Monitoring the Evolution and Benefits of Responsible Research and Innovation - MoRRI

Presentations MoRRI final event (D15)

Day 1 – Discussions on technical aspects

Final Event – Discussion on technical aspects

Date: 6 March 2018

Location: Science14 atrium - rue de la science 14b, Brussels

Presentations

- Welcome – Viola Peter
- The monitoring framework and the state-of-play of RRI in the EU28 – Niels Mejlgaard
- Dimension 1: Public Engagement – Niels Mejlgaard
- 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

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienn ingenio CSIC-UPV Fraunhofer ISI US University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

Monitoring the Evolution and Benefits of Responsible Research and Innovation - MoRRI

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…')

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento Fraunhofer ISI US University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

Indicator fiche

4.2.2 Science literacy and science education

Information item	SLSE1
Indicator characteristics	
Name of indicator	**Importance of societal aspects of science in science curricula for 15-18 year olds**
Primary/secondary data	Primary
Need for supplementary data collection	n/a
Description	Indicator providing information to which extent societal aspects of science and technology are mentioned in the curricula as important aspects that teachers should consider and teach. The indicator is inspired by and partly based on the FP7-funded project SECURE – Science Education Curriculum Research (project reference 266640). Several changes to the set-up of the project are proposed due to resource constraints. This indicator specifically looks at two controversial science topics, genetically modified organisms (GMO) and nuclear energy. It records whether social, economic, environmental and ethical aspects are taught and discussed in relation to these two controversial topics. Note: In case no information about GMO can be found, as an alternative the topic stem cell research can be analysed.
Qual / Quant	Qualitative
Source of data	Primary data(Desk research, interviews)
Date	n/a
Time-series	n/a
Potential time series data	No
Measurement level	Ordinal
Unit of analysis	Country (if due to the education system structure the unit of analysis is on the sub-country i.e. regional level, then the choice will be made in cooperation with the project team)
Coverage	n/a
Attributes	A qualitative assessment should be written based on the responses to the following questions. 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)? a. social aspects, such as consequences for the society or agriculture b. environmental aspects, such as the effects of monocultures or resistances, atomic waste storage etc c. ethical aspects, such as development issues like the „golden rice", intergenrational fairness etc 3. To what degree are they covered? Are they important aspects of the topic or only mentioned in passing? Please briefly explain the reasoning for your assessment. In practice, the research could be conducted as follows: For member states with a single curricula or the whole country: Country researcher please... 1. Identify all school curricula aimed at pupils between 15 and 18 years old for subjects such as biology, physics, chemistry addressing the controversial topics. 2. Answer the questions above 3. Contact an expert (for instance in the ministry or other curriculum setting body) to validate your findings. For member states without various regional curricula, country researcher please... 1. Validate whether there is a national body, which sets at least 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 specifications	
Data collection methods	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.
Representation issues	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.
Feasibility issues	The feasibility is expected to be comparably 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.
Additional points to pay attention to	
Comments/caveats	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.

Monitoring indicators

RRI dimension	Indicator code	Indicator title	Year(s)	Source
Gender	GE1	Share of research-performing organisations with gender equality plans	2014-2016	HEI, PRO surveys
	GE2	Share of female researchers by sector	2007, 2014	Eurostat
	- GE2.1	Share of female researchers - all sectors	2007, 2014	Eurostat
	- GE2.2	Share of female researchers - business enterprise sector	2007, 2014	Eurostat
	- GE2.3	Share of female researchers - government sector	2007, 2014	Eurostat
	- GE2.4	Share of female researchers - higher education sector	2007, 2014	Eurostat
	GE3	Share of research-funding organisations promoting gender content in research	2014-2016	RFO survey
	GE4	Dissimilarity index	2009, 2012	SHE Figures, 2012, 2015
	- GE4.1	Dissimilarity index: higher education sector	2009, 2012	SHE Figures 2012, 2015
	- GE4.2	Dissimilarity index: Government sector	2009, 2012	SHE Figures 2012, 2015
	GE5	Share of research-performing organisations with policies to promote gender in research content	2014-2016	HEI, PRO surveys
	GE6	Glass ceiling index	2010, 2013	SHE Figures, 2015
	GE7	Gender wage gap	2010, 2014	Eurostat
	- GE7.1	Gender wage gap - academic professions	2010, 2014	Eurostat
	- GE7.2	Gender wage gap - technicians and associate professionals	2010, 2014	Eurostat
	GE8	Share of female heads of research-performing organisations	2014-2016	HEI, PRO surveys
	GE9	Share of gender-balanced recruitment committees at research-performing organisations	2014-2016	HEI, PRO surveys
	GE10	Share of female inventors and authors	2005-2016	Patstat, Scopus
	- GE10.1	Share of female authors	2005-2016	Scopus
	- GE10.2	Share of female inventors	2005-2016	Patstat
Science literacy and science education	SLSE1	Importance of societal aspects of science in science curricula for 15 to 18-year-old students	2016	Desk research and interviews
	SLSE2	RRI related training at higher education institutions	2014-2016	HEI survey
	SLSE3	Science communication culture	2012	MASIS
	SLSE4	Citizen science activities in research-performing organisations	2015, 2016	ECSA, Scopus

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

SLSE training

GE status

OA status

Core indicators

GE action

PE participation

OA action

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento Fraunhofer ISI US University of Sussex UCL HELLENIC REPUBLIC National and Kapodistrian University of Athens

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)

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento Fraunhofer ISI US University of Sussex UCL HELLENIC REPUBLIC National and Kapodistrian University of Athens

Objectives

- Critical and open discussion on our approaches, methodologies and reasoning on RRI indicators;
- Provide feedback, thoughts and suggestions on indicators and future monitoring

Monitoring the Evolution and Benefits of Responsible Research and Innovation - MoRRI

The monitoring framework and the state-of-play of RRI in the EU28

Niels Mejlgaard, Aarhus University

Final Event – Discussion on technical aspects

Date: 6 March 2018

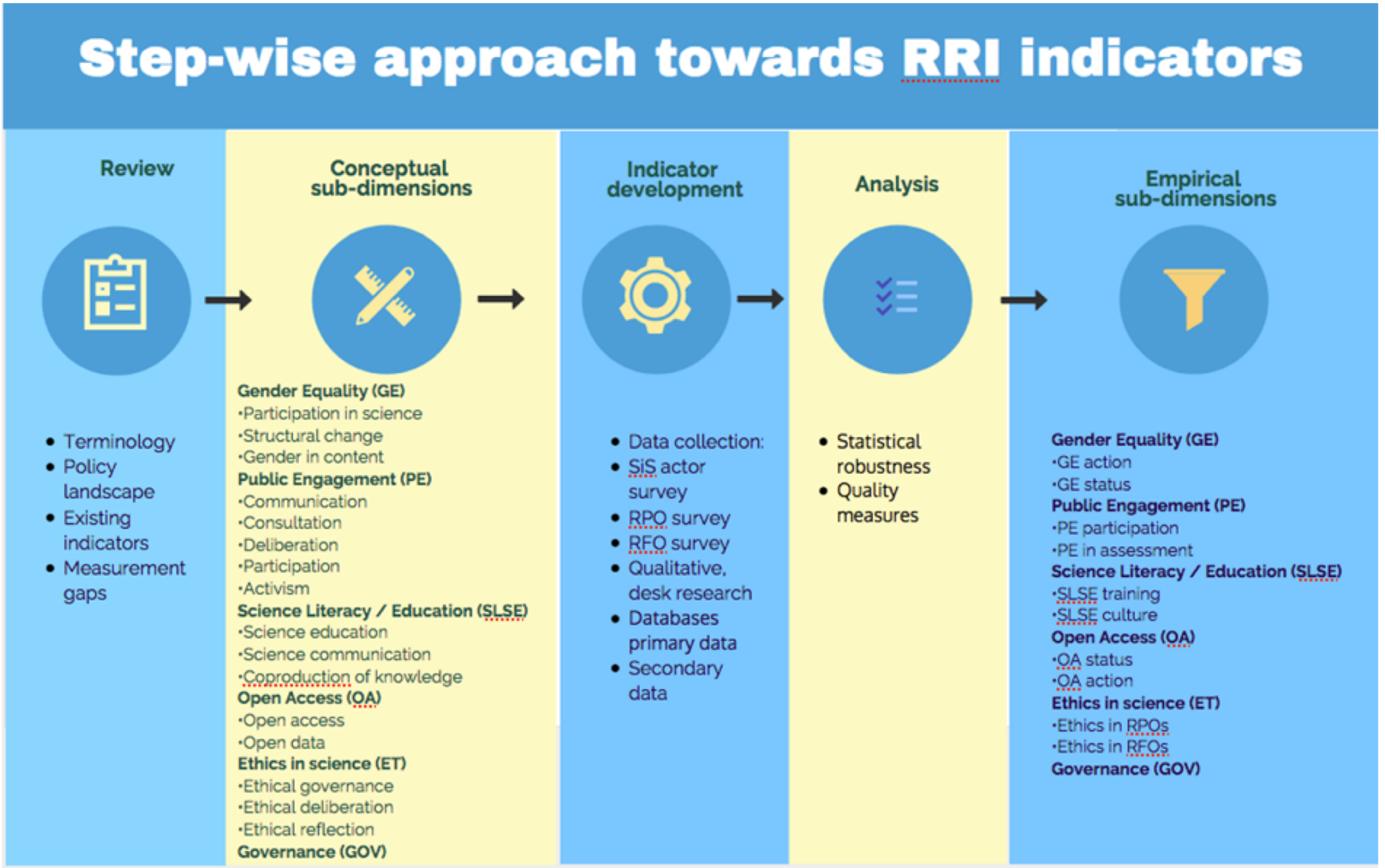
Location: Science14 atrium - rue de la science 14b, Brussels

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

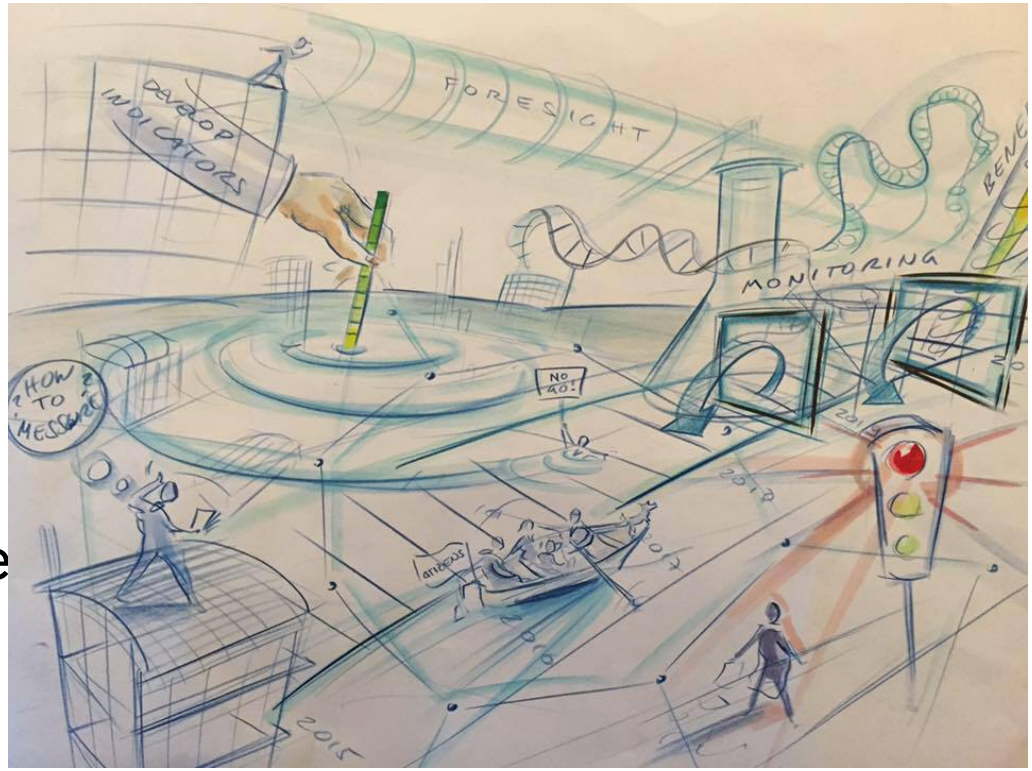
technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Fraunhofer ISI US University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

Step-wise approach towards RRI indicators



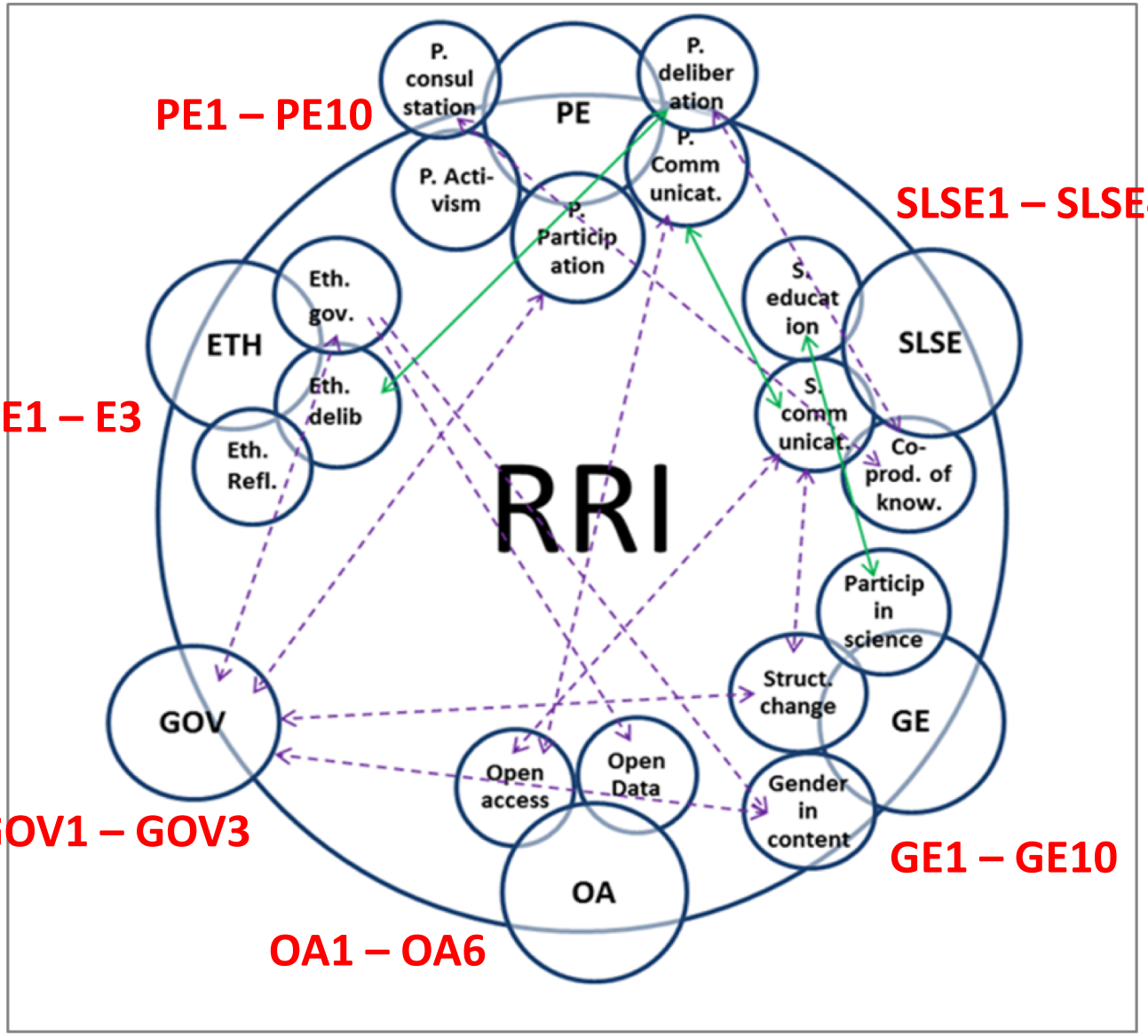
Core questions related to RRI indicators

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



technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Fraunhofer ISI US University of Sussex UCL HELLENIC REPUBLIC National and Kapodistrian University of Athens

Data sources	Indicators
Science in Society actor survey	PE9, PE10
RPO-survey	GE1, GE5, GE8, GE9, SLSE2, SLSE 4, PE5, PE6, OA6, E1, GOV2, GOV3
RFO-survey	GE3, PE7, PE8, E3, GOV2, GOV3
Register data (database)	GE10, OA1, OA2, OA3
Qualitative, desk-research	SLSE1
Eurostat; She Figures; MORE2; MASIS; Eurobarometers; EPOCH; SATORI; Openaire.eu	GE2, GE4, GE6, GE7, SLSE3, PE1, PE2, PE3, PE4, E2, OA4, OA5, GOV1



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

Indicator	Availability of data	Statistical robustness	Feasibility/ Replicability
GE1			
GE2		*no validation conducted*	
GE3			
GE4		*no validation conducted*	
GE5			
GE6		*no validation conducted*	
GE7		*no validation conducted*	
GE8			
GE9			
GE10		*no validation conducted*	
SLSE1		*no validation conducted*	
SLSE2			
SLSE3		*no validation conducted*	
SLSE4			

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento Fraunhofer ISI University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

Assessment of RRI indicators

Indicator	Availability of data	Statistical robustness	Feasibility/ Replicability
PE1		*no validation conducted*	
PE2			
PE3			
PE4			
PE5			
PE6 (DROPPED)		-	
PE7			
PE8			
PE9			
PE10			
OA1			
OA2 (DROPPED)		-	
OA3			
OA4			
OA5		*no validation conducted*	
OA6			

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento Fraunhofer ISI US University of Sussex UCL HELLENIC REPUBLIC National and Kapodistrian University of Athens

Assessment of RRI indicators

Indicator	Availability of data	Statistical robustness	Feasibility/ Replicability
E1a			
E1b			
E2		*no validation conducted*	
E3a			
E3b			
GOV1		*no validation conducted*	
GOV2			
GOV3			

