication

• DataCite is a consortium providing DOIs to datasets recorded in data centres from all over the world. It is considered the most promising source for repositories but currently not yet sufficiently developed:
  • Geographical spread very uneven
  • Content of the repositories, and
  • Different practices in science fields
Open Data: The Researcher perspective

• Global survey to researchers on data sharing practices
• Bibliometric analysis of data journals
• 3 Case studies
• Main conclusion is that there are intensive data-sharing and restricted data-sharing fields
• In the first, data is database oriented and in which the pragmatics of data sharing and reuse are embedded both in conceptions of data and in normal data processing work.
Insights from bibliometric data
*Articles and their citations in data journals*

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<tr>
<th>JOURNAL</th>
<th>APPROX. NO. OF ARTICLES</th>
<th>NO. OF CITATIONS</th>
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<tr>
<td>Data in Brief (Elsevier)</td>
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<td>Biodiversity Data Journal (Pensoft)</td>
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<tr>
<td>Scientific Data (Springer Nature)</td>
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<td>Journal of Open Psychology Data (Ubiquity Press)</td>
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<td>Geoscience Data Journal (John Wiley and Sons)</td>
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<td>Dataset Papers in Science (Hindawi)</td>
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<td>Journal of Open Archaeology Data (Ubiquity Press)</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Open Health Data (Ubiquity Press)</td>
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<tr>
<td>Open Journal of Bioresources (Ubiquity Press)</td>
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</table>

<table>
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<tr>
<td>2015</td>
<td>425</td>
</tr>
<tr>
<td>2016</td>
<td>1028</td>
</tr>
</tbody>
</table>
Global survey: A third of respondents do not publish research data

Q: Have you published the research data that you used or created as part of your last research project in any of the following ways?

Figure 1. Dissemination of research data (% , n=1162)
Assessment of OA indicators

- OA1,3 and 4 are robust, repeatable and feasible indicators.
- OA5, the Funder mandate is complicated, but relevant.
- OA6 is a composite indicator but targeted at relevant organisational levels, and asking the questions at stake.
- Robustness: Cronbach's alpha=0.78 (satisfactory).
- Intraclass=0.13 (very low, indicating that most variation is within country).
Critical Reflection

In terms of OA indicators:
• The selection covers all relevant stakeholders.
• It covers both practices (state of play) and plans.
• Open access publishing is not necessarily organised at country level (role of publishers)
• Some data are outdated (OA4, OA5).
• Eurobarometer question can be updated on a regular basis, but responses are already high.
• Remains difficult to trace ‘use of knowledge’ (or data)
Recommendations

- The large scale surveys are difficult to carry out, and not suitable for regular updates. But HEI/RPO and RFO is the critical organisational level to monitor.
- RRI dimensions are not related to the researcher reward and incentive systems (cf visioning workshop).
- This shows most clearly in open data practices (economic benefits).
- Database data can be updated yearly, for other indicators 2-3 years intervals would be ok.
- Open access publishing is in a transition phase to full open access.
Open access
Main observations

Publications
- Journal-based ‘gold’ OA publishing is on the rise while self-archiving ‘green’ OA decreased.
- In most EU Member States, OA increased between 2010 and 2014 at a rate of 5% to 10%.
- Exceptions are the Netherlands, Ireland, Croatia, Cyprus and Malta.
- The share of OA publications among all publications varies between 16% in Malta and 41% in Croatia.
- It is higher in countries that publish a lot (between 26% and 3%).

Citations
- The citation scores in 16 Member States increased for OA publications, while in 12 it decreased for the period 2010-2014.
- The only MS with an increased gold OA citation score was the United Kingdom.

Social media
- OA publications are more likely to be tweeted compared to non-OA publications.
- OA publications are more widely used as references in Wikipedia entries than non-OA publications.

Open data
- There is a clear need to develop the setting for open data and its reuse before valid indicators can be developed.

Data sharing
- Higher education institutions provide incentives and infrastructures for data sharing to varying degrees.
- The Czech Republic leads here, followed by the UK and Lithuania.
Dimension 5: Ethics

Erich Griessler, IHS

Final Event – Discussion on technical aspects
Date: 6 March 2018
Location: Science14 atrium - rue de la science 14b, Brussels
Starting Point


discouraged

“the widespread use of simple quantitative indicators of the number of ethical issues declared, the percentage of projects that undergo ethical review, etc..
Proposition: Complex set of mostly process and output indicator

- Existence of ethics assessment/review
  - Scope of ethics assessment/review (legal requirements/ethics/societal impact/ …)
  - Use of ethics assessment by disciplines
- Influence of ethics review/assessment on the shaping of R&I priorities
- Involvement of different societal actors / stakeholders to assess the ethical acceptability of research that you fund
- Impact of stakeholder involvement on funding decisions
- Involvement of different stakeholders in assessing the societal relevance (research aiming at answering questions society asks or solving problems it faces) of the research
- Integration of social sciences and humanities to address the societal and/or ethical impact of research in technical science, natural science or health science
- Percentage of projects that went through an ethics review process
- Percentage of projects that required substantive changes in grant application or second ethics assessment?
# Ethics

