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Monitoring the Evolution and Benefits of Responsible Research and Innovation

The evolution of Responsible Research and Innovation – the Indicators report

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2018

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Monitoring the Evolution and Benefits of Responsible Research and Innovation

The evolution of Responsible Research and Innovation – the Indicators report

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1 Introduction

This report is one of the core outputs of the so-called MoRRI project - Monitoring the evolution and benefits of 'Responsible Research and Innovation' (RRI) - , a commissioned study by DG-RTD, which a consortium of nine partners provided between the end of 2014 and early 2018. Within this period, the different RRI dimensions of gender equality, public engagement, science literacy and science education, ethics and open access were defined, indicators identified and further refined, and data collected.

This monitoring report provides a rich set of RRI indicators that were collected either by using available data from previous collection efforts or through our own collection. The downside, however, is that not all the collected data is very recent – in particular, data from Eurobarometer and MASIS indicate a situation of 4 to 7 years ago. The project team has launched four surveys since 2016, collecting data for the years 2014 to 2016, namely: Science in society stakeholders survey (SiS survey); Research-funding organisations survey (RFO survey), Higher education institutions survey (HEI survey) and the Public research organisations (PRO) survey.

The collection effort has also seen limitations, in particular concerning 'open data' indicators. Other RRI areas such as 'ethics' and the overarching 'governance', were also rather difficult to capture. Ideas on how to overcome the challenges are put forward in the annexes. Besides the presentation of the data, the report offers an appraisal of each indicator in its methodological annex and a more detailed explanation (such as for open data) and -if appropriate – suggests alternative collection methods which in 2014 were in an infant stadium, but could be tested in future monitoring exercises.

What can we see in terms of the evolution of RRI?

Bringing together a large number of indicators provides detailed information on many aspects of the different RRI dimensions. Given the difference in terms of age of the data, not all of the previously collected data may be outdated, but our own data collection suggests that there is change: It may be slow as suggested by some gender equality indicators. In fast-moving areas such as open access, the changes are more pronounced. What we can notice in terms the pace of change is that structural data – mainly linked to human resources – tends to move rather slowly. More 'visible' year-on-year change could be seen if mandatory policy measures were introduced (e.g., a law that requires the establishment of ethical boards).

One should not forget that we aggregate at the national level, but the data is collected at the institutional level. In the absence of national initiatives, the diffusion of any given RRI dimension through the majority of research and innovation performing public institutions as well as funding bodies takes much more time. Therefore, in a number of indicators which depend on the efforts to introduce, mainstream, and live RRI at institutional level, the year-on-year changes are in general not large.

Use of data

The use of this monitoring data would in our view be predominantly at a national level. The data shows how countries perform compared to the other member states and thus can be used as information basis for discussions on policy reviews as well as new measures and instruments to foster one or more RRI dimensions. Its use at the institutional level should be much more cautious – and conscious about the limitations. While an organisation may see where the country stands, it can possibly compare its situation.

But here comes the limitation: many of the indicators provide information about formal structures – does an organisation has a committee X or does it provide structure Y. How these settings are actually supporting RRI and how they are impacting on the researchers or wider society however, is not told through this aggregated data. At institutional level, we recommend searching for good practice examples which are more telling (e.g., our case study report (Wutekich et al 2016) or the RRI tools website (https://www.rri-tools.eu/).

Structure of the report

The report is structured as following:

- Section 2 provides the overview of the indicators, including the years of coverage and the sources;
- Section 3 summarises the evolution of RRI dimensions and the RRI concept through news items on the web.
- Sections 4 to 9 are the main part. They provide the overviews by individual dimension and indicators. The situation in the latest available year is explained and where more than one year is available, the evolution is described.

The Annexes provide all the background concerning our data collection and individual indicator appraisals.