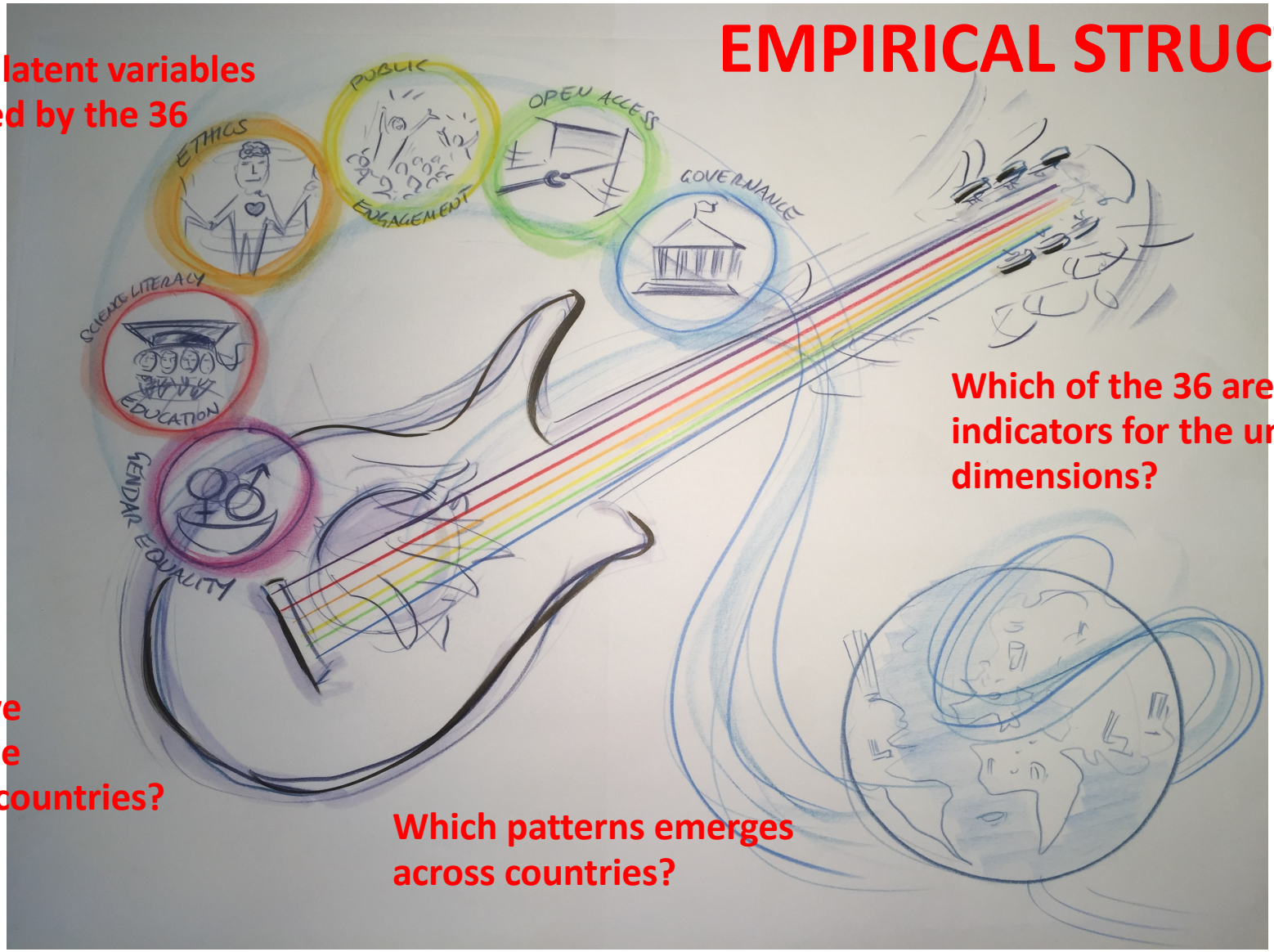
technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento Fraunhofer ISI US University of Sussex UCL HELLENIC REPUBLIC National and Kapodistrian University of Athens

MoRRI surveys response rates

Survey	Total contacts	Total responses (including partially completed)	Response rate	Countries below 10% response rate
Science in Society survey	686	326	48%	/
Research Funding Organisations survey	275	122	44%	LV, LU, RO
Higher Education Institutions survey	1479	259	18%	CZ, FR, LU, PL, PT
Public Research Organisations survey	1486*	208	14%	BG, EE, DE, PL, UK

EMPIRICAL STRUCTURE?

How many latent variables are captured by the 36 indicators?



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

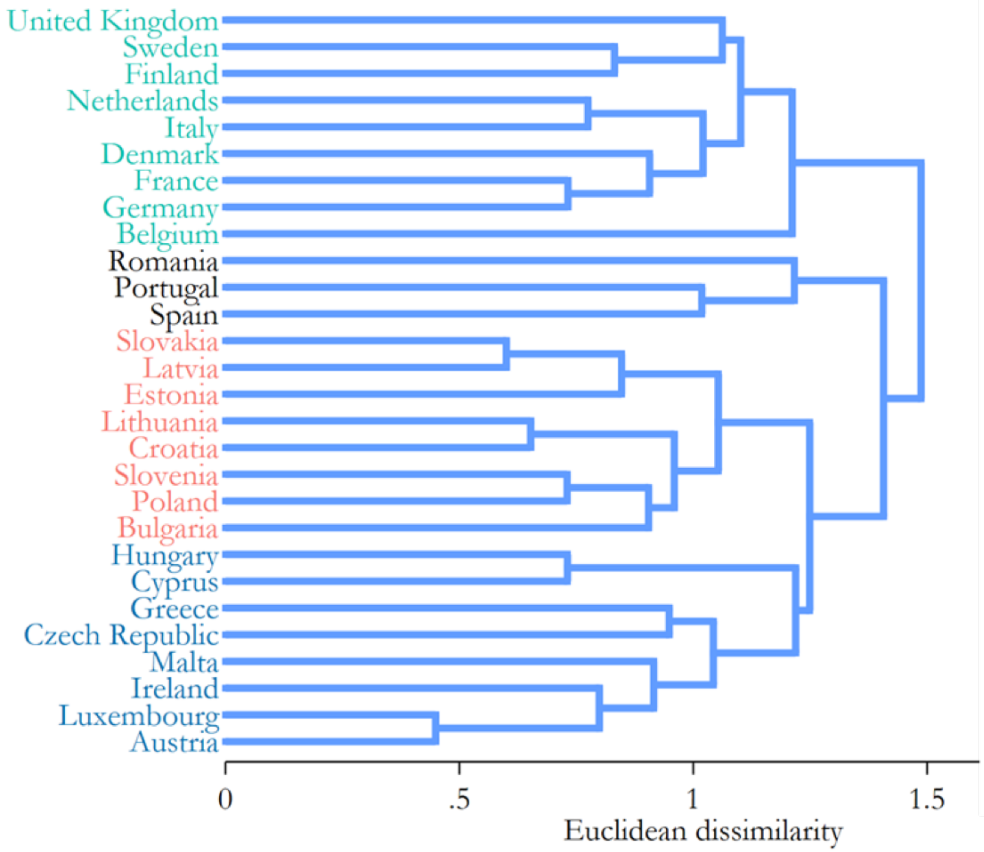
How can we characterise individual countries?

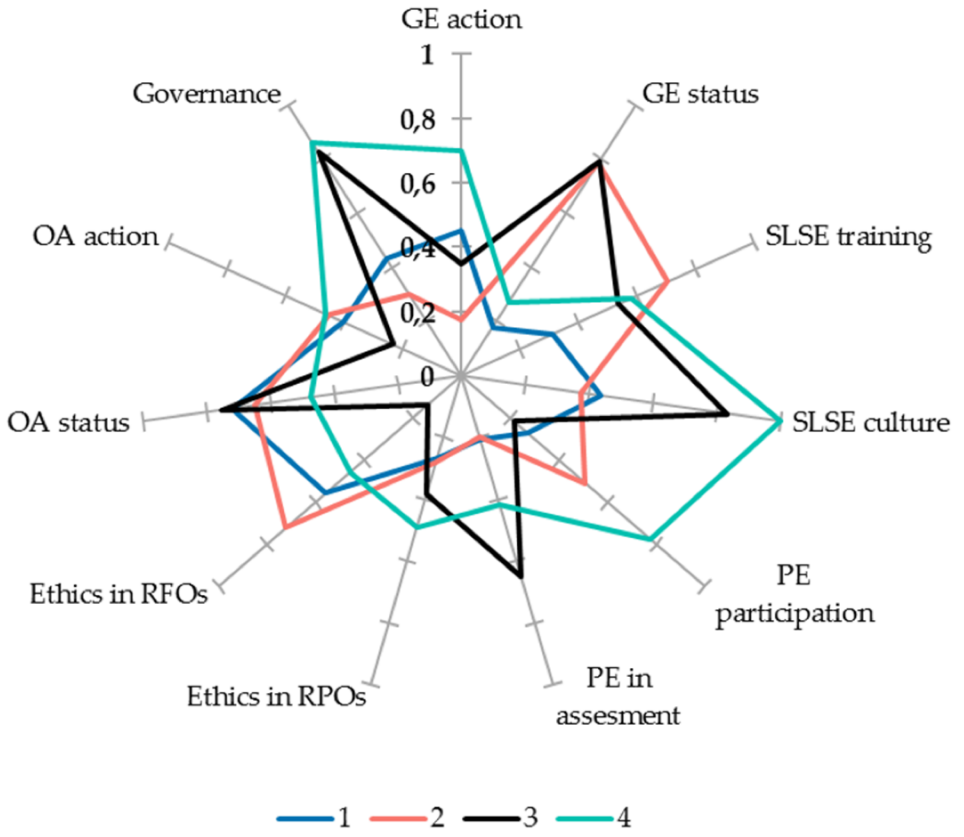
Which patterns emerges across countries?

(Empirical) Sub-dimensions and core indicators

Dimension	Core indicators
GE action	GE1, GE5
GE status	GE2.3, GE10.1
SLSE training	SLSE1, SLSE2
SLSE culture	SLSE3, SLSE4
PE participation	PE1, PE4, PE9
PE in assessment	PE7, PE8
Ethics in RPOs	E1a, E1b
Ethics in RFOs	E3a, E3b
OA status	OA1.1, OA1.2
OA action	OA3, OA4, OA6
Governance	GOV1, GOV2, GOV3

Clusters; based on 11 indicies





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?

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

Monitoring the Evolution and Benefits of Responsible Research and Innovation - MoRRI

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

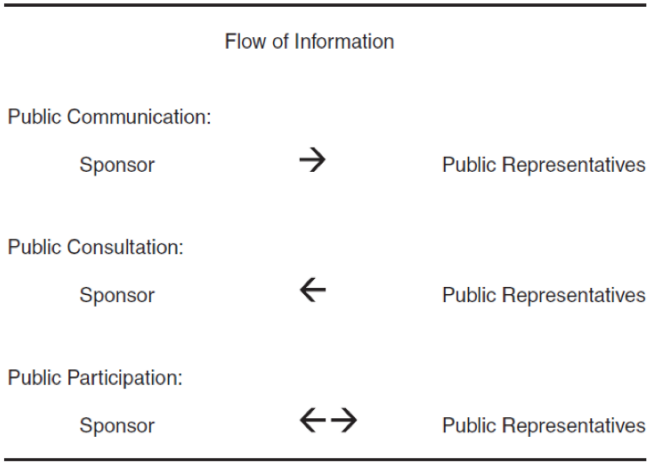
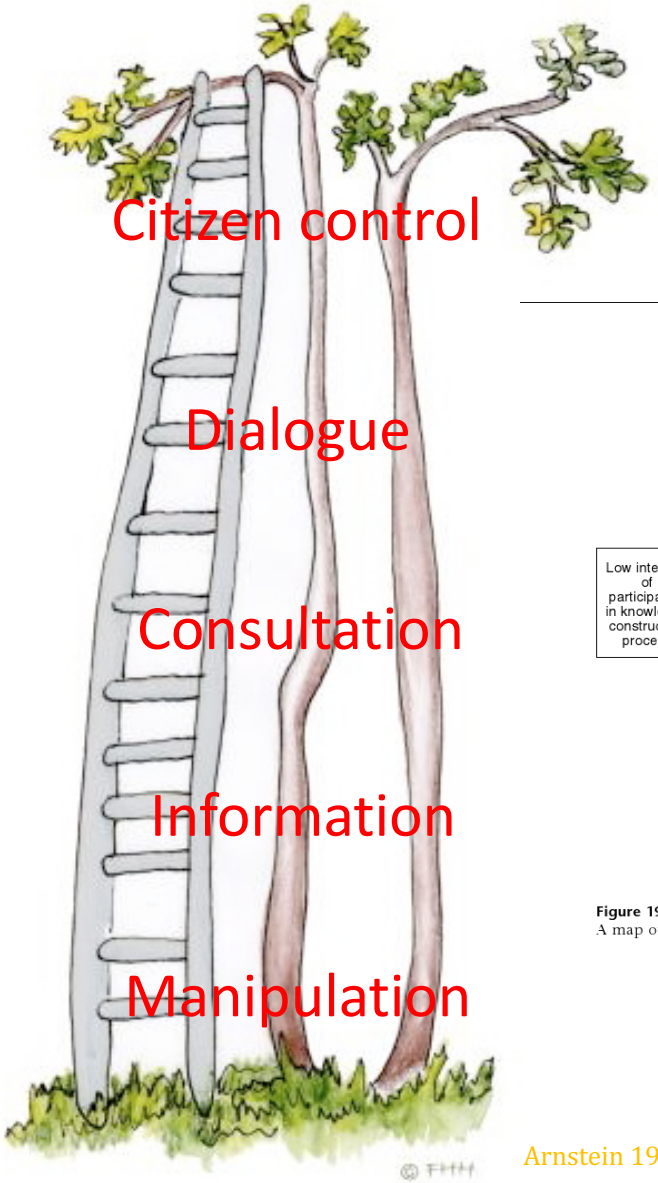


Figure 1. The three types of public engagement.

Rowe & Frewer 2005:255

Formalized / high involvement	Formalized / low involvement	Not formalized / high involvement	Not formalized / low involvement
Belgium	Albania	Austria	Bulgaria
Denmark	Croatia	Iceland	Cyprus
Finland	Estonia		Czech Republic
France	Greece		Hungary
Germany	Latvia		Ireland
Italy	Montenegro		Israel
Lithuania	Poland		Lichtenstein
Norway	Portugal		Luxembourg
Sweden	Slovakia		Macedonia
Switzerland	Slovenia		Romania
The Netherlands	Turkey		Serbia
United Kingdom			Spain

Mejlgaard et al 2012



Arnstein 1969

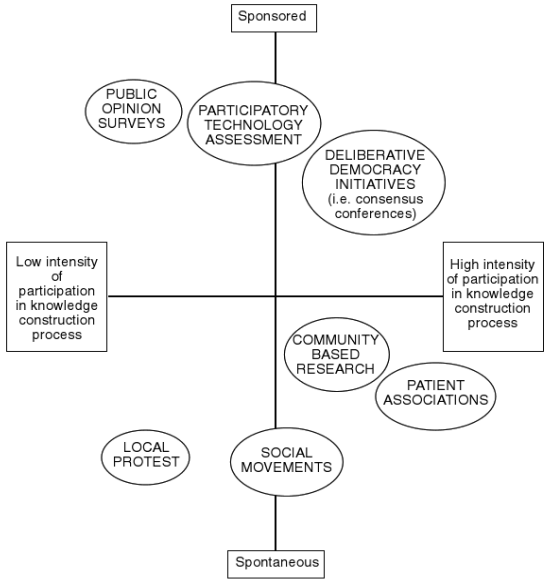


Figure 19.1
A map of public participation in science and technology.

Bucchi & Neresini 2008

MoRRI PE concept (see also PE2020)

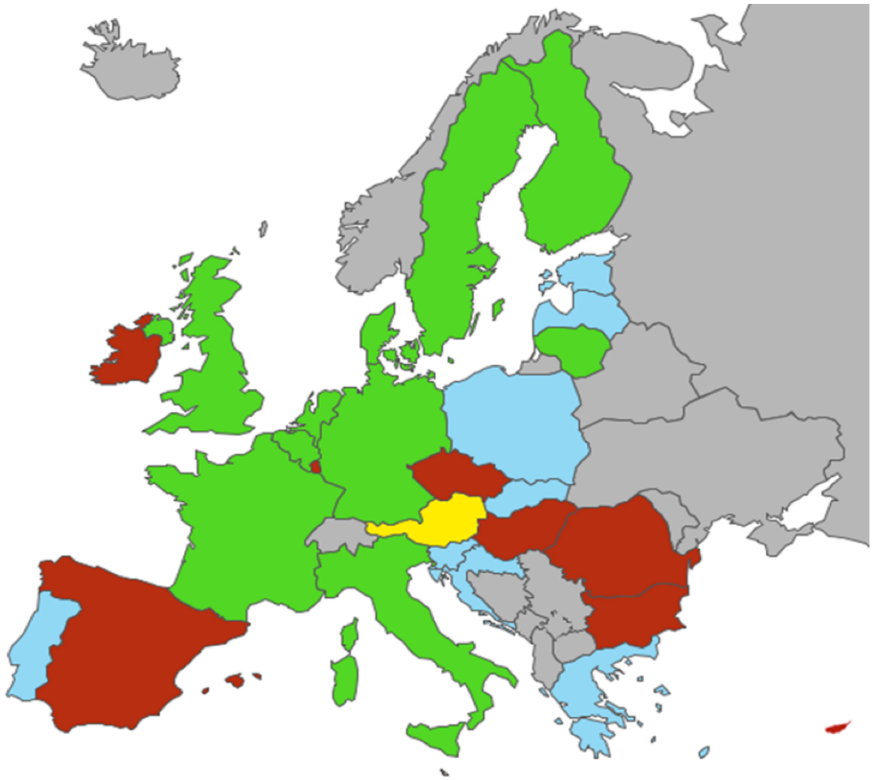
Categorisations
Public communication – *the aim is to inform and/or educate citizens*. The flow of information constitutes one-way communication from sponsors to public representatives, and no specific mechanisms exist to handle public feedback (examples include public hearings, public meetings and awareness raising activities).
Public activism – *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).
Public consultation – *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).
Public deliberation – *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).
Public participation – *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).