<table>
<thead>
<tr>
<th>Number</th>
<th>Name of indicator</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1a</td>
<td>Ethics at the level of higher education institutions and public research organisations</td>
<td>Data available for 2014, 2015, 2016. Composite index based on HEI and PRO surveys of MoRRI consortium, 2017.</td>
</tr>
<tr>
<td>E1b</td>
<td>Ethics at the level of higher education institutions and public research organisations (composite indicator)</td>
<td>Data available for 2014, 2015, 2016. Composite index based on HEI and PRO surveys of MoRRI consortium, 2017.</td>
</tr>
<tr>
<td>E2</td>
<td>National ethics committees index</td>
<td>Unchanged indicator based on EPOCH (2012).</td>
</tr>
</tbody>
</table>
E1a Ethics at the Level of Higher Education Institutions

• Did your organisation have a research ethics committee?
• Did your organisation have a research integrity office?
Share of higher education institutions having a research ethics committee

Note: No data for LU. FR and PL’s response rate too low.
Share of higher education institutions having a research integrity office

Note: No data for LU. FR and PL’s response rate too low.
Share of public research organisations having a research ethics committee

Note: No data for LU. LV and RO’s response rate too low.
Share of public research organisations having a research integrity office

Note: No data for LU. LV and RO’s response rate too low.
E1b: Ethics at the level of higher education institutions and public research organisations (composite indicator)

- Do you have a REC/RIO?
- Design
- Function
- Impact
- Binding or non/binding
- Independent initiative to investigate a case
Composite index of research ethics committees/research integrity offices at higher education institutions

Source: HEI Survey, MoRRI 2017
Note: No data for LU. FR and PL’s response rate too low.
Composite index of research ethics committees/research integrity offices at public research organisations
E3a: Research-funding organisations index

- Has your organisation integrated any type of ethics assessment/review in its funding decisions?
Research-funding organisations’ index
E3b: Research-funding organisations’ index (composite indicator)

• Has your organisation integrated any type of ethics assessment/review in its funding decisions?“

• Design

• Number of projects concerned
Composite index of research-funding organisations

The bar chart displays the composite index of research-funding organisations for various countries over the years 2014, 2015, and 2016. The countries are represented as follows:

- NL (Netherlands)
- BG (Bulgaria)
- LT (Lithuania)
- BE (Belgium)
- MT (Malta)
- EL (Greece)
- AT (Austria)
- SI (Slovenia)
- SE (Sweden)
- SK (Slovakia)
- FI (Finland)
- HR (Croatia)
- CZ (Czech Republic)
- DK (Denmark)
- IE (Ireland)
- IT (Italy)
- EE (Estonia)
- CY (Cyprus)
- FR (France)
- DE (Germany)
- HU (Hungary)
- PT (Portugal)
- ES (Spain)
- UK (United Kingdom)

The chart shows a comparison of the index values across these countries for the mentioned years, with a peak in 2014 and a general decrease in 2016.
Lessons I

• Many respondents answered the first “general” YES/NO question whether they had an Ethics committee, but the following sub questions were not always answered thoroughly.
• This can be caused by lack of information or difficulties to retrieve these very specific information.
• Or: The number of questions in the ethics indexes could have generated respondents’ fatigue.
**Issues to consider**

- A replicable system of indicators based on survey procedures could have indicators that are composed of less questions.
  - however: this could also mean a loss in meaningfulness of the indictors (see Expert Group’s recommendation).
  - and: the results show that quantitative indicators are not easy to interpret as well. Context information is needed to interpret and explain the quantitative data. This cannot be done without detailed context information about countries.

- In future a balanced approach is needed which includes complex and meaningful quantitative as well as qualitative indicators.

- This will create a challenge for data collection.
Dimension 6: Governance

Ralf Lindner, Fraunhofer ISI

Final Event – Discussion on technical aspects
Date: 6 March 2018
Location: Science14 atrium - rue de la science 14b, Brussels
Defining „Governance” for the purpose of MoRRI

We defined governance as a

“(…) way in which societal and state actors intentionally interact in order to transform ST&I systems, by regulating issues of societal concern, defining processes and direction of how technological artefacts and innovations are produced, and shaping how these are introduced, absorbed, diffused and used within society and economy.”