2 Overview of the indicators

RRI dimension	Indicator code	Indicator title	Year(s)	Source
Gender equality	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
	- SLSE4.1	Organisational memberships in ECSA	2015, 2016	ESCA
	- SLSE4.2	Citizen science publications	2015, 2016	Scopus
Public engagement	PE1	Models of public involvement in science and technology decision-making	2012	MASIS

RRI dimension	Indicator code	Indicator title	Year(s)	Source
	PE2	Policy-oriented engagement with science	2010	Eurobarometer
	PE3	Citizen preferences for active participation in science and technology decision-making	2013	Eurobarometer
	PE4	Active information search about controversial technologies	2010	Eurobarometer
	PE5	Public engagement performance mechanisms at the level of research-performing organisations	2014-2016	HEI, PRO surveys
	PE6	Dedicated resources for public engagement		Not available. Results from HEI and PRO surveys (MoRRI, 2017) inconsistent.
	PE7	Embedment of public engagement activities in the funding structure of key public research-funding agencies	2014-2016	RFO survey
	PE8	Public engagement elements as evaluative criteria in research proposal evaluations	2014-2016	RFO survey
	PE9	Research and innovation democratisation index	2016	SiS survey
	PE10	National infrastructure for involvement of citizens and societal actors in research and innovation	2016	SiS survey
Open access	OA1	Open access literature	2010, 2016	DOAJ list, PMC, the ROAD list, CrossRef, and OpenAIRE
	- OA1.1	Share of Open Access publications	2010, 2016	DOAJ list, PMC, the ROAD list, CrossRef, and OpenAIRE
	- OA1.2	Citation scores for OA publications	2010-2014	DOAJ list, PMC, the ROAD list, CrossRef, and OpenAIRE
	OA2	Data publications and citations		The information lacks credibility. The indicator is omitted (see Annex 2).
	OA3	Social media outreach/take up of open access literature	2012-2015	WoS and Altmetric.com
	- OA3.1	Ratio of OA and non-OA publications used in Twitter	2012-2015	WoS and Altmetric.com. Limited to publications
	- OA3.2	Ratio of OA and non-OA publications used in Wikipedia	2012-2015	WoS and Altmetric.com. Limited to publications
	OA4	Public perception of open access	2013	Eurobarometer
	OA5	Funder mandates	2011	DG-RTD
	OA6	Research-performing organisations' support structures for researchers as regards incentives and barriers for data sharing	2014-2016	HEI, PRO surveys

RRI dimension	Indicator code	Indicator title	Year(s)	Source
Ethics	E1a	Ethics at the level of research-performing organisations	2014-2016	HEI, PRO surveys
	E1b	Ethics at the level of research-performing organisations (composite indicator)	2014-2016	HEI, PRO surveys
	E2	National ethics committees index	2012	EPOCH
	E3a	Research-funding organisations index	2014-2016	RFO survey
	E3b	Research-funding organisations index (composite indicator)	2014-2016	RFO survey
Governance	GOV1	Use of science in policy making	2012	MASIS
	GOV2	RRI-related governance mechanisms within research-funding and performing organisations	2014-2016	RFO, HEI, PRO surveys
	GOV3	RRI-related governance mechanisms within research-funding and performing organisations – composite index	2014-2016	RFO, HEI, PRO surveys

3 RRI in the public sphere[1]

While the concept of 'responsible research and innovation' originates from the European Commission's Directorate-General for Research and Innovation (DG RTD), in particular during the Horizon 2020 (H2020) Framework Programme (2013-2020), we were interested to see if this concept, which is pushed through the Framework Programme (FP) priority and relevant funding, diffuses beyond the FP-funded community.

How, then, has the RRI concept evolved? In order to analyse its societal uptake, we used a media intelligence tool, allowing us to analyse millions of public news items for the term 'responsible research and innovation'. According to Figure 1, the term first appeared in 2011. In 2011 and 2012, the news items were predominantly about the relevant FP calls or mentioned in the context of developments under H2020. Already in 2012, the term appeared within ongoing research, for example on Communicating nano-ethics (nanowerk.com) and a Synthetic Biology Roadmap (EPSRC, UK). In 2013, the first funded FP projects (NanoDiode, Res-AgorA, etc.) as well as the special Eurobarometer results were published.

In 2014, there were a number of workshops and conferences dealing with RRI (e.g. in Estonia, Switzerland, Italy and the Netherlands – the latter during the Dutch presidency). RRI was also discussed in the daily news: 'Beyond Naughty or Nice: Defence research and responsible innovation' (*The Guardian*, UK). In Germany, the visibility of RRI was particularly increased due by attempts by the Fraunhofer Society and its establishment of a dedicated research group and a design competition. In Spain, RRI was taken up for example by universities, now trying to 'collect all science dissemination activities' in order 'for getting closer to society' (University of Barcelona). FP-funded RRI projects were making themselves and the concept visible, for example in science nights (Florence, Italy) or dedicated workshops that received wider attention (NERRI: Neuro-Enhancement Responsible Research and Innovation), and also from legal and medically oriented news.