Number	Name of indicator	Note
PE1	Models of public involvement in science and technology (S&T) decision-making	MASIS, 2012
PE2	Policy-oriented engagement with science	Eurobarometer, 2010
PE3	Citizen preferences for active participation in S&T decision-making	Eurobarometer, 2013
PE4	Active information search about controversial technologies	Eurobarometer, 2010
PE5	Public engagement performance mechanisms at the level of research-performing organisations	Data available for 2014, 2015, 2016. Composite index based on HEI and RPO surveys
PE6	Dedicated resources for PE	RPO survey
PE7	Embedment of public engagement activities in the funding structure of key public research-funding agencies	Data available for 2014, 2015, 2016. Composite index based on RFO survey
PE8	Public engagement elements as evaluative criteria in research proposal evaluations	Data available for 2014, 2015, 2016. Composite index based on RFO survey
PE9	Research and innovation democratisation index	SiS survey
PE10	National infrastructure for involvement of citizens and societal actors in research and innovation	SiS survey

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

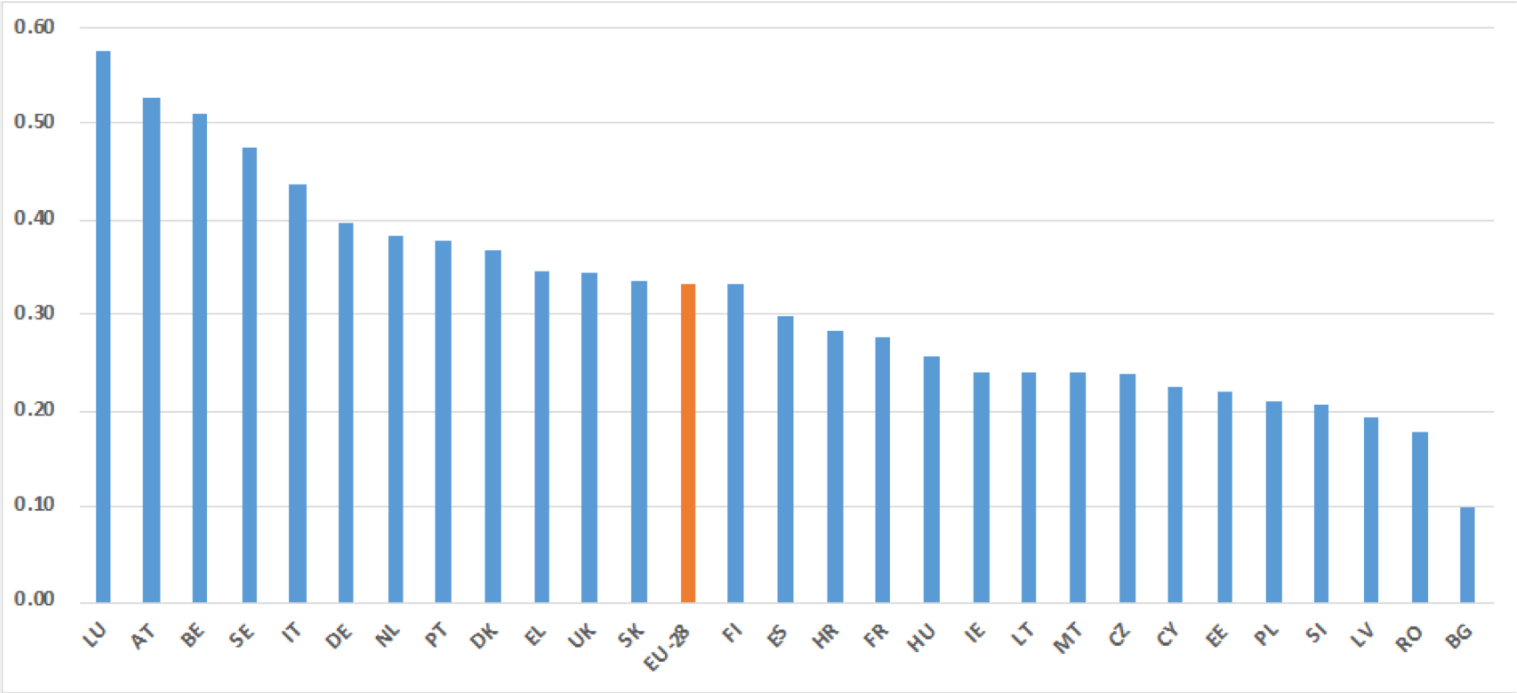


technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienna ingenio CSIC-UPV Fraunhofer ISI US University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

PE2: Policy-oriented engagement with science

- EB 2010

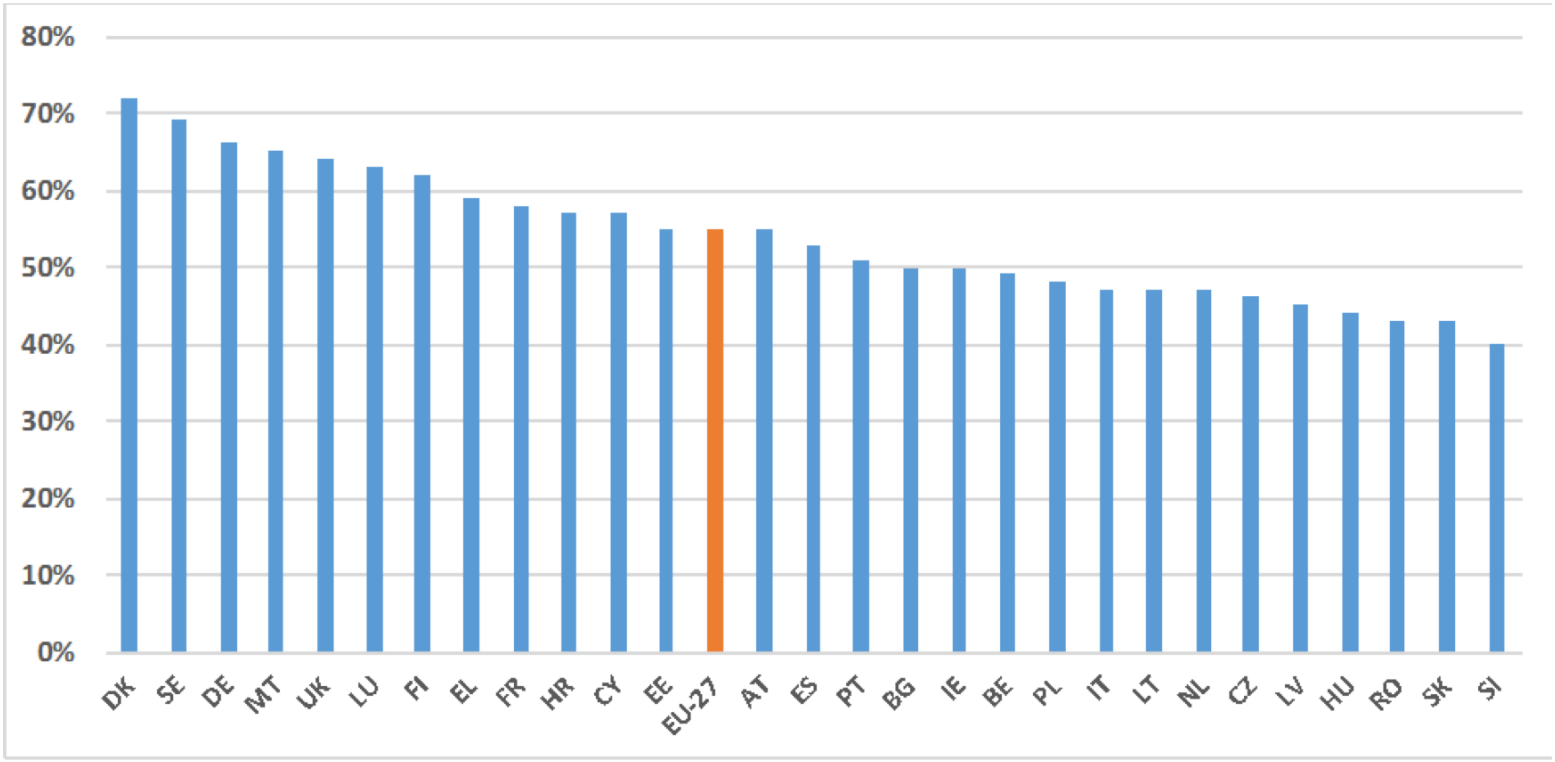
- Do you attend public meetings or debates about science and technology?
- Do you sign petitions or join street demonstrations on matters of nuclear power, biotechnology or the environment?
- Do you participate in the activities of a non-governmental organisation dealing with science and technology-related issues?



PE3: Citizen preference for active participation

- EB 2013

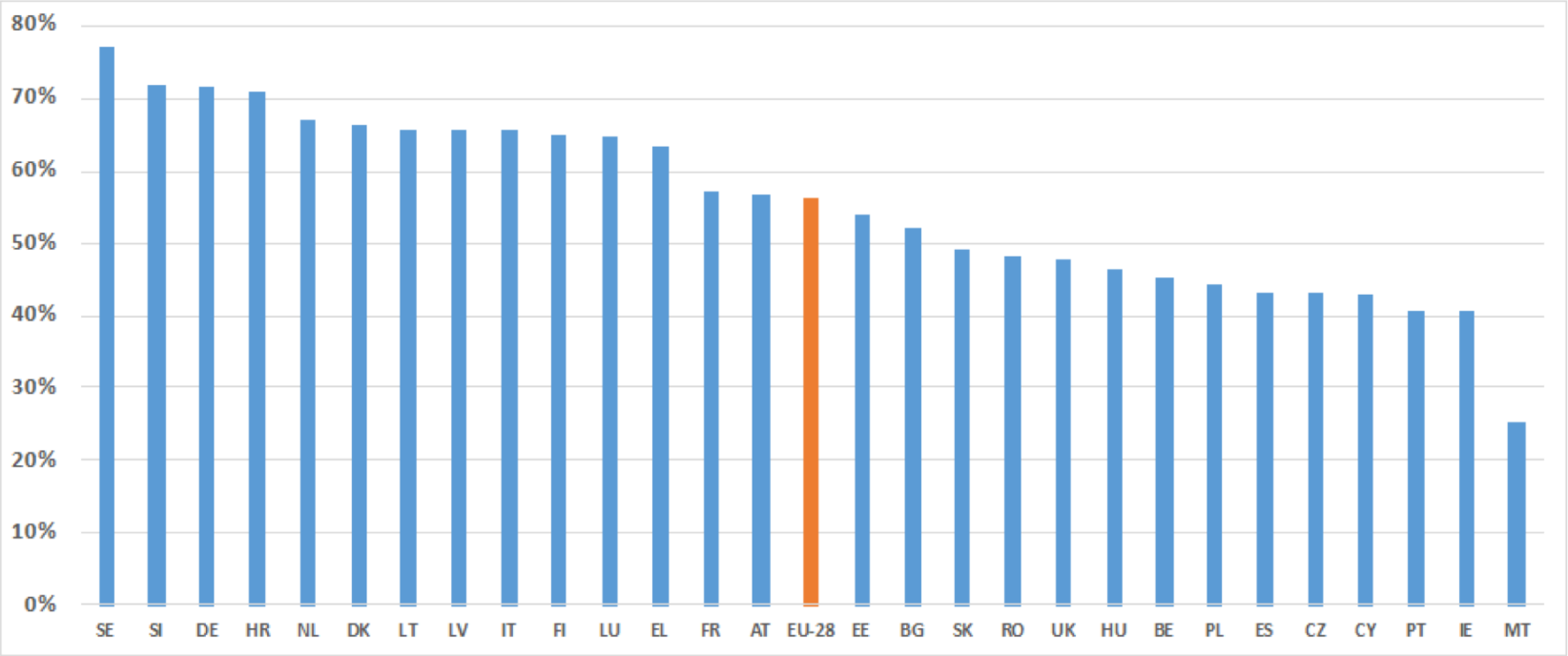
- citizens do not need to be involved or informed;
- citizens should only be informed;
- citizens should be consulted and their opinions should be considered;
- citizens should participate and have an active role;
- citizens' opinions should be binding;
- don't know.



PE4: Active information search about controversial technologies (GM food)

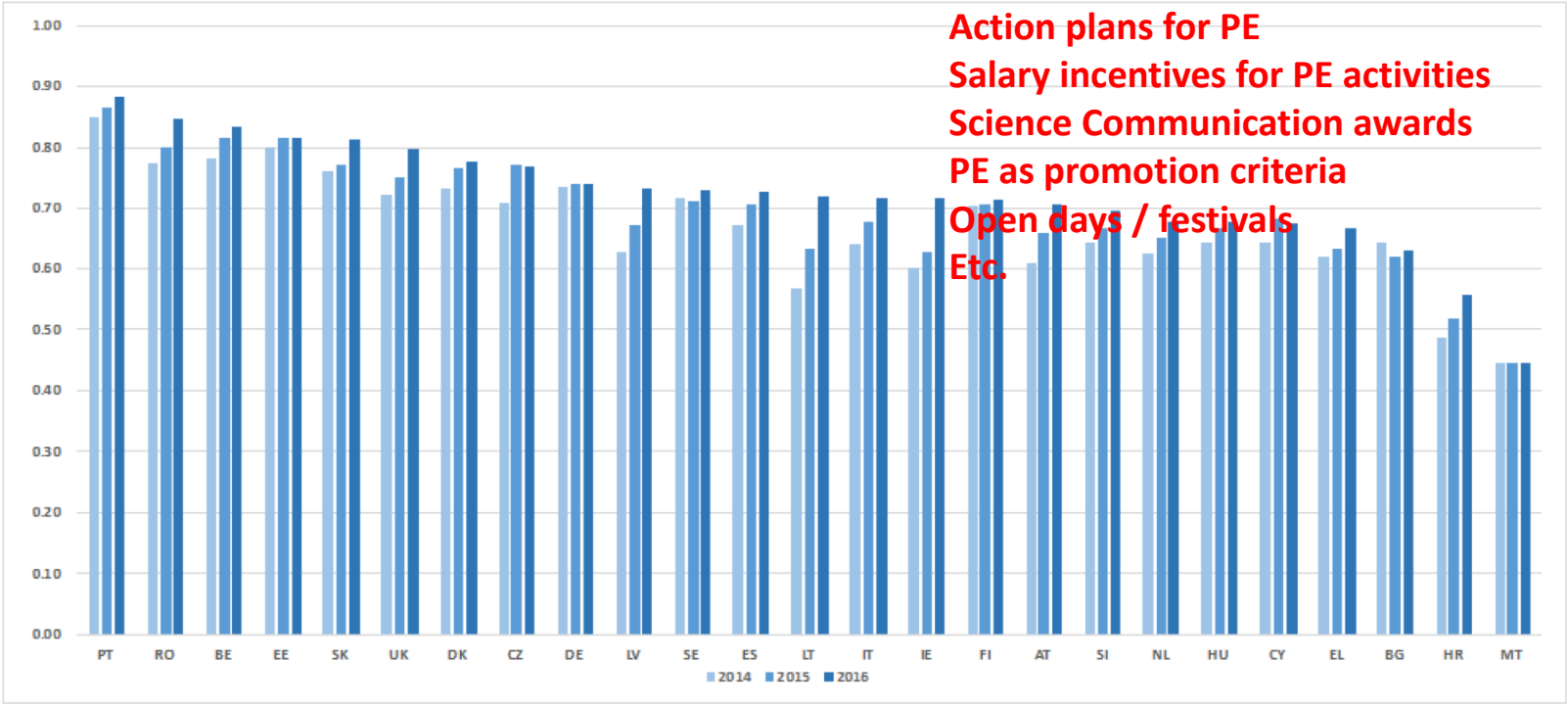
- EB 2010

- 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)

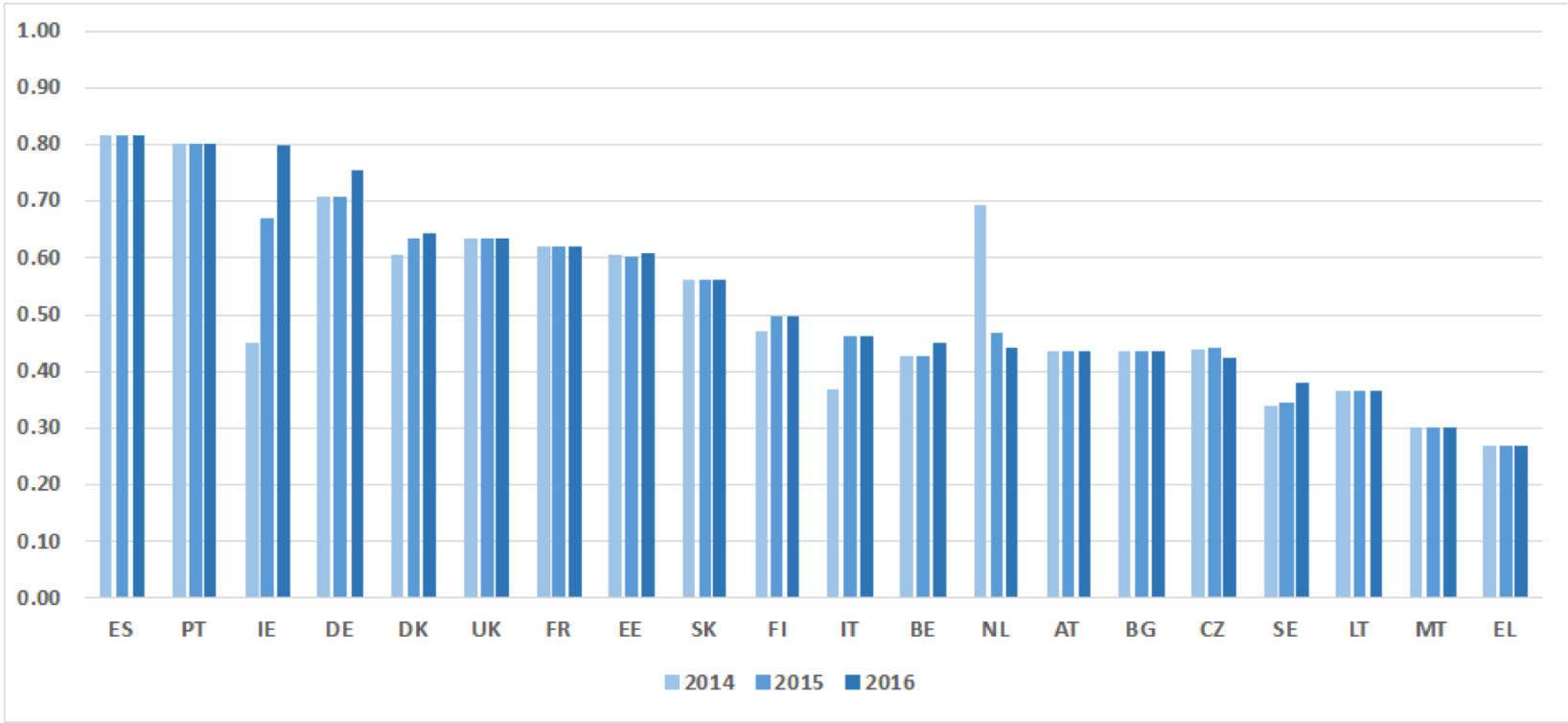


Partnerships
NGO collaboration
Community representation in boards
Conferences for broader publics
Action plans for PE
Salary incentives for PE activities
Science Communication awards
PE as promotion criteria
Open days / festivals
Etc.