(Borrás/Edler 2014: 14).
# MoRRI Indicators for Governance

<table>
<thead>
<tr>
<th>Number</th>
<th>Name of indicator</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOV1</td>
<td>Use of science in policymaking</td>
<td>Unchanged indicator based on MASIS (2012).</td>
</tr>
<tr>
<td>GOV2</td>
<td>RRI-related governance mechanisms within research-funding and performing organisations (extent to which processes for managing RRI elements have been established)</td>
<td>Data available for 2014, 2015, 2016. Composite index based on HEI, PRO and RFO surveys of MoRRI consortium, 2017.</td>
</tr>
<tr>
<td>GOV3</td>
<td>RRI-related governance mechanisms within research-funding and performing organisations (composite indicator) (captures how actively these organisations have promoted RRI)</td>
<td>Data available for 2014, 2015, 2016. Composite index based on HEI, PRO and RFO surveys of MoRRI consortium, 2017.</td>
</tr>
</tbody>
</table>
Governance

Main observations

- There were many changes between 2014 and 2016.
- In Croatia, Portugal, the Netherlands, Spain and the UK, RRI dimensions diffused considerably.
- Beside Poland - which did not record any change, and Romania, which saw a decrease between 2015 and 2016, all other countries seem to have introduced one or more of the RRI dimensions in their organisations.
- By 2016, all Member States had reached a considerable degree, which signals a geographical widening of RRI dimensions in all Member States.
Indicator GOV1 – Use of science in policymaking

Description:

• Indicator was developed by drawing on qualitative opinions by national experts in the course of the MASIS project (2012)

• 2 dimensions related to use of science in policymaking:
  a) extent to which a formalised structure for feeding science-based knowledge into decision making is in place;
  b) extent to which science-based knowledge and advice have a real impact on decisions.

• Type: qualitative

• Source: MASIS project, specifically the publication Mejlggaard et al (2012), no time series

• Replicability: possible, but a specific data collection process needs to be set up.
4 groups of MS can be broadly identified:

- 10 MS: highly formalised, with high impacts on policy-making (green)
- 9 MS: characterised neither by formalisation nor impact of science on policymaking (red)
- 2 MS: formalised, but rather low impact (yellow)
- 4 MS: high impacts despite low degrees of formalisation (blue)
Description:

- Indicator determines whether RRI is seen as a priority issue for organisations and is supported by a formalised governance structure.
- Type: quantitative
- Source: Data collected through MoRRI’s HEI, PRO and RFO surveys; no time series (survey conducted once, for years 2014, 2015 and 2016)
- Data collections: Data collected from survey, Q°7 of the HEI, PRO and RFO surveys, namely: “Based on your experience and knowledge, has your organisation established processes for managing the following aspects in 2014, 2015, 2016?”. Possible responses: Ethics; Citizen Engagement; Open Access; Gender Equality; Responsible R&I
- Replicability: moderate complexity
Findings: RRI-related governance mechanisms within RFO and HEI
Indicator GOV2: Findings

• 2016: 10 MS reached above the 0.70 mark, indicating that at least 70% of the RPOs and RFOs had RRI-related governance mechanisms in place.

• Highest shares with above 0.70 can be found in 10 MS ranging from Sweden to Ireland. Only 4 MS score below 0.50: Estonia, Lithuania, Cyprus and Bulgaria.

• Indicator reflects an increase across all EU Member States between 2014 and 2016. The dimensions seem to diffuse considerably in all MS.

• Most of the increase can be found in Malta (+0.40), but also Slovenia (+0.19), Portugal (+0.18), Estonia (+0.16) and Austria (+0.15) had marked increases.
Indicator GOV3 – RRI-related governance mechanisms within RFOs and RPOs (composite index)

Description

- Indicator is based on the question: „Does your organisation actively encourage ethics/ citizen engagement/ open access and open science/ gender equality/ RRI among researchers, employees or partner organisations during 2016, and are there changes to previous years?“
  Respondents were asked to indicate the degree of the present encouragement and that of the last 2 years.

- Type: quantitative

- Source: Data collected through MoRRI’s HEI, PRO and RFO surveys; no time series (survey conducted once, for years 2014, 2015 and 2016)

- Data collections: Data collected from survey, Q°13 of the HEI, PRO and RFO surveys

- Replicability: complex indicator
Composite index on RRI-related governance mechanisms, 2016
Composite index on RRI-related governance mechanism changes, 2014-2015
Indicator GOV3: Findings

- 2016: 4 MS (Slovenia, Hungary, Slovakia and Cyprus) are lagging in terms of encouragement. All other MS are above the mean of 0.5. Portugal, Germany and the United Kingdom reach values above 0.70.

- Evolution: Did changes in 2014 and 2015 have potentially affected the situation in 2016? Example Portugal: shows changes at the level of 0.61 between 2014 and 2016. In 2016, however, it reached 0.76. This suggests that the previous changes had a positive effect on the situation in 2016.

At the other end, Hungary indicated changes in 2014 and 2015 (0.53) that affected RRI-related governance mechanisms, but showed negative indications in 2016. The index for Hungary reached only 0.36.

Summary of findings across all 3 governance indicators:

Shares of RPOs and RFOs with RRI-related governance mechanisms in place range from 43% to 79%, with ten countries above 70%. Within the short period examined (2014-2016), almost all countries experienced an increase in the share of organisations with RRI-related governance mechanisms.
Discussion and Questions

• Have we identified and monitored the “right” indicators?

• What would be the ideal collection means and in which interval should data/information be collected?

• How could the information support policy-making? What could be recommended to the EC?