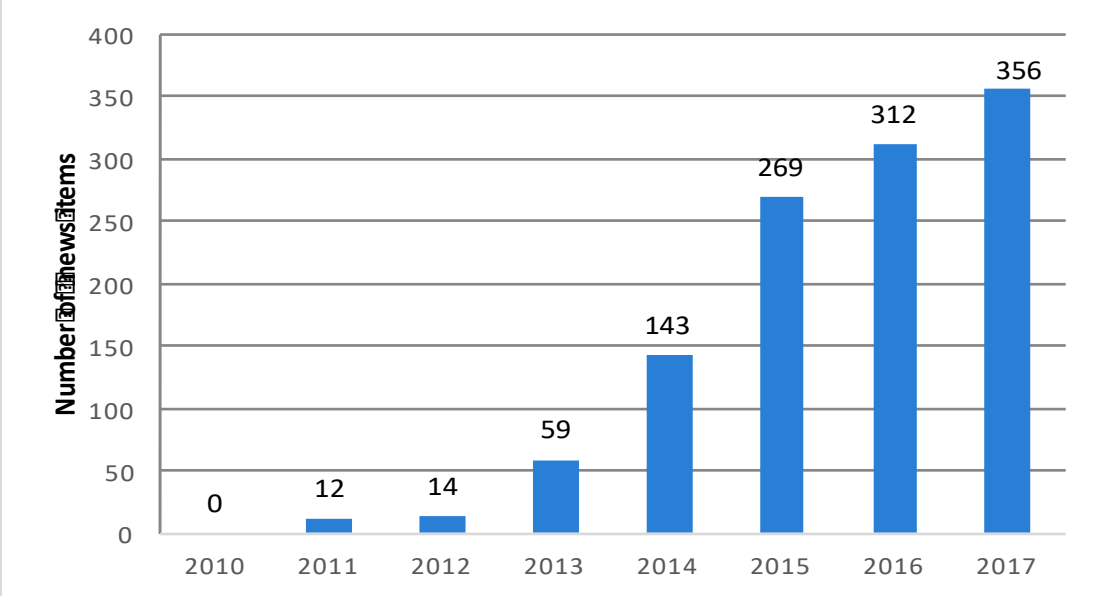
The concept was also diffusing beyond Europe. In 2014, the first Asia Pacific Responsible Business Innovation Workshop was organised by the University Malaysia Sarawak, a partner of one of the earlier RRI projects, in 2015, Australian debated about RRI in the context of 'Big questions about risk assessment of nanomaterials', and in the USA 'NASA considers public values in its Asteroid Initiative' – pointing toward the RRI concept.

By 2014/2015, RRI moved beyond workshops and conferences to actions. For example, in 2015, six European foundations introduced the European Foundations Award for Responsible Research & Innovation. The Austrian Science Fund FWF signed a Memorandum of Understanding on RRI in order to foster the dialogue between science and society, and the country began the alliance of Austrian research organisations, forming a competence network of science cultures and centres for citizen engagement.

An interesting aspect about the FP-funded RRI projects is that through workshops and the inclusion of good practices and MS examples, the concept is further diffused and 'marketed' widely. Several reflections on and actions about science and innovation policies refer to RRI. The nature of the content of an increasing number of news items suggests that individual research organisations – performers as well as funding bodies – but also the private sector reflects and develops concepts to make use of the RRI concept.

[1] This section is based on using the Meltwater.com media-monitoring platform. It uses and analyses data outside company firewalls and can thus provide insights if terms (such as RRI) are used in media coverage, blogs, etc. Here we use it primarily to show if the RRI concept is diffusing beyond the FP sphere.