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Fraunhofer ISI University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

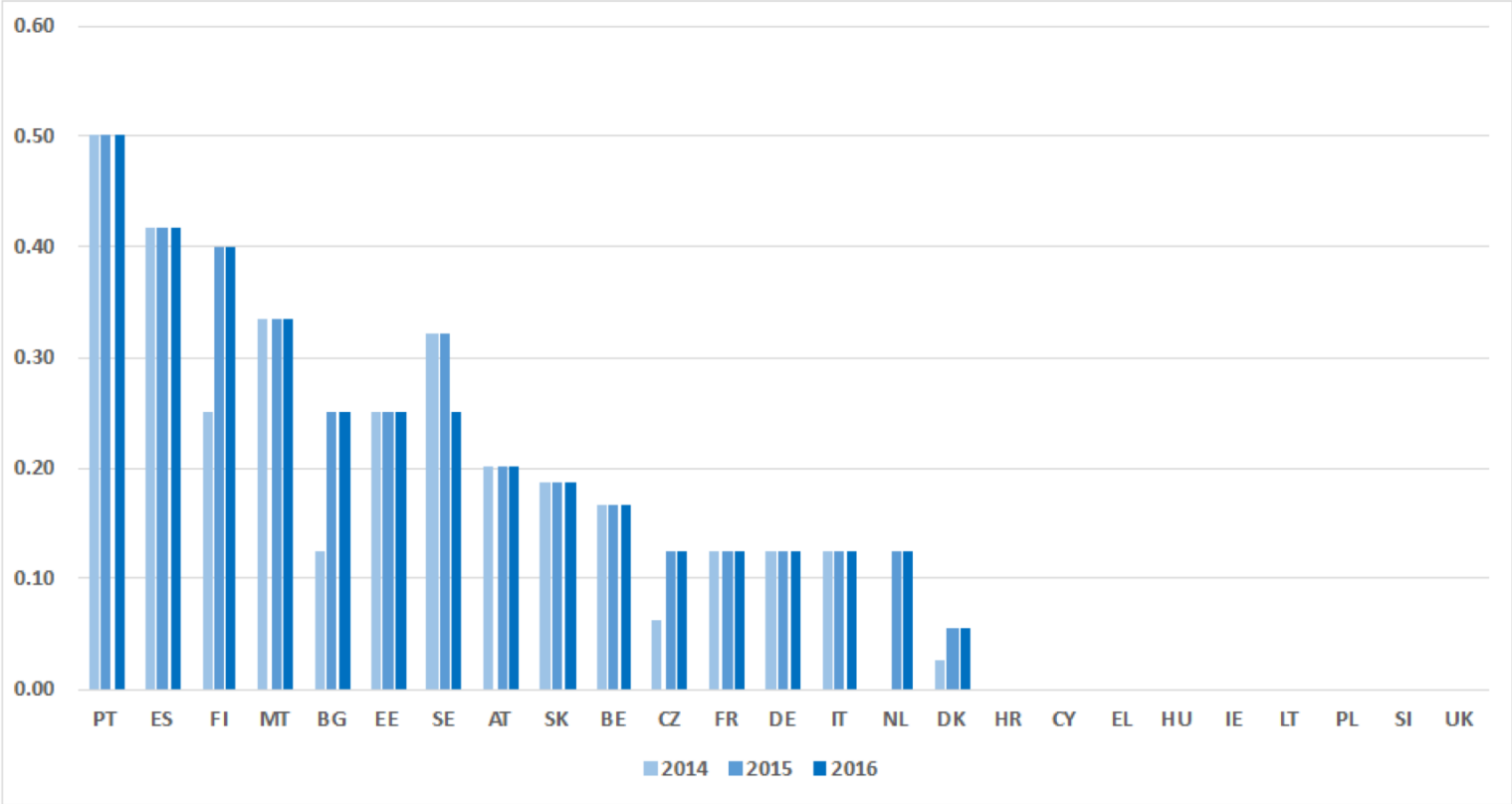
PE7: PE activities in RFO funding structure

- 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

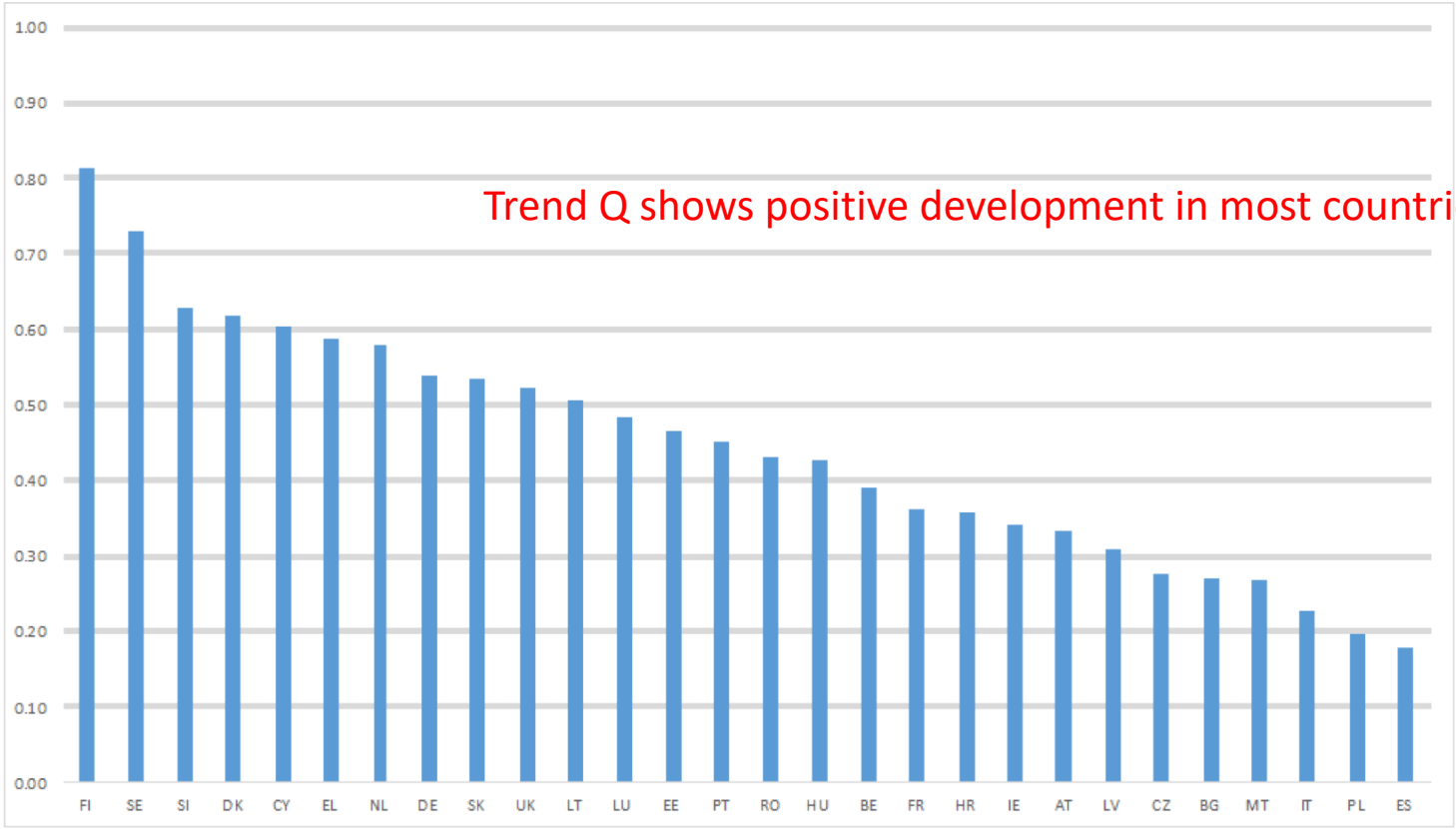
- RFO survey 2017
- "Please indicate the extent to which public engagement has been a criterion for the appraisal of research applications"



technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienna ingenio CSIC-UPV Fraunhofer ISI University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

PE9: R&I democratisation index

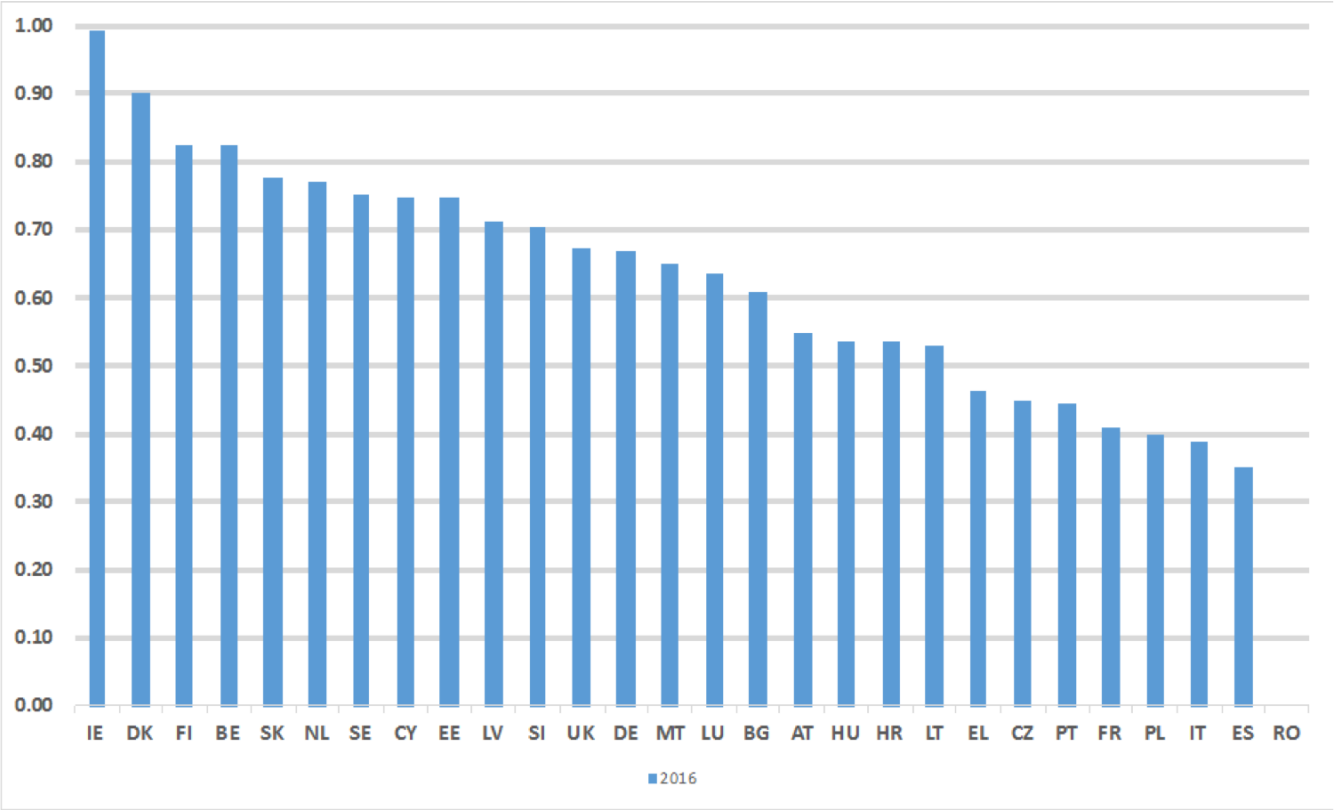
- SiS survey 2017
- Extent to which CSOs are (1) informed, (2) consulted, (3) if their opinions had a significant impact on political decisions on research and innovation (R&I)
- Extent to which their values and expectations played an important role in R&I agenda setting



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



technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Fraunhofer ISI University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

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

Indicator	Availability of data	Statistical robustness	Feasibility/ Replicability
PE1		*no validation conducted*	
PE2			
PE3			
PE4			
PE5			
PE6 (DROPPED)		-	
PE7			
PE8			
PE9			
PE10			

Monitoring the Evolution and Benefits of Responsible Research and Innovation - MoRRI

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 reserach-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

Monitoring the Evolution and Benefits of Responsible Research and Innovation - MoRRI

Dimension 3: Science Literacy & Science Education

Dr Thomas Teichler, Lead to Trust

Final Event – Discussion on technical aspects

Date: 6 March 2018

Location: Science14 atrium - rue de la science 14b, Brussels

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

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento Fraunhofer ISI US University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

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

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Fraunhofer ISI US University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

What are the MoRRI SLSE-indicators?

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

SLSE3: Science communication culture

SLSE2: RRI-related training at higher education institutions

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

Illustration: European Commission; Heyko Stöber

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

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

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

SLSE1 – Data collection & indicator building

Qualitative assessment based on responses to:

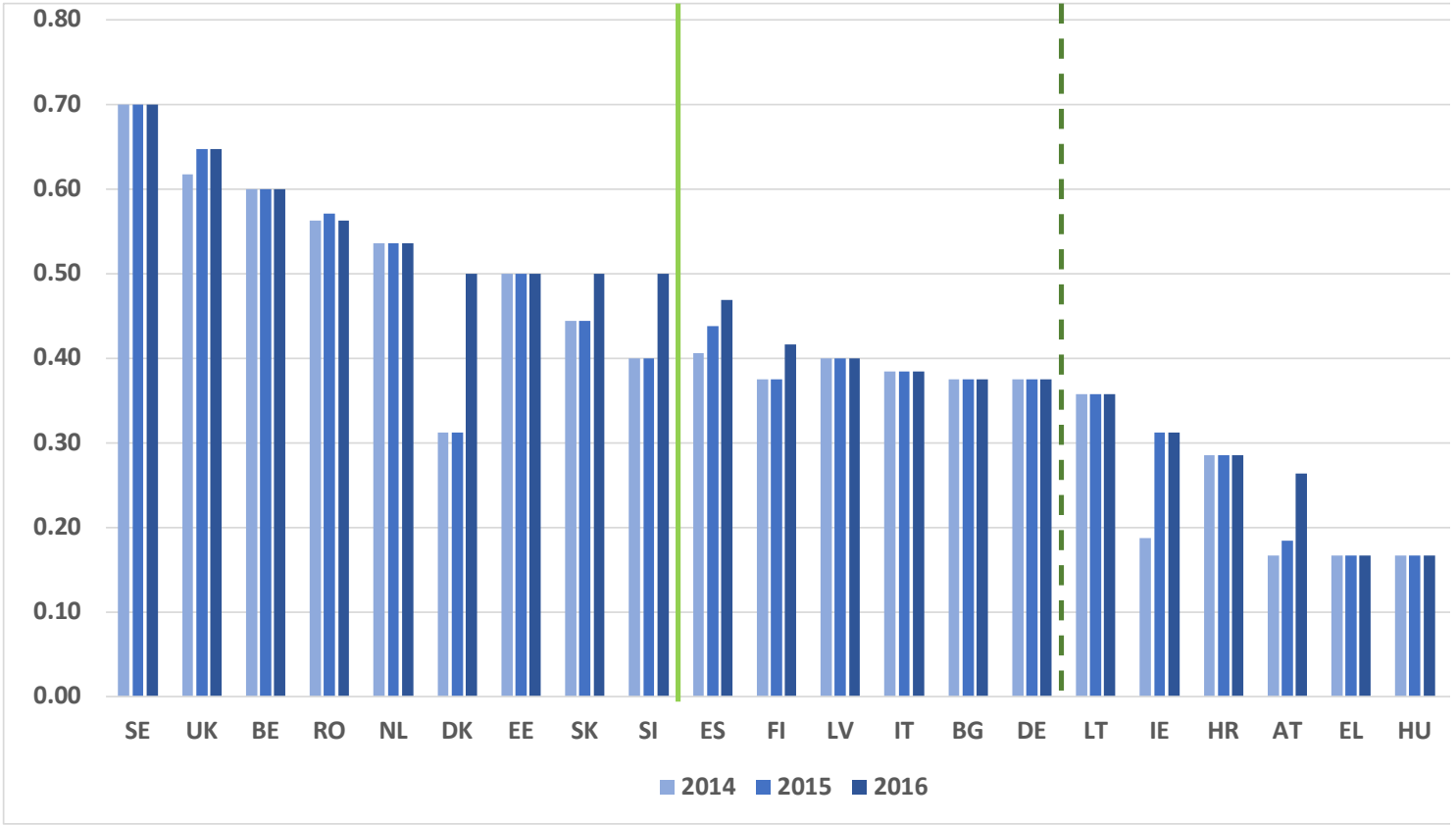
1. ‘Does the curriculum address the controversial character of either one of the two topics? “yes” “no”
2. Which of the following issues is addressed by the curriculum in relation to the controversial topic (GMO, nuclear energy)?
   - social aspects, such as consequences for the society or agriculture
   - 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 1point 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%

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento Fraunhofer ISI US University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

SLSE2 – Critical science in curricula

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.
- **Source:** HEI Survey, MoRRI, 2017.

SLSE2 – Data collection & indicator building

- Data collected through HEI survey

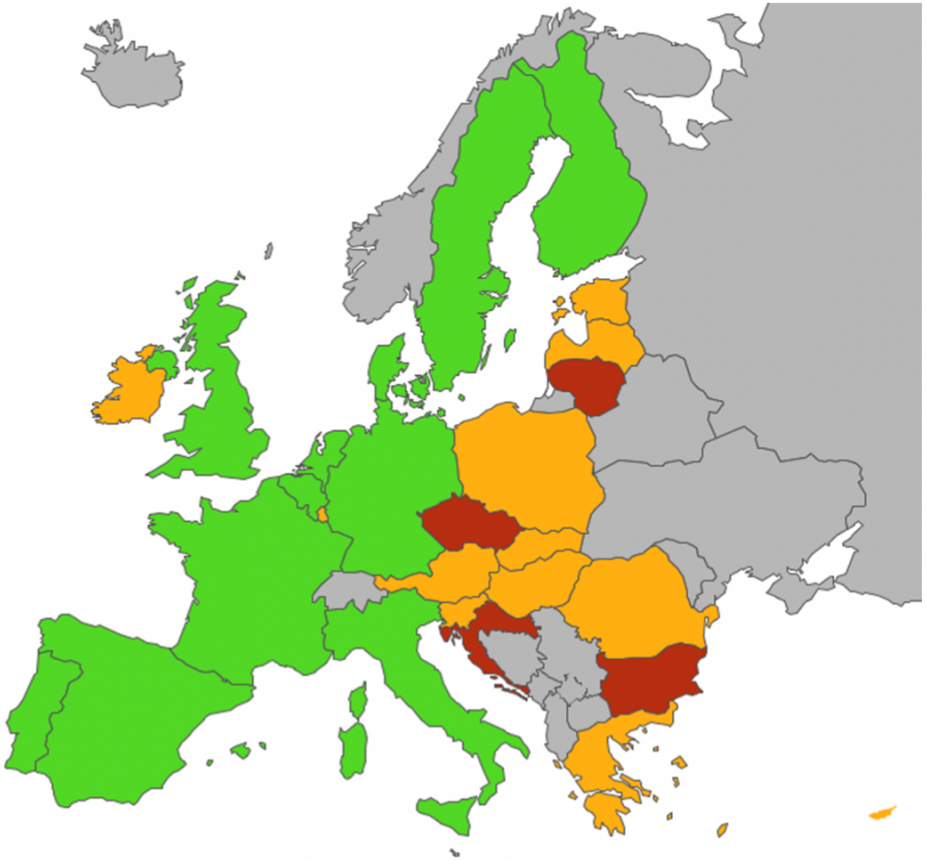
- Q25: “Did PhD students' trainings include RRI-related aspects (such as ethical, economic, environmental, legal and social aspects) in 2014, 2015 and 2016?”

- 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

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienna ingenio CSIC-UPV Fraunhofer ISI University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

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.
- **Source:** MASIS, 2012.