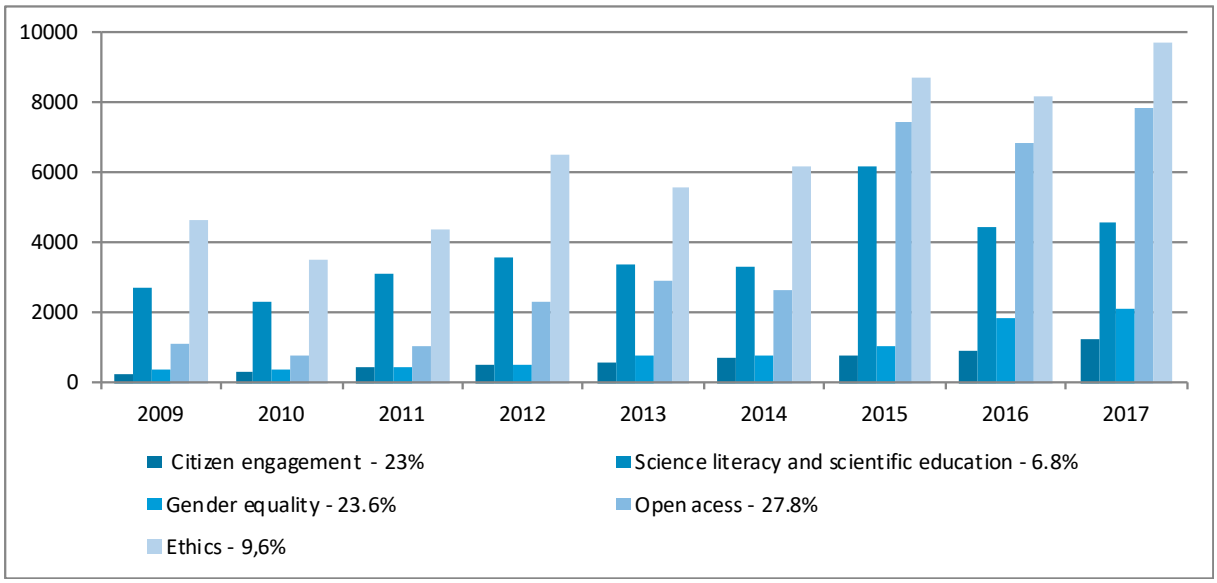
Figure 1 Evolution of the term 'responsible research and innovation' in news items



Source: Technopolis Group; Data: Meltwater.
Note: search in 'all sources', Meltwater news section.

The searches for the other dimensions were done in all EU-member state (MS) languages in combination to find 'research' or 'innovation' in proximity (near 5 or near 10), meaning that for example 'ethic' or 'ethics' needed to appear with 'research' or 'innovation' with a maximum of five words in-between. This limits the unwanted hits ('noise') since for example 'open access' is a key term in information and communication technologies[2].

Figure 2 Evolution of the RRI dimensions based on news items, 2009-2017

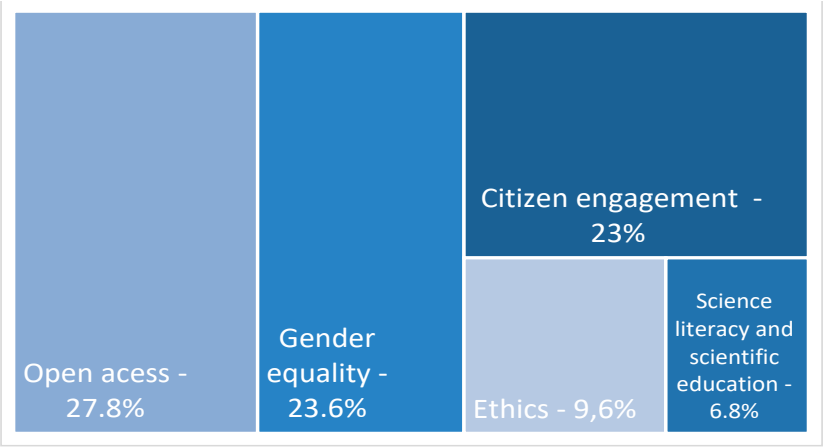


Source: Meltwater; Calculations: Technopolis Group.
Note: the search was limited to European sources.

The individual RRI dimensions were in the news before the concept was further diffused and promoted through FP7. While all the dimensions grew, some grew more than others. The highest growth can be seen for 'open access' followed by 'gender equality' and 'citizen engagement'. The lowest growth can be recorded for 'ethics' and science literacy and scientific education (SLSE) (see Figure 3).

[2] See Annex 6 for the search keys.

Figure 3 Average annual growth of RRI dimensions, 2009-2017



Source: Meltwater; Calculations: Technopolis Group.

4 Gender equality

Gender equality is defined as a three-dimensional construct whereby gender equality is reached when:

- women and men are equally represented in all disciplines and at all hierarchical levels;
- gendered barriers are abolished so that women and men can develop their potential equally;
- when the gender dimension is considered in all research and innovation activities.

The following indicators (with breakdowns) are included:

Number	Name of indicator	Note
GE1	Share of research-performing organisations with gender equality plans	Data available for 2014, 2015, 2016. Indicator based on HEI and PRO surveys of MoRRI consortium, 2017.
GE2	Share of female researcher by sector	Data available until 2014, Source: Eurostat.
- GE2.1	Share of female researchers - all sectors	
- GE2.2	Share of female researchers - business enterprise sector	
- GE2.3	Share of female researchers - government sector	
- GE2.4	Share of female researchers - higher education sector	
GE3	Share of research-funding organisations promoting gender content in research	Data available for 2014, 2015, 2016. Indicator based on RFO survey of MoRRI consortium, 2017.
GE4	Dissimilarity index	Data available for 2009, 2012. Source: She Figures, 2015.
- GE4.1	Dissimilarity index : higher education sector	
- GE4.2	Dissimilarity index : Government sector	
GE5	Share of research-performing organisations with policies to promote gender in research content	Data available for 2014, 2015, 2016. Indicator based on HEI and PRO surveys of MoRRI consortium, 2017.
GE6	Glass ceiling index	Data available for 2010, 2013. Source: She Figures, 2015.
GE7	Gender wage gap	Data available for 2010, 2014. Source: Eurostat.
- GE7.1	Gender wage gap - academic professions	
- GE7.2	Gender wage gap - technicians and associate professionals	
GE8	Share of female heads of research-performing organisations	Data available for 2014, 2015, 2016. Indicator based on HEI and PRO surveys of MoRRI consortium, 2017.
GE9	Share of gender-balanced recruitment committees at research-performing organisations	Data available for 2014, 2015, 2016. Composite indicator based on HEI and PRO surveys of MoRRI consortium, 2017.
GE10	Share of female authors and inventors	Available years: 2005, 2014, Sources: Scopus, Patstat.
- GE10.1	Share of female authors	Source : Scopus
- GE10.2	Share of female inventors	Source : Patstat

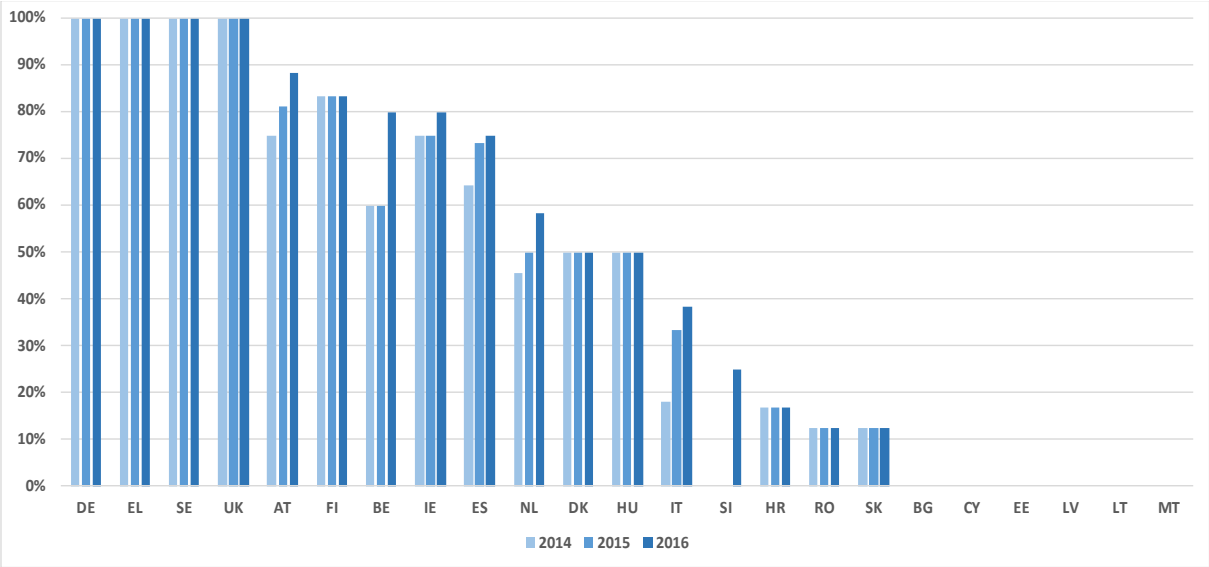
4.1 GE1 - Share of research-performing organisations with gender equality plans