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento Fraunhofer ISI US University of Sussex UCL HELLENIC REPUBLIC National and Kapodistrian University of Athens

SLSE3 – Data collection & indicator building

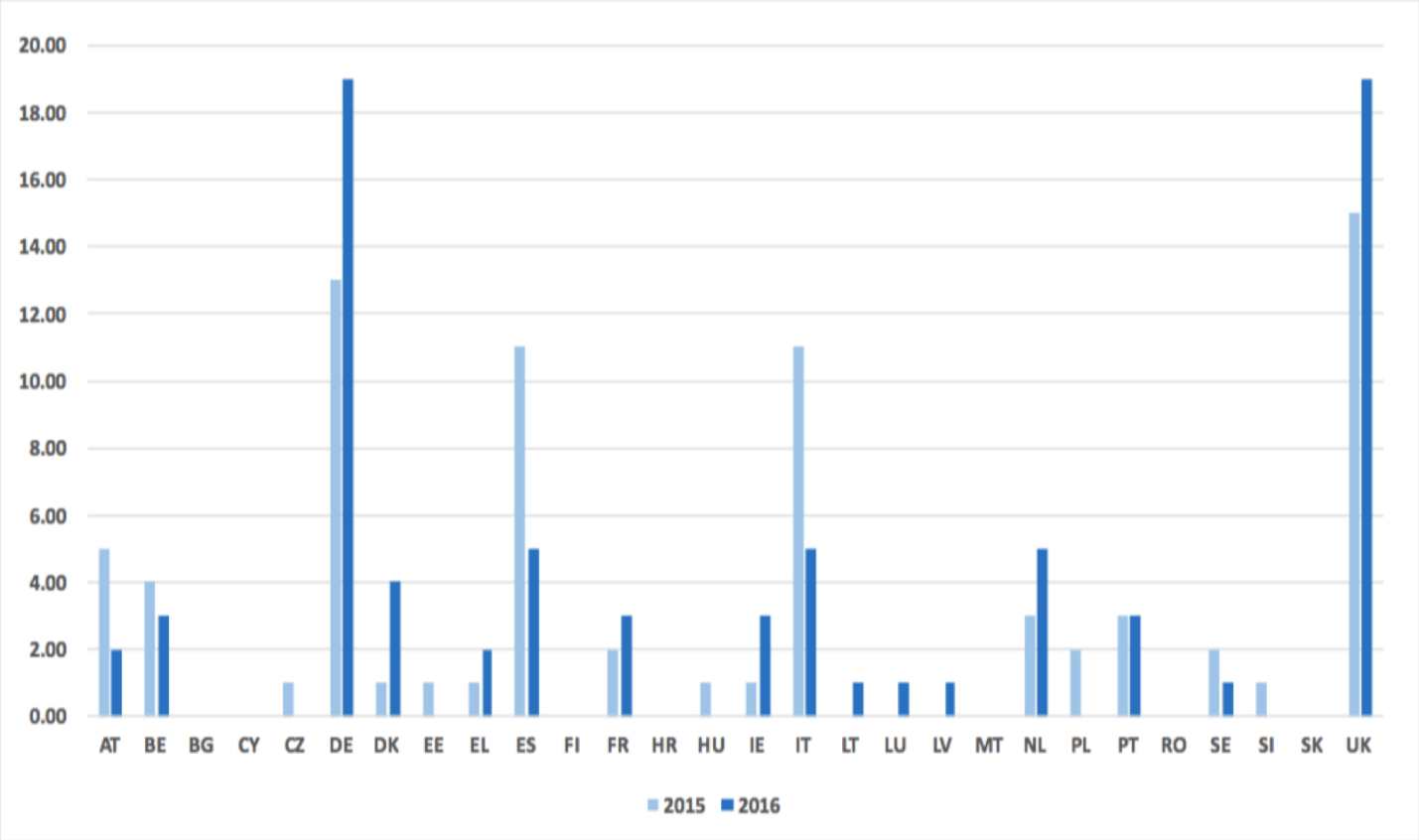
- Data collection method and indicator was originally developed by the MASIS project.
- Data collection is based on country reports produced by a network of national experts, following a common guideline and template.

- **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"

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

SLSE4 – Citizen science activities in RPOs

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

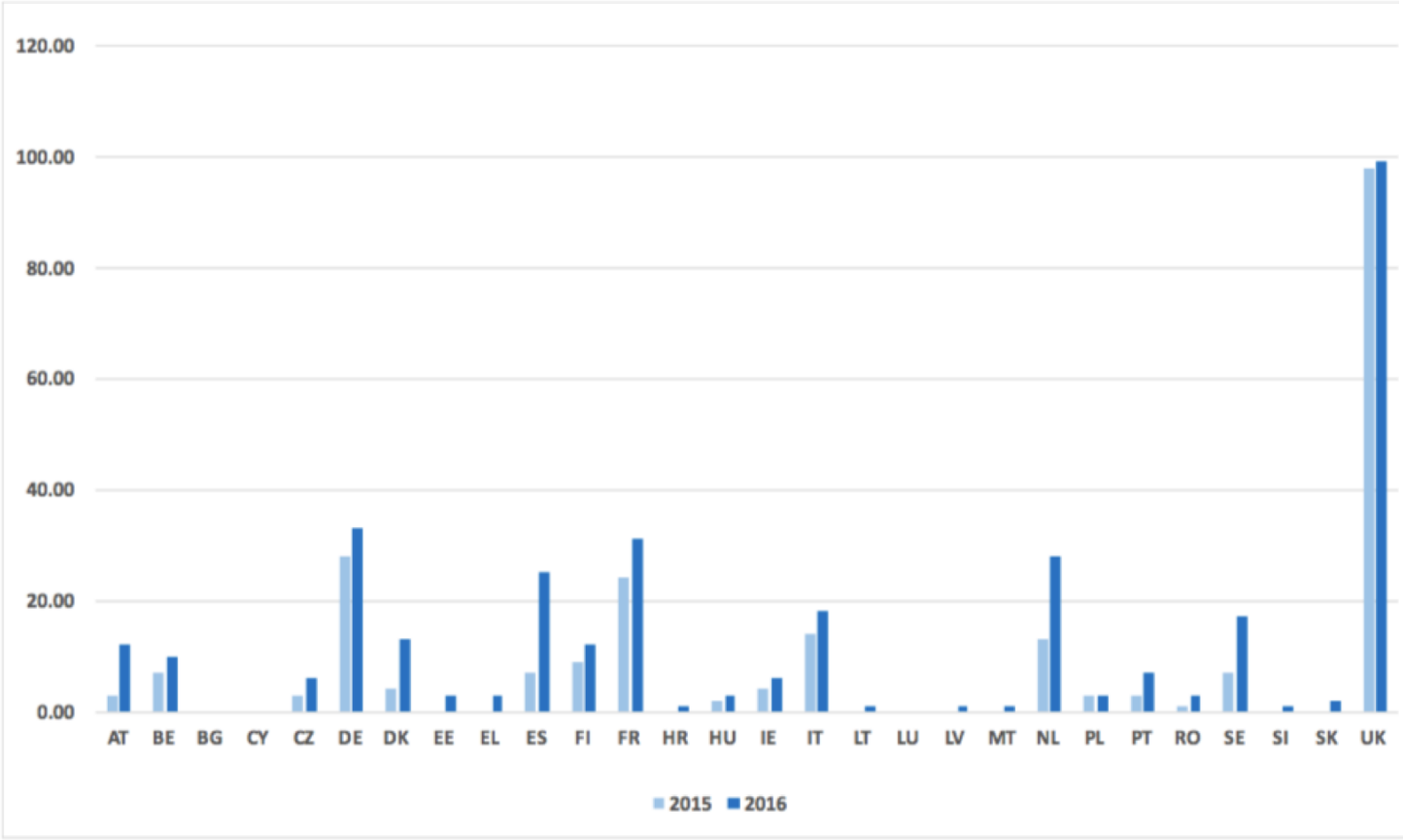


- **ECSA** is an umbrella organisation set up in 2013
- **Majority** of its members are located in DE and UK (19 in 2016)
- Followed by NL, IT, ES
- 12 Member States were not represented in ECSA and several others had 1 or 2 members
- **Source:** ESCA, Annual Reports

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

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

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

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

- 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

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)

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

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

LEAD TO TRUST

Coaching – Training – Consulting

Frankfurt am Main & Zürich

Dr Thomas Teichler
E: thomas@leadtotrust.com
M: +49-151-551 65 250

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Fraunhofer ISI University of Sussex UCL Hellenic Republic National and Kapodistrian University of Athens

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

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

Monitoring the Evolution and Benefits of Responsible Research and Innovation - MoRRI

Dimension 4: Open Access

Ingeborg Meijer, CWTS

Final Event – Discussion on technical aspects

Date: 6 March 2018

Location: Science14 atrium - rue de la science 14b, Brussels

‘Open Access’ from the policy perspective

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

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

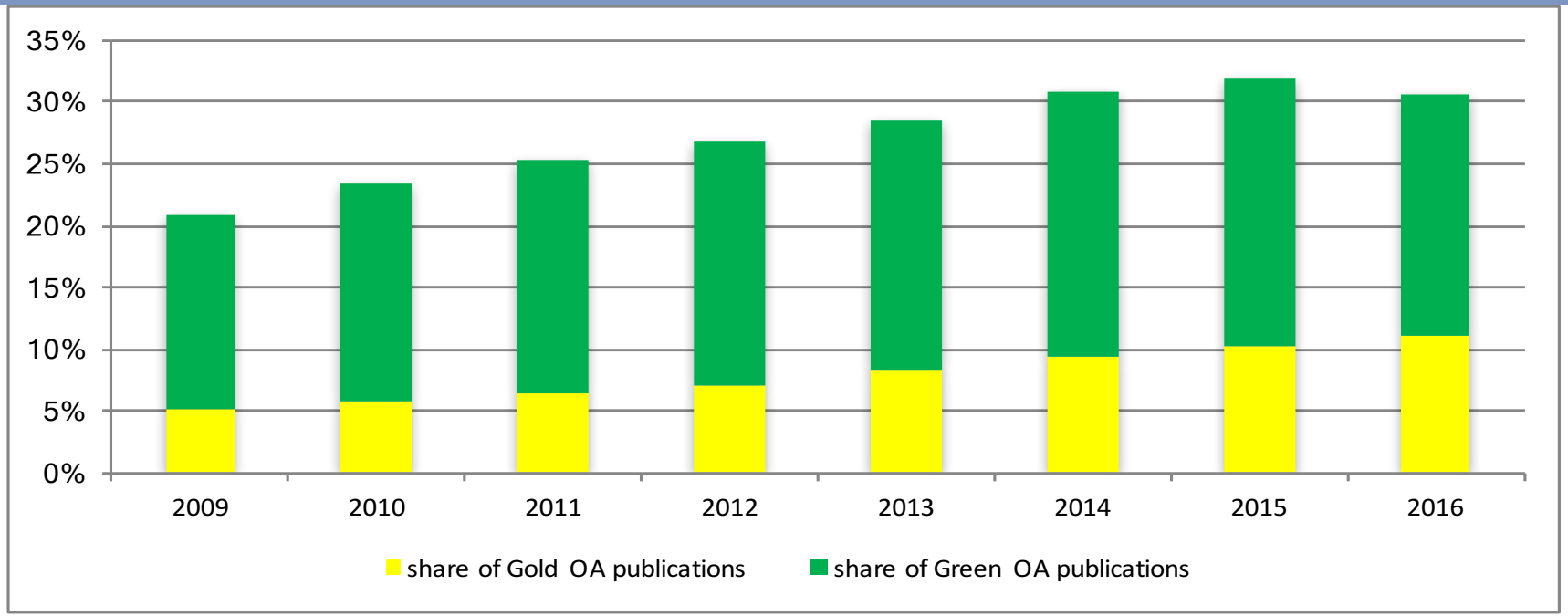
Open Access Indicators

Number	Name of indicator	Note
OA1	Open access literature	Developed by CWTS within the MoRRI consortium.
- OA1.1	Share of Open Access publications	
- OA1.2	Citation scores for OA publications	
OA3	Social media outreach/take up of OA literature	Developed by CWTS within the MoRRI consortium.
- OA3.1	Ratio of OA and non-OA publications used in Twitter	
- OA3.2	Ratio of OA and non-OA publications used in Wikipedia	
OA4	Public perception of open access	Unchanged indicator based on Eurobarometer (2013).
OA5	Funder mandates	Unchanged indicator based on EC data (2011).
OA6	Research-performing organisations' support structures for researchers as regards incentives and barriers for data sharing	Data available for 2014, 2015, 2016. Composite index based on HEI and PRO surveys of MoRRI consortium, 2017.

OA1 Method

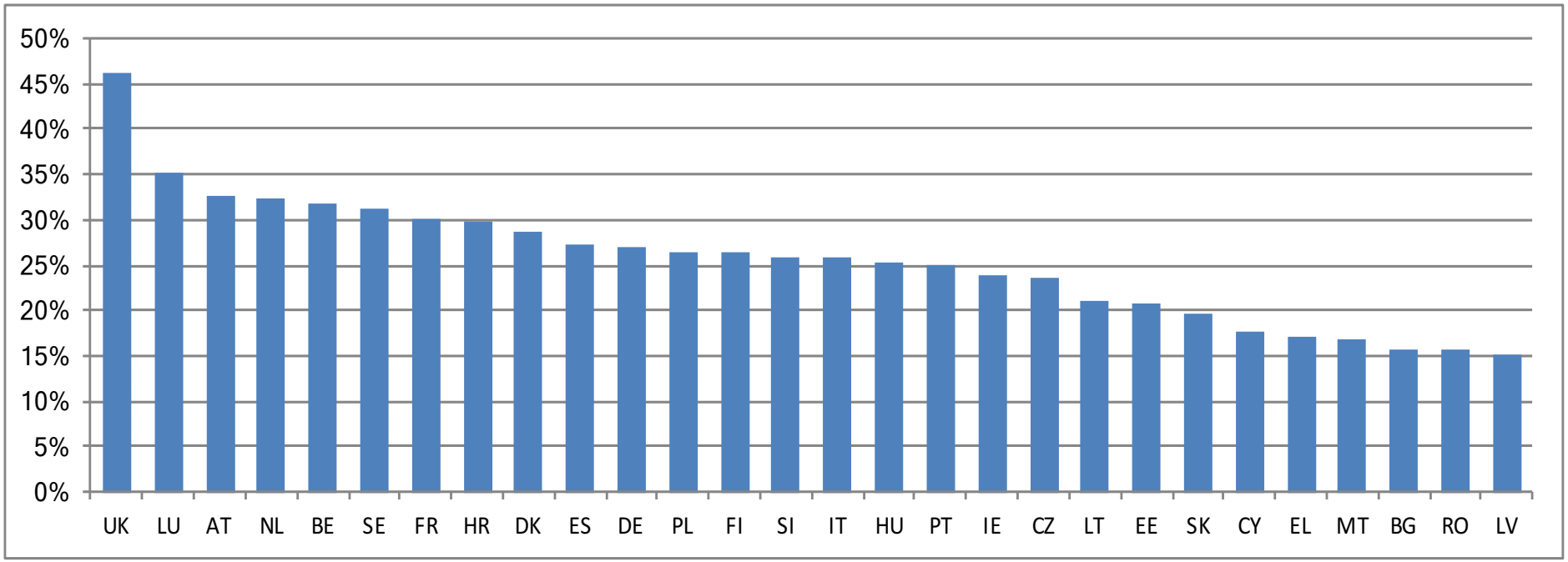
- WoS database (CWTS version)
- Find Open Access ***evidence*** by coupling journals/publications to:
  - DOAJ list (Directory of Open Access Journals) > GOLD
  - PMC (PubMed Central)
  - the ROAD list (Directory of Open Access scholarly Resources)
  - CrossRef
  - OpenAIRE
- Coupling of publications 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%

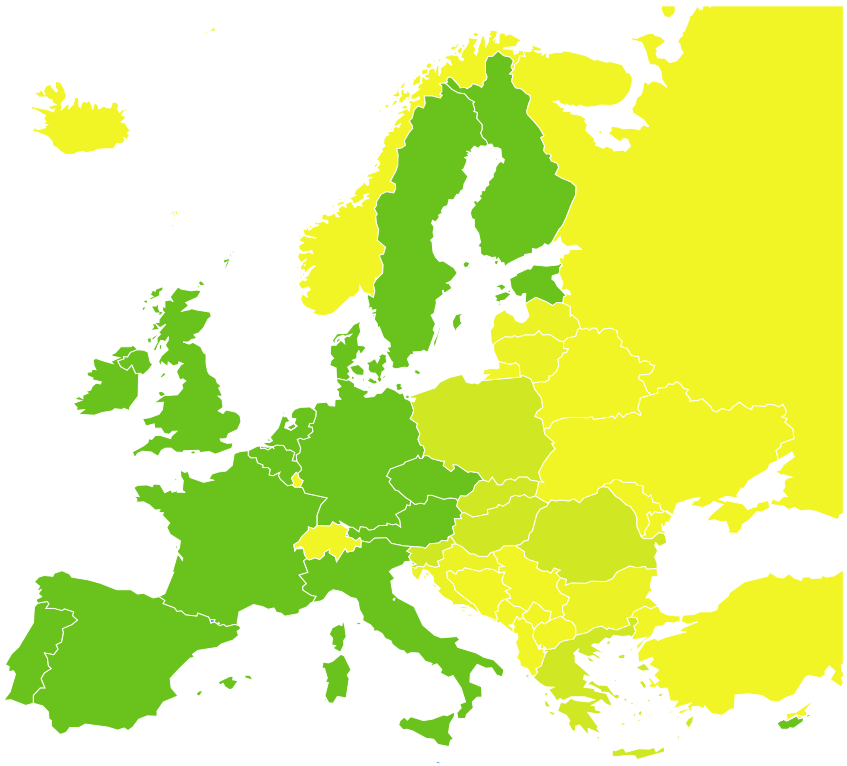
OA1.1 Open Access publishing EC MS



- EC MS range from 15% till 46% OA publishing

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento Fraunhofer ISI US University of Sussex UCL HELLENIC REPUBLIC National and Kapodistrian University of Athens

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))

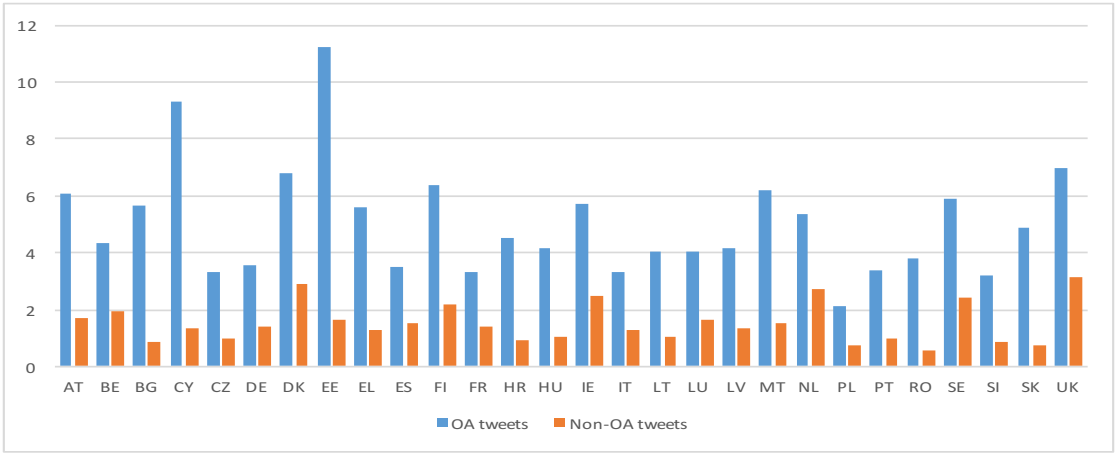
technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Fraunhofer ISI US University of Sussex UCL HELLENIC REPUBLIC National and Kapodistrian University of Athens

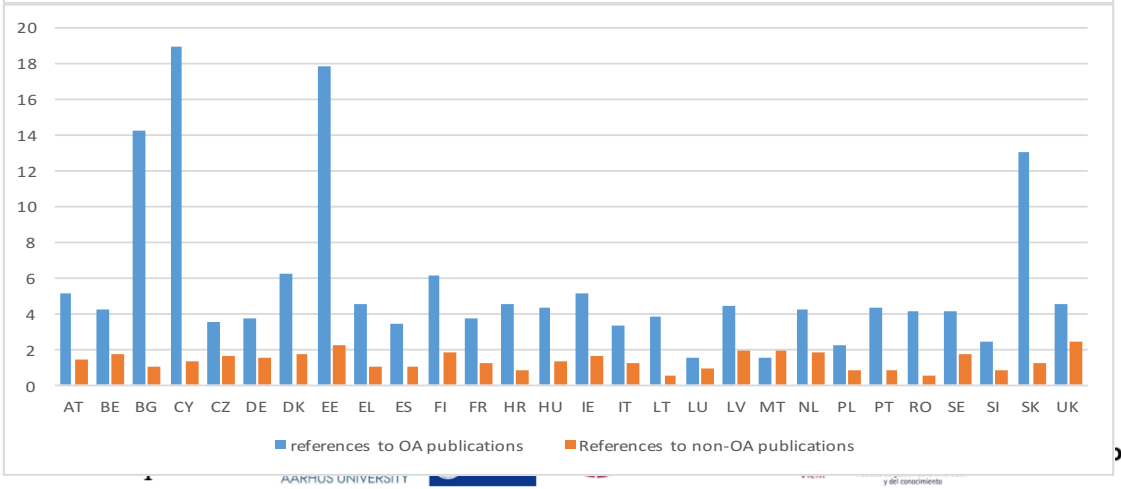
OA3 Method

- 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

technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento Fraunhofer ISI US University of Sussex UCL HELLENIC REPUBLIC National and Kapodistrian University of Athens

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.