The indicator

GE1 measures institutional engagement in gender equality work. The existence of a gender equality plan (GEP) indicates institutionalised activities for gender equality. A GEP is a consistent set of provisions and actions aimed at ensuring gender equality. The indicator is based on one question in the HEI survey (MoRRI, 2017), namely: 'Does your organisation have a gender equality plan?'

Outcomes

Figure 4 Share of higher education institutions with gender equality plans



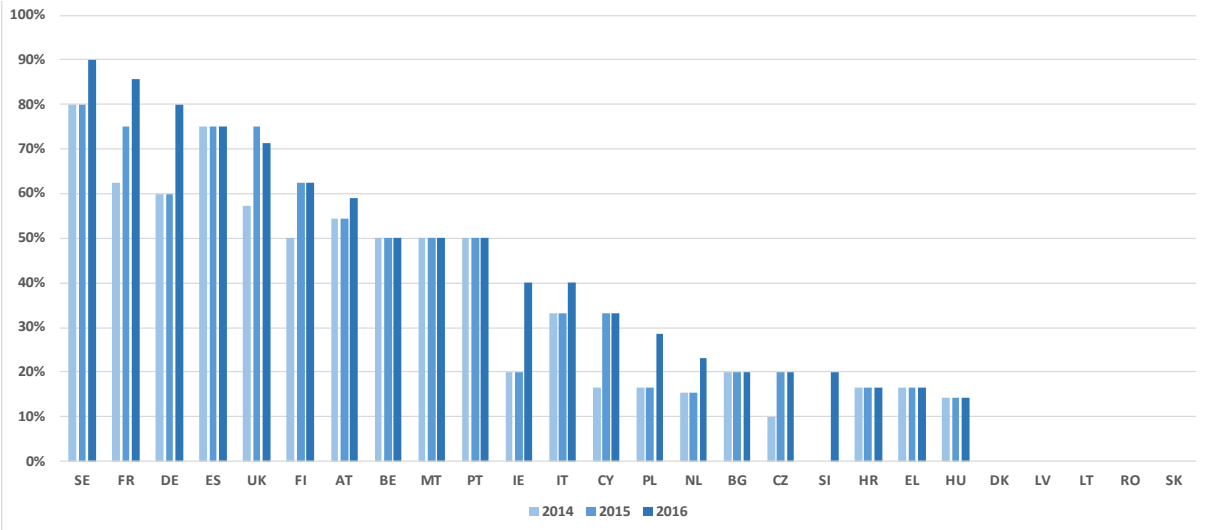
Source: HEI survey, MoRRI, 2017.
Note: Insufficient number of responses for CZ, FR, LU, PL, PT (see Annexes 4 and 5). In the case of FR, 0.75 of responding HEIs reported that they did have gender equality plans in 2016. Respondents for CZ, PL and PT reported not having gender equality plans in any year. No respondents for LU.

Within the EU, respondent higher education institutions (HEIs) in 6 member states reported not having gender equality plans (Bulgaria, Cyprus, Estonia, Latvia, Lithuania, Malta). A group of 4 MS (Germany, Greece, Sweden, United Kingdom) perform particularly strongly on this indicator across the 3-year monitoring period. A second group of 5 MS also perform strongly, while the Netherlands, Denmark, Hungary and Italy are also making progress on this measure according to the currently available data. The remaining member states have made a start in establishing gender equality plans. For those MS with variation in the data across the period, the trend is positive in all cases. Higher response rates that allow for more complete information will improve the quality of this indicator in the future.