University of Sussex

UCL

HELLENIC REPUBLIC
National and Kapodistrian University of Athens

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:

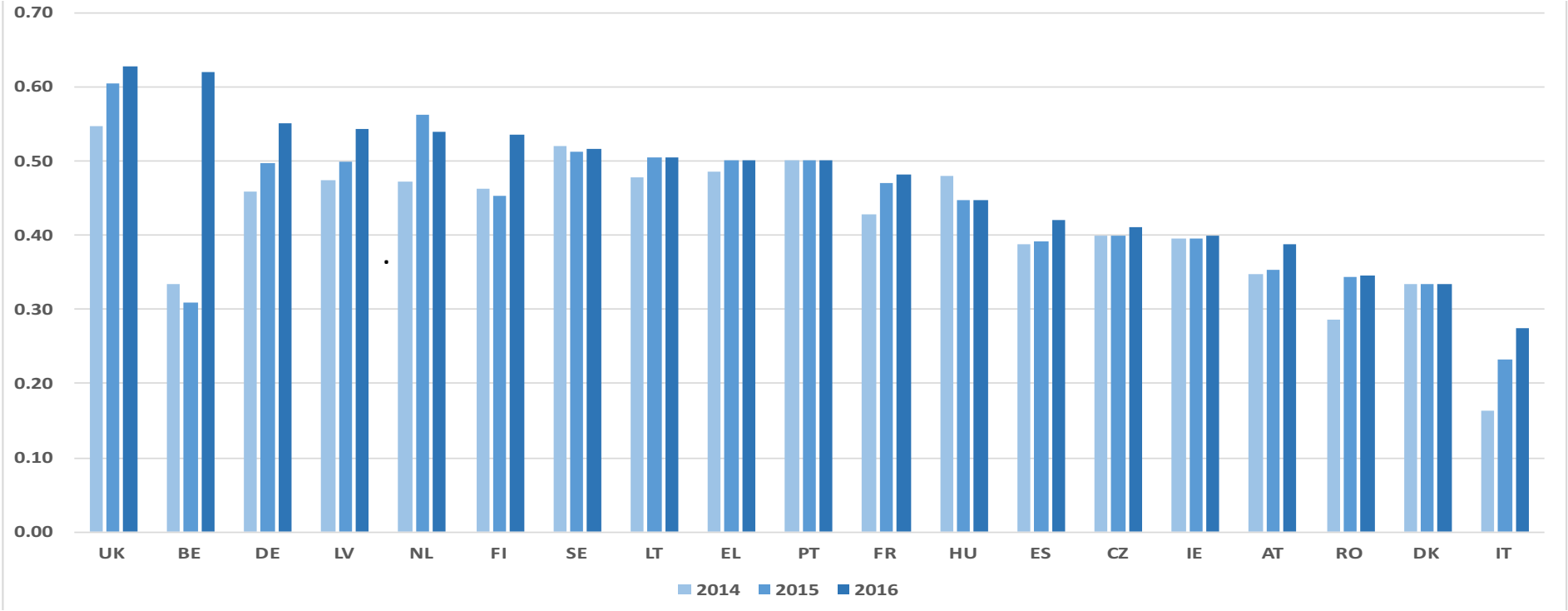
- Repositories are provided by your institution/ by departments?

(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.

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien / Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

OA6 Support structures and incentives in HEI/RPO



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.

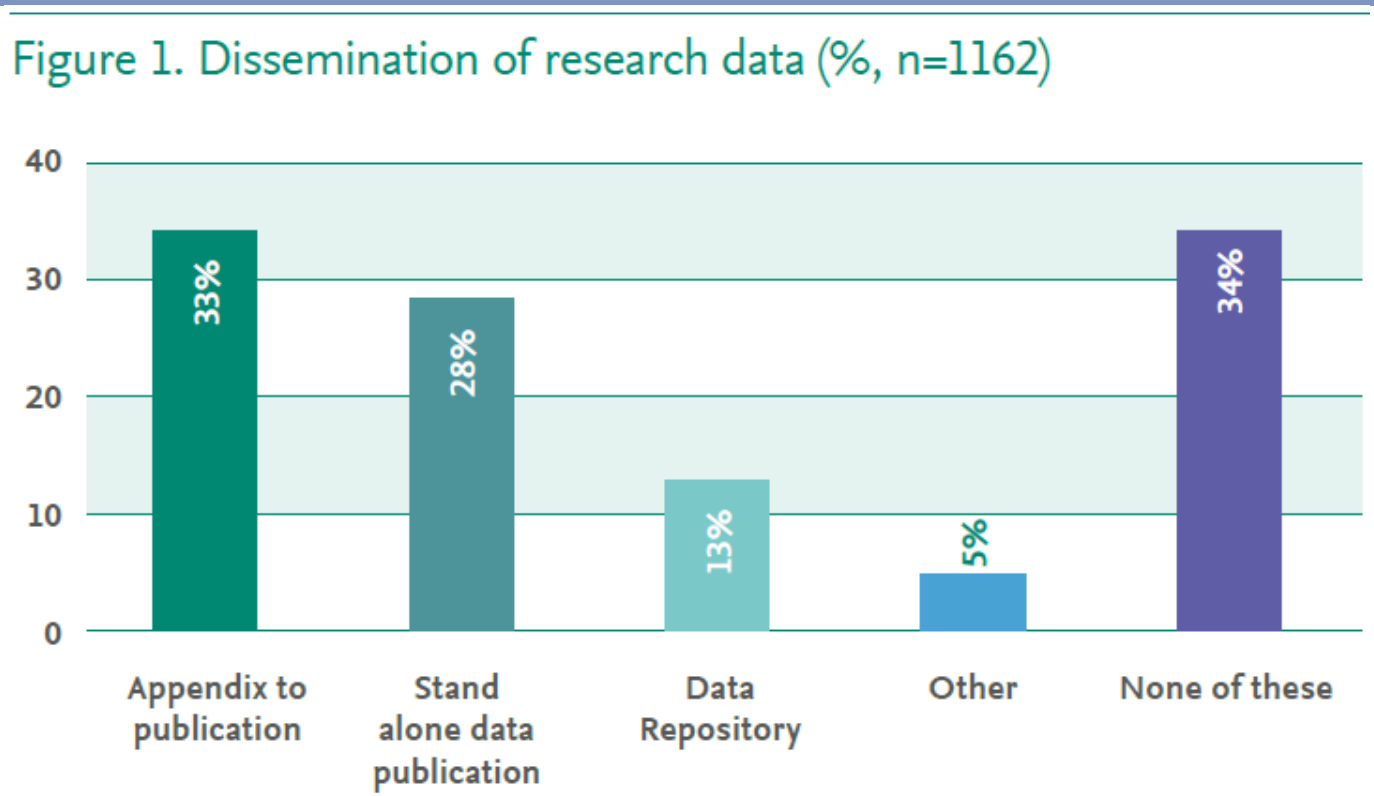
Insights from bibliometric data
Articles and their citations in data journals

JOURNAL	APPROX. NO. OF ARTICLES	NO. OF CITATIONS
Data in Brief (Elsevier)	1200	433
Biodiversity Data Journal (Pensoft)	400	187
Scientific Data (Springer Nature)	250	786
Journal of Open Psychology Data (Ubiquity Press)	60	16
Geoscience Data Journal (John Wiley and Sons)	30	98
Dataset Papers in Science (Hindawi)	20	21
Journal of Open Archaeology Data (Ubiquity Press)	20	5
Open Health Data (Ubiquity Press)	20	5
Open Journal of Bioresources (Ubiquity Press)	15	8

YEAR	NO. OF CITATIONS
2012	3
2013	1
2014	50
2015	425
2016	1028

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

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?

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

Assessment of OA indicators

OA1			
OA2 (DROPPED)		-	
OA3			
OA4			
OA5		*no validation conducted*	
OA6			

- 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 ion 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 then 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.

Monitoring the Evolution and Benefits of Responsible Research and Innovation - MoRRI

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

"Expert Group on Policy Indicators for Responsible Research and Innovation" (2015)

discouraged

"the widespread use of simple quantitative indicators of the number of ethical issues declared, the percentage of projects that undergo ethical review, etc..

(Expert Group on Policy Indicators for Responsible Research and Innovation (2015): Indicators for Promoting and Monitoring Responsible Research and Innovation. Report from the Expert Group on Policy Indicators for Responsible Research and Innovation. Brussels, 2015. http://ec.europa.eu/research/swafs/pdf/pub_rri/rri_indicators_final_version.pdf (14.9.2017)

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?)

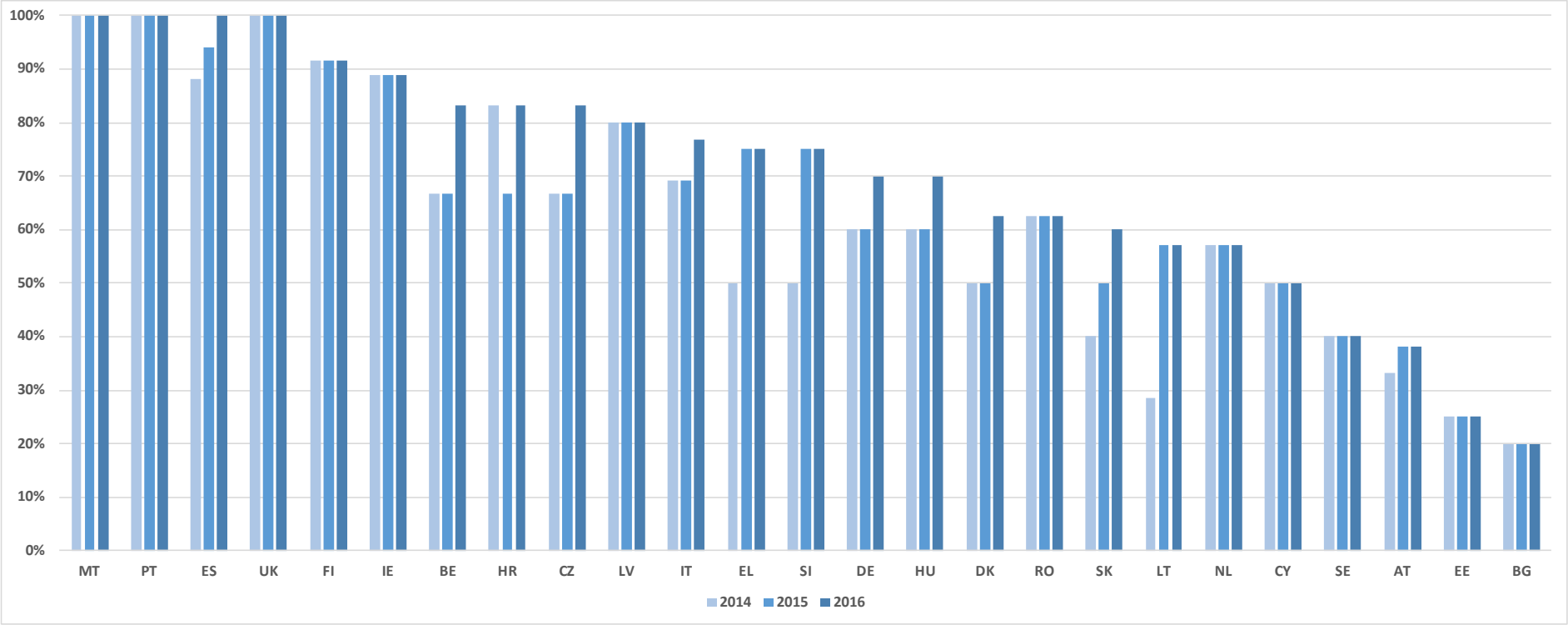
Ethics

Number	Name of indicator	Note
E1a	Ethics at the level of higher education institutions and public research organisations	Data available for 2014, 2015, 2016. Composite index based on HEI and PRO surveys of MoRRI consortium, 2017.
E1b	Ethics at the level of higher education institutions and public research organisations (composite indicator)	Data available for 2014, 2015, 2016. Composite index based on HEI and PRO surveys of MoRRI consortium, 2017.
E2	National ethics committees index	Unchanged indicator based on EPOCH (2012).
E3a	Research-funding organisations index	Data available for 2014, 2015, 2016. Composite index based on RFO survey of MoRRI consortium, 2017.
E3b	Research-funding organisations index (composite indicator)	Data available for 2014, 2015, 2016. Composite index based on RFO survey of MoRRI consortium, 2017.

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?

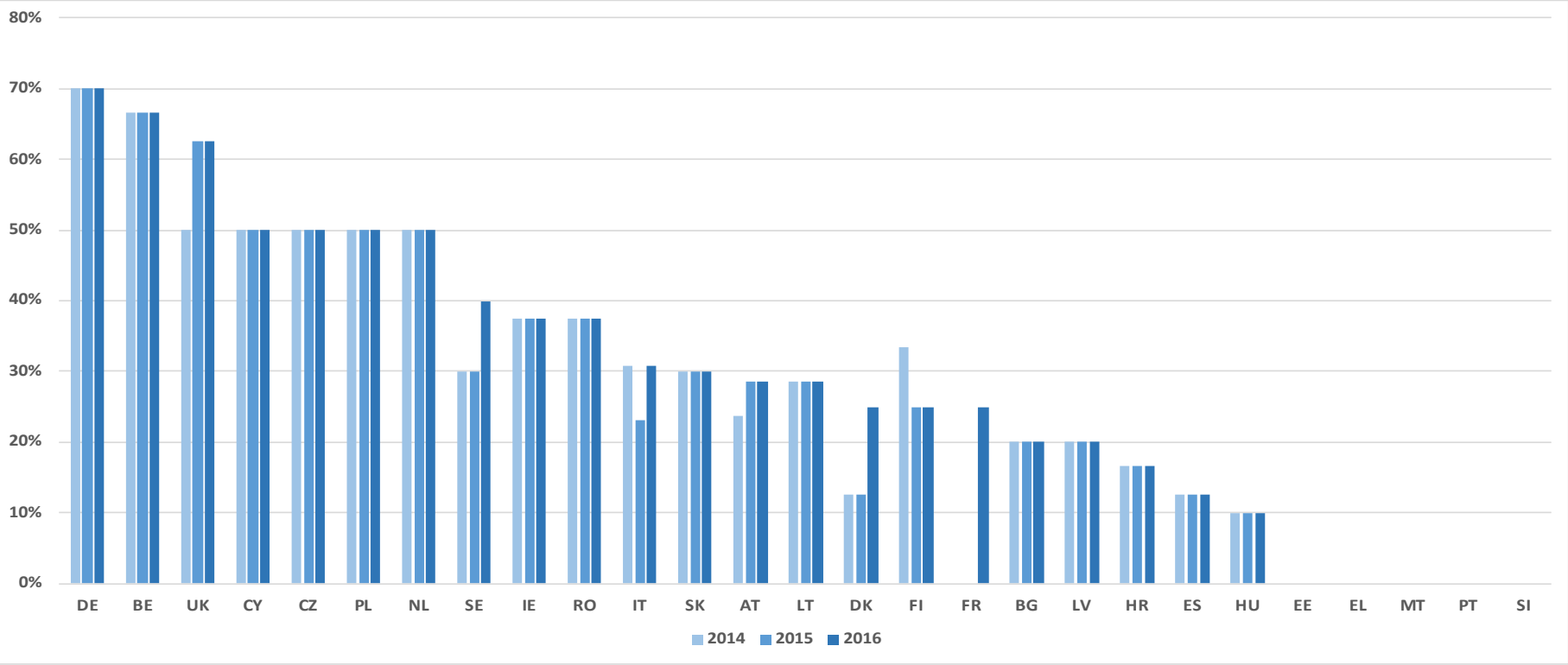
Share of higher education institutions having a research ethics committee



Source: HEI Survey, MoRRI, 2017.

Note: No data for LU. FR and PL's response rate too low.

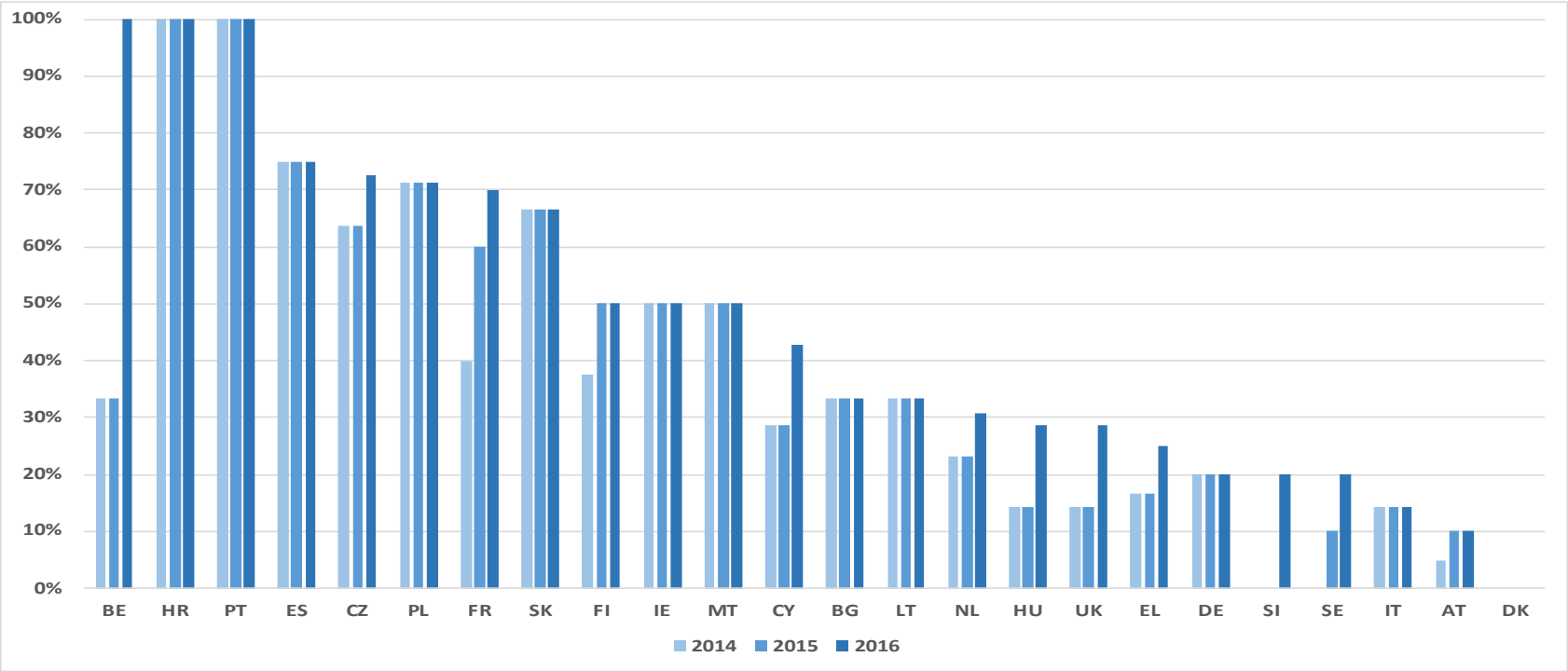
Share of higher education institutions having a research integrity office



Source: HEI Survey, MoRRI, 2017.

Note: No data for LU. FR and PL's response rate too low.

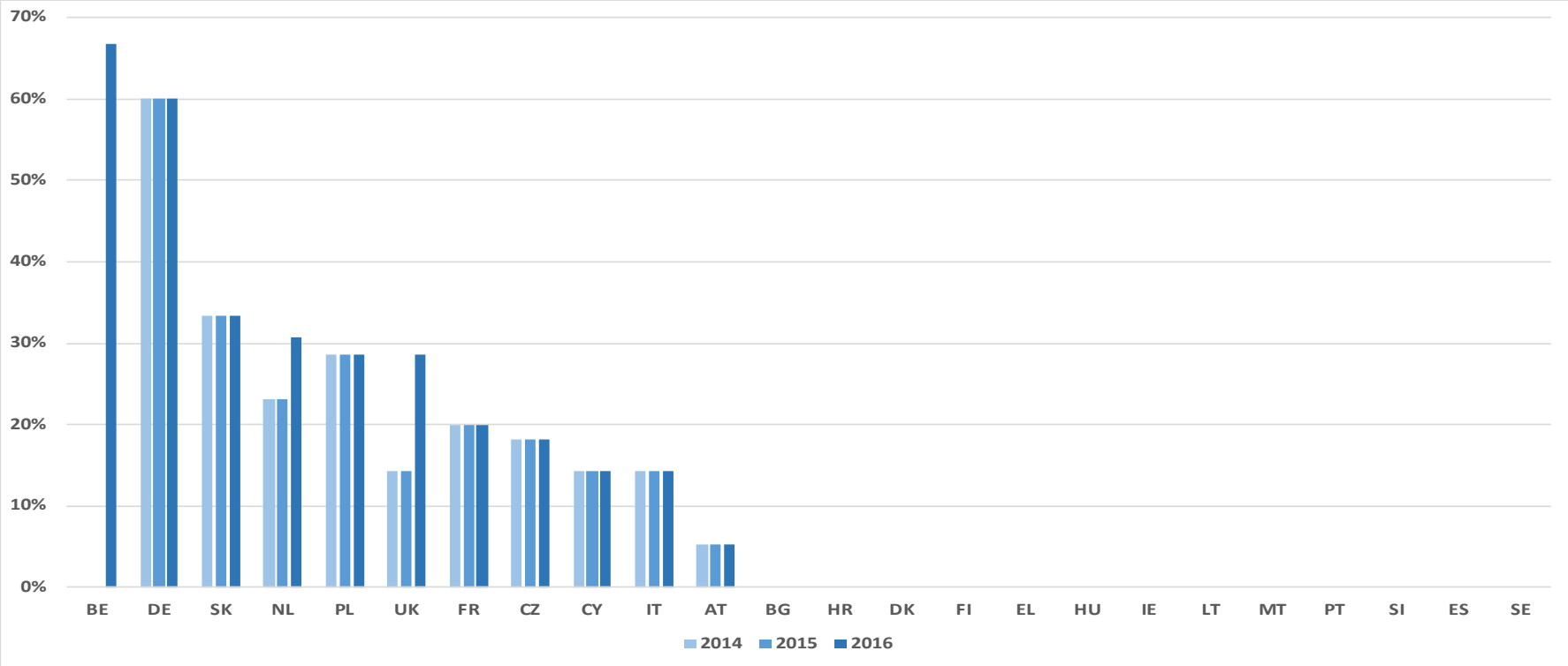
Share of public research organisations having a research ethics committee



Source: PRO Survey, MoRRI, 2017.

Note: No data for LU. LV and RO's response rate too low.

Share of public research organisations having a research integrity office



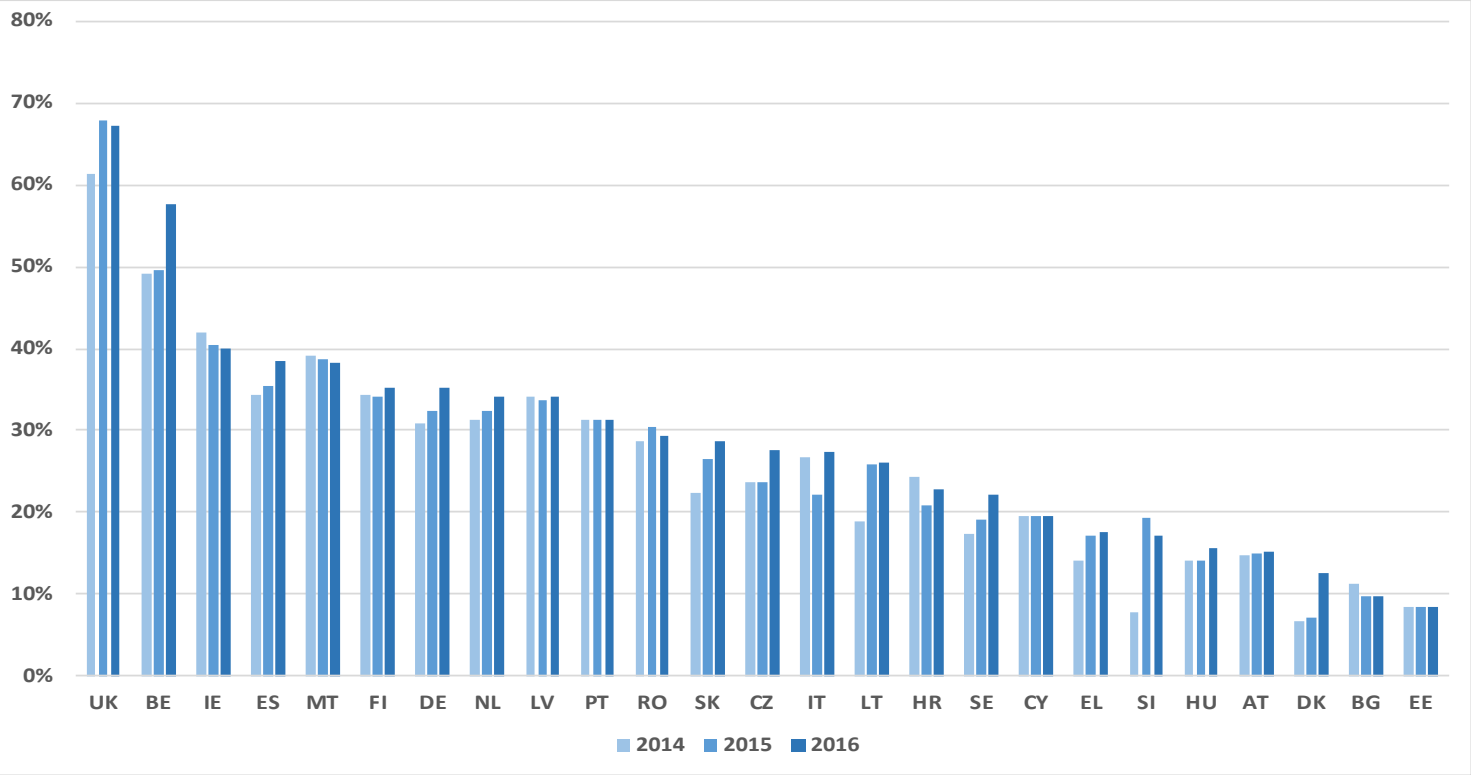
Source: PRO Survey, MoRRI, 2017.

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

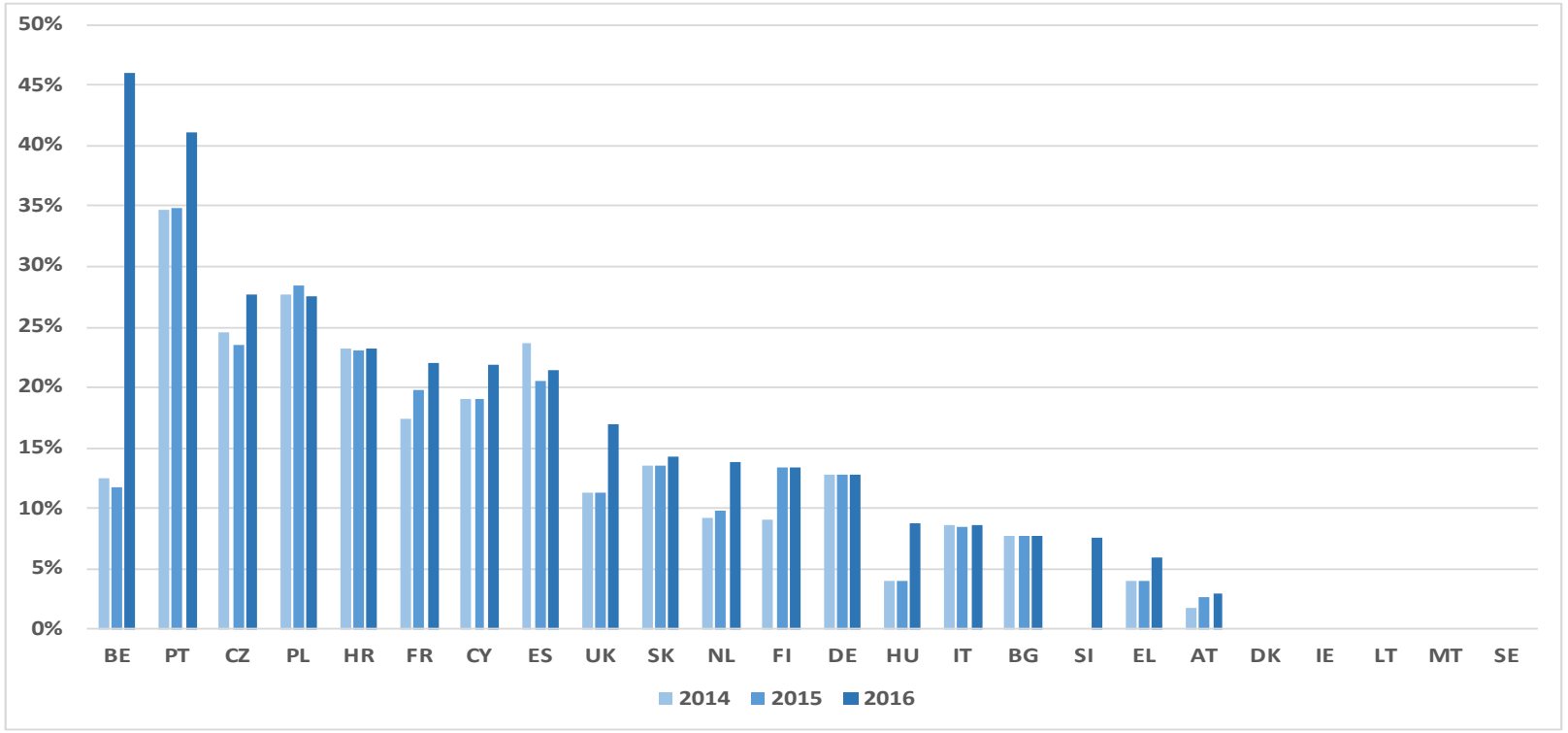
Composite index of research ethics committees/research integrity offices at higher education institutions



Source: HEI Survey, MoRRI 2017

Note: No data for LU. FR and PL's response rate too low.

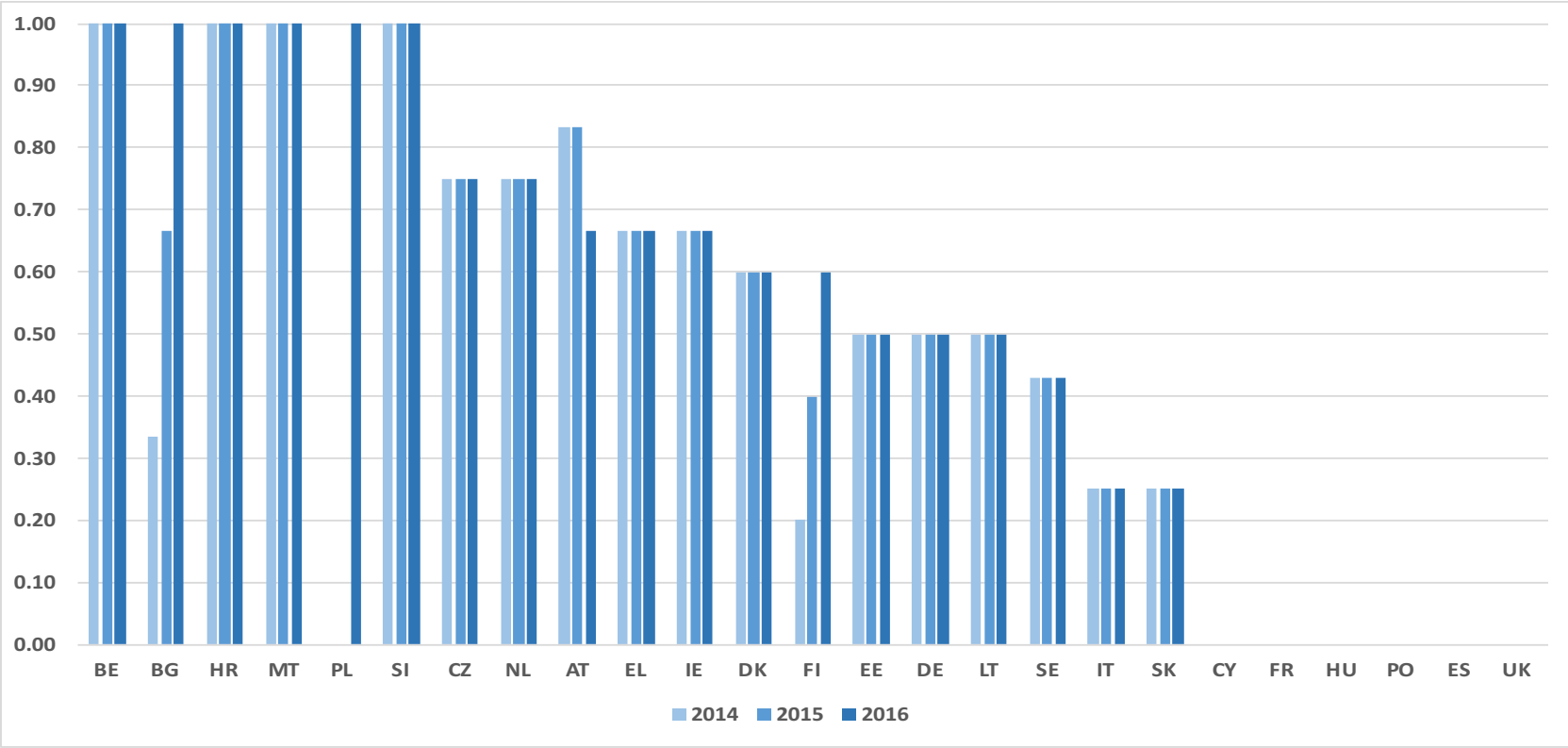
Composite index of research ethics committees/research integrity offices at public research organisations



E3a: Research-funding organisations index

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

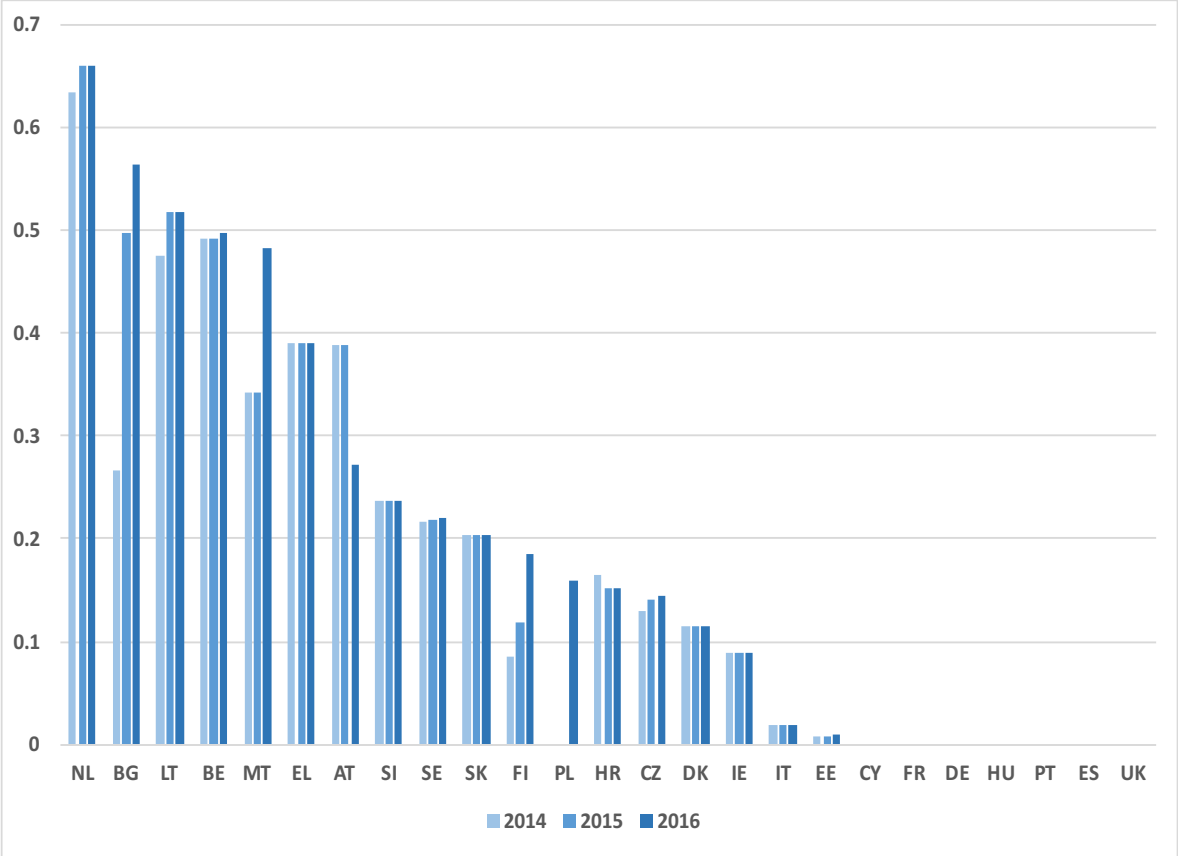
Research-funding organisations' index



E3b: Research-funding organisations' index (composite indicator)

- Has your organsation integrated any type of ethics assessment/review in its funding decisions?"
- Design
- Number of projects concerned

Composite index of research-funding organisations



technopolis|group| AARHUS UNIVERSITY Universiteit Leiden Institut für Höhere Studien Institute for Advanced Studies Vienr ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento Fraunhofer ISI US University of Sussex UCL HELLENIC REPUBLIC National and Kapodistrian University of Athens

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.

Monitoring the Evolution and Benefits of Responsible Research and Innovation - MoRRI

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.*“

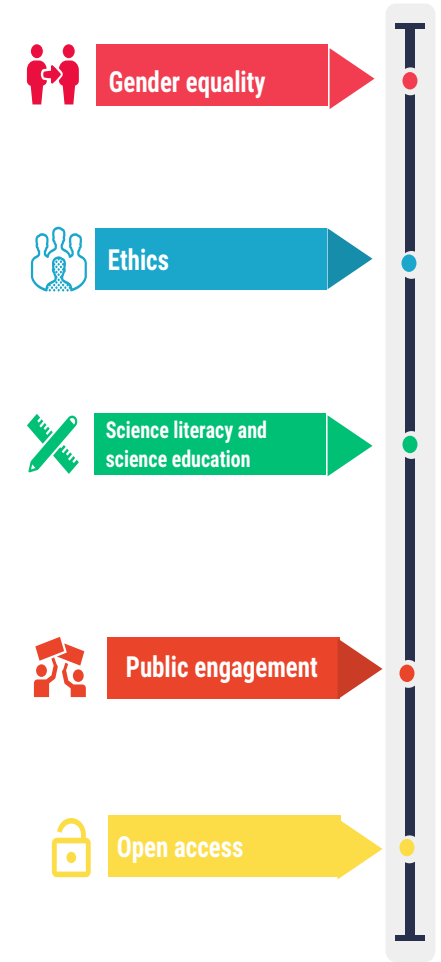
(Borrás/Edler 2014: 14).

MoRRI Indicators for Governance

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

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

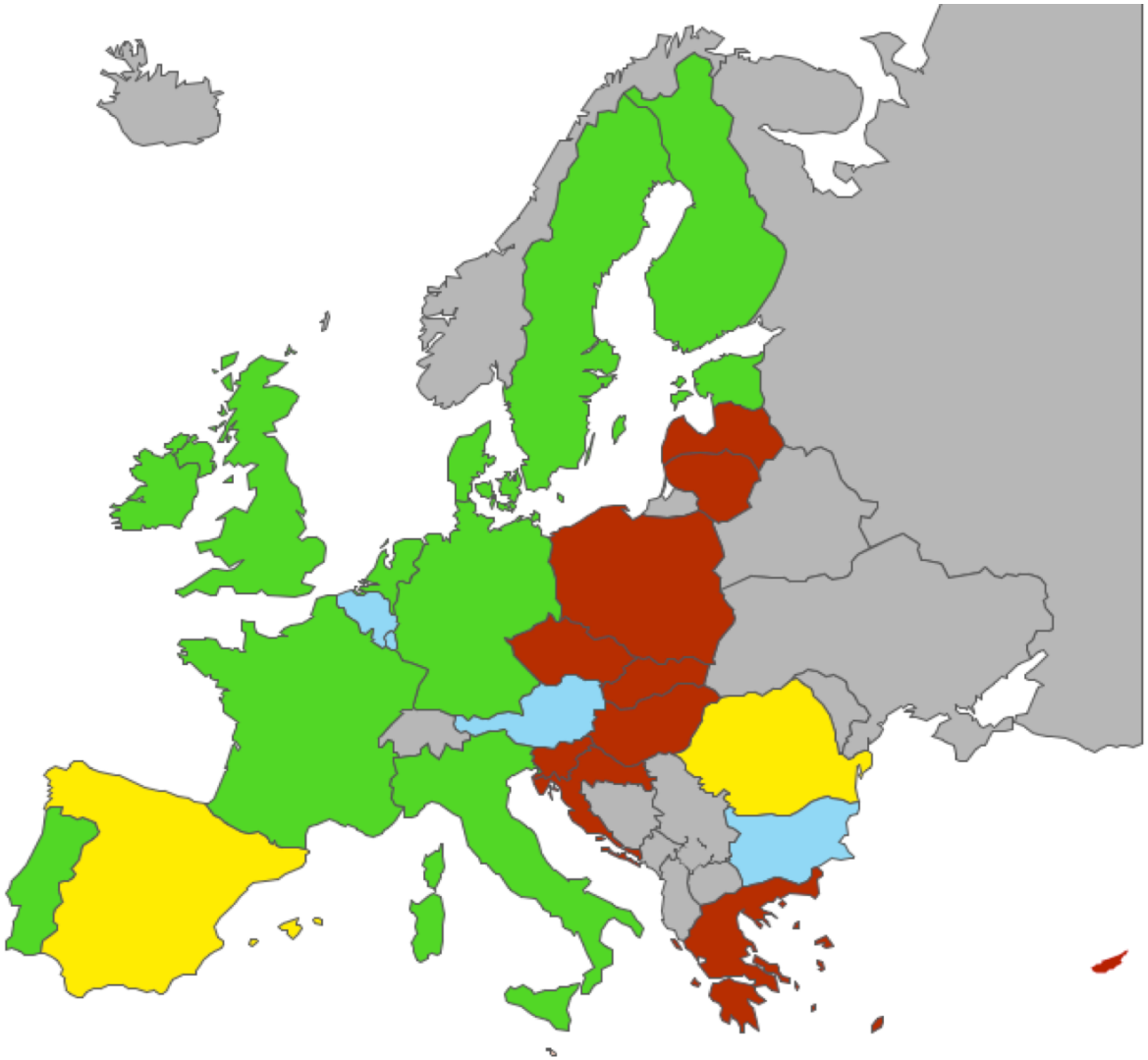
Description:

- 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 Mejlgaard et al (2012), no time series
- Replicability: possible, but a specific data collection process needs to be set up.

Indicator GOV1: Findings

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)



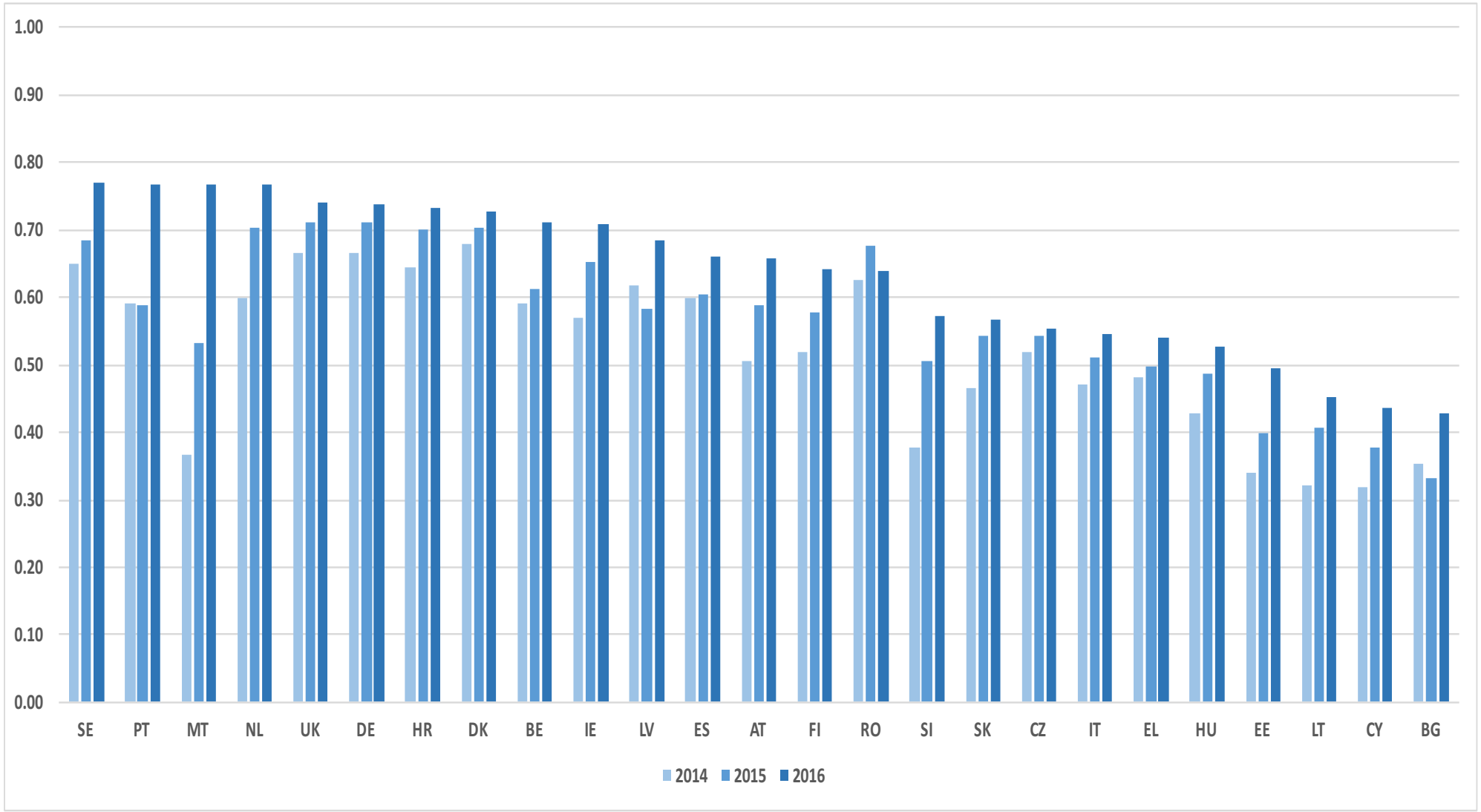
technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens

Indicator GOV2 – RRI-related governance mechanisms within RFO and HEI

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

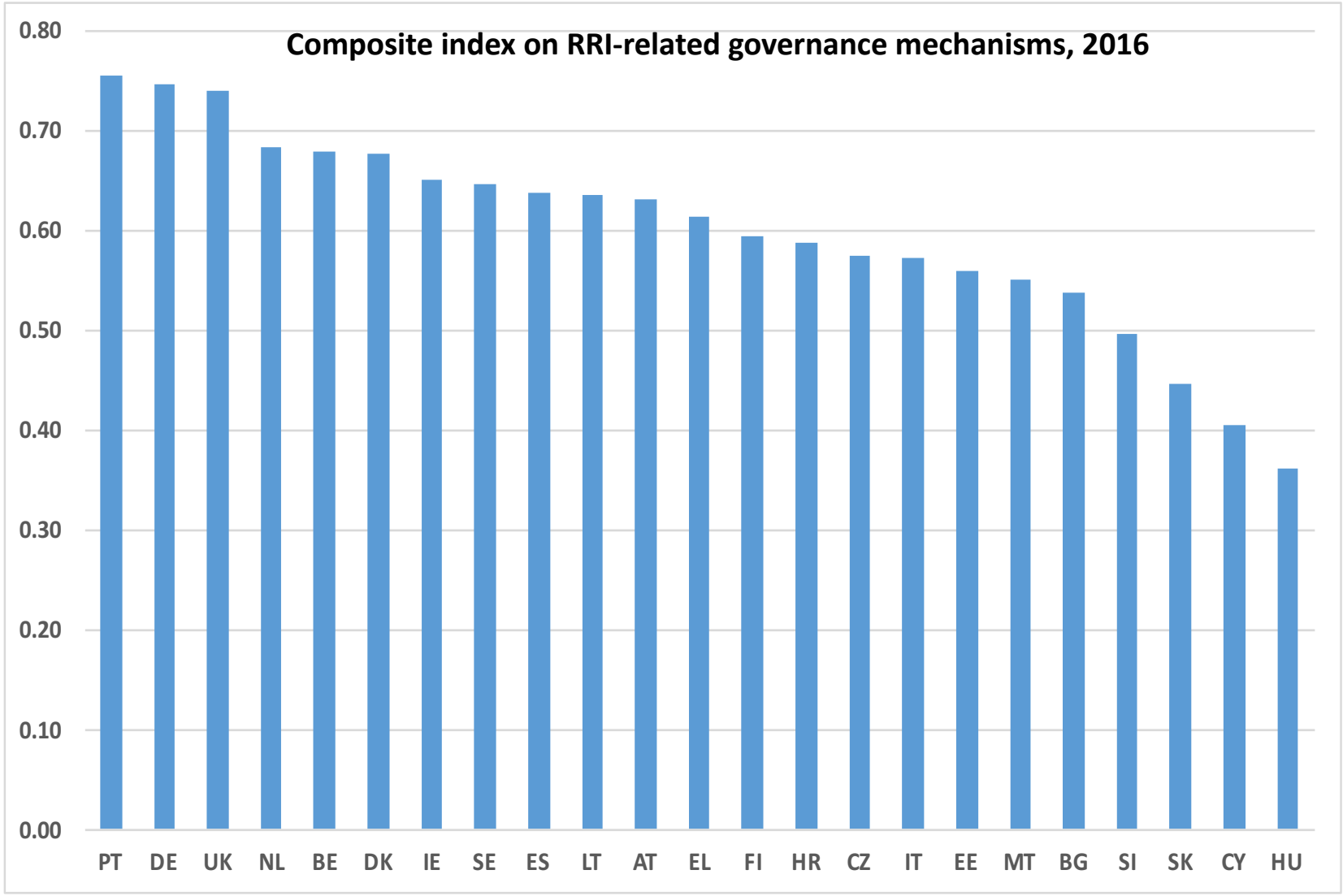
- 2016: 10 MS reached above the 0.70 mark, indicating that at least 70 % of the RPOs and RFOs had RRI-related governance mechanisms in place.
- Highest shares with above 0.70 can be found in 10 MS ranging from Sweden to Ireland. Only 4 MS score below 0.50: Estonia, Lithuania, Cyprus and Bulgaria.
- Indicator 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)

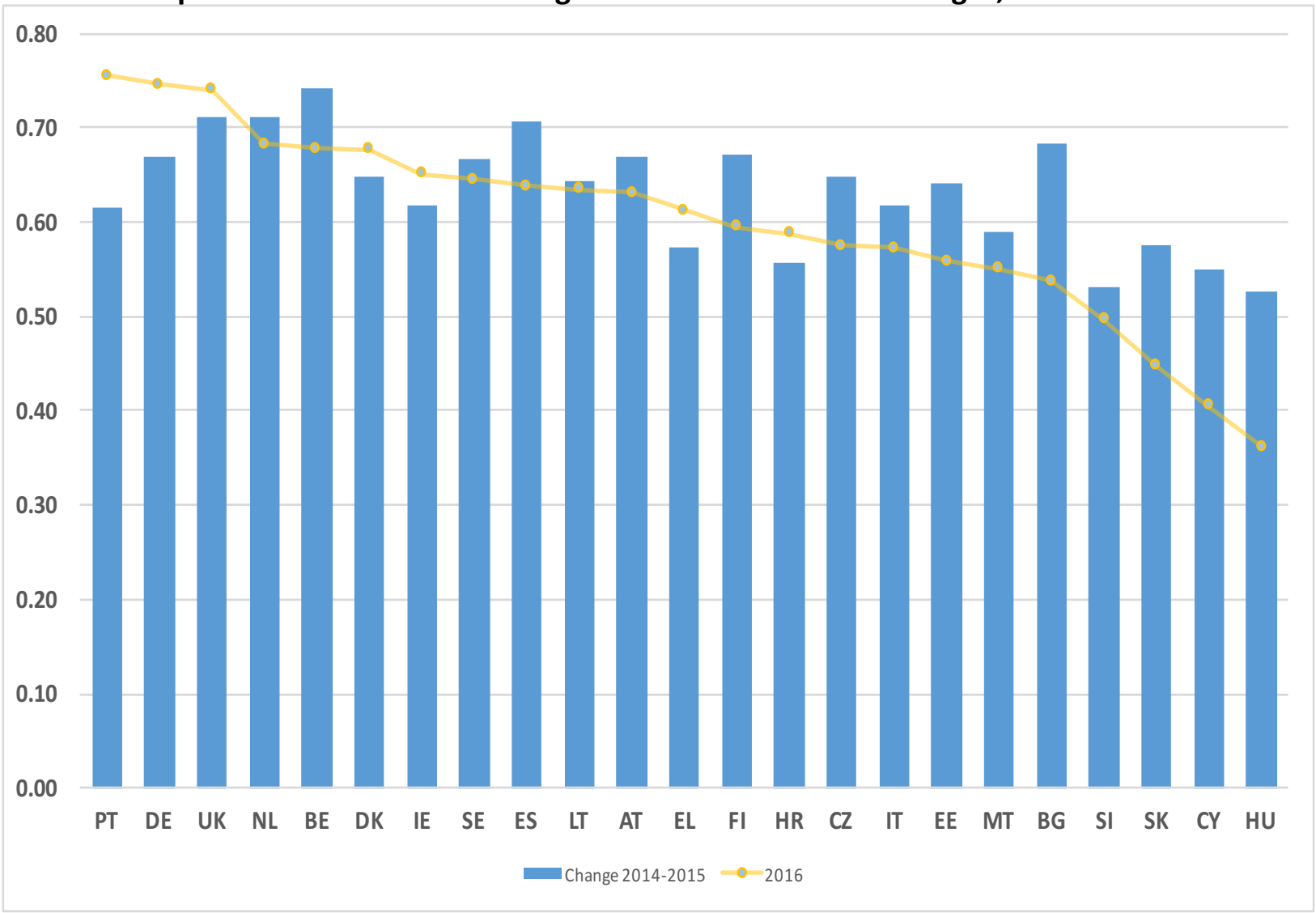
Description

- Indicator is based on the question: „Does your organisation actively encourage ethics/ citizen engagement/ openaccess 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

technopolis group | AARHUS UNIVERSITY | Universiteit Leiden | Institut für Höhere Studien Institute for Advanced Studies Vienna | ingenio CSIC-UPV | Fraunhofer ISI | University of Sussex | UCL | Hellenic Republic National and Kapodistrian University of Athens


Composite index on RRI-related governance mechanisms, 2016
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
PT
DE
UK
NL
BE
DK
IE
SE
ES
LT
AT
EL
FI
HR
CZ
IT
EE
MT
BG
SI
SK
CY
HU

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?