Within the EU, respondent public research organisations (PROs) in 4 member states reported not having gender equality plans (Latvia, Lithuania, Romania, Slovakia). A group of 5 member states (Sweden, France, Germany, Spain, United Kingdom) perform particularly strongly on this indicator across the 3-year monitoring period. A second group of countries of 5 MS (Finland, Austria, Belgium, Malta, Portugal) also perform strongly, while most of the other member states are also making progress on this measure at lower levels.

Many member states show a positive change in this indicator, suggesting the ongoing implementation of gender equality plans in PROs across Europe. Once again, achieving higher response rates will allow for more complete information and improve the quality of this indicator in the future. However, the current results are very encouraging in the PRO sector.

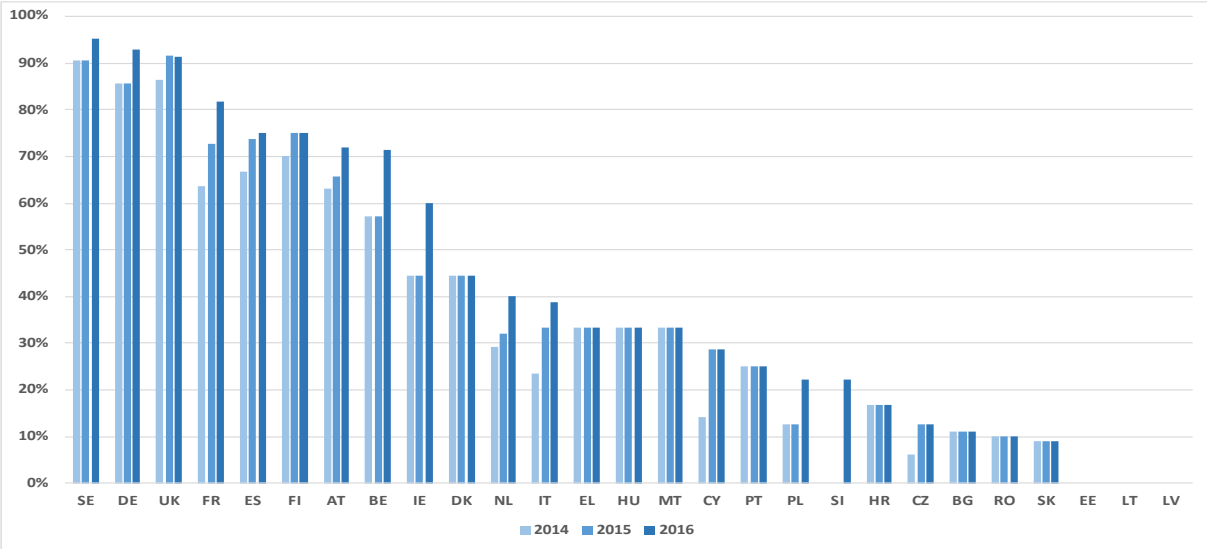
Figure 5 Share of public research organisations with gender equality plans



Source: PRO survey, MoRRI, 2017.
Note: Insufficient number of responses for EE and LU (see Annexes 4 and 5).

The combined results for HEIs and PROs show the consistently strong outcomes on this indicator for gender equality plans (GEPs) across different types of public sector organisations in Sweden, Germany and the United Kingdom. The result for France also appears strong, although only relatively small numbers of organisations responded to the HEI and PRO surveys in France. At the other end of the scale, respondents from the Baltic member states did not report the use of gender equality plans.

Figure 6 GE1 - Share of HEIs and PROs with gender equality plans



Source: HEI and PRO surveys, MoRRI, 2017.
Note: Insufficient number of responses for LU (see Annexes 4 and 5).

Evolution

A 3-year series only allows for a limited insight into the evolution of this indicator, given that introducing policy and process changes to allow for the establishment and use of GEPs can take significant time. Nevertheless, the results for this indicator are very encouraging in terms of the observable changes. Improving scores on this indicator are observable for 15 member states and a further 9 member states report stable results across the 3-year series. There is no evidence of reduction in the indicator in any member state. Also encouraging is that all the MS that perform well on this indicator continue to improve, as do many of the MS that are in the mid-range in terms of performance. Overall improvement on this indicator in the future may well be driven by the increased use of GEPs in those member states where they are in use in some organisations, but they have not become widespread, such as in Greece, Hungary, Malta, Portugal, Croatia, Bulgaria, Romania and Slovakia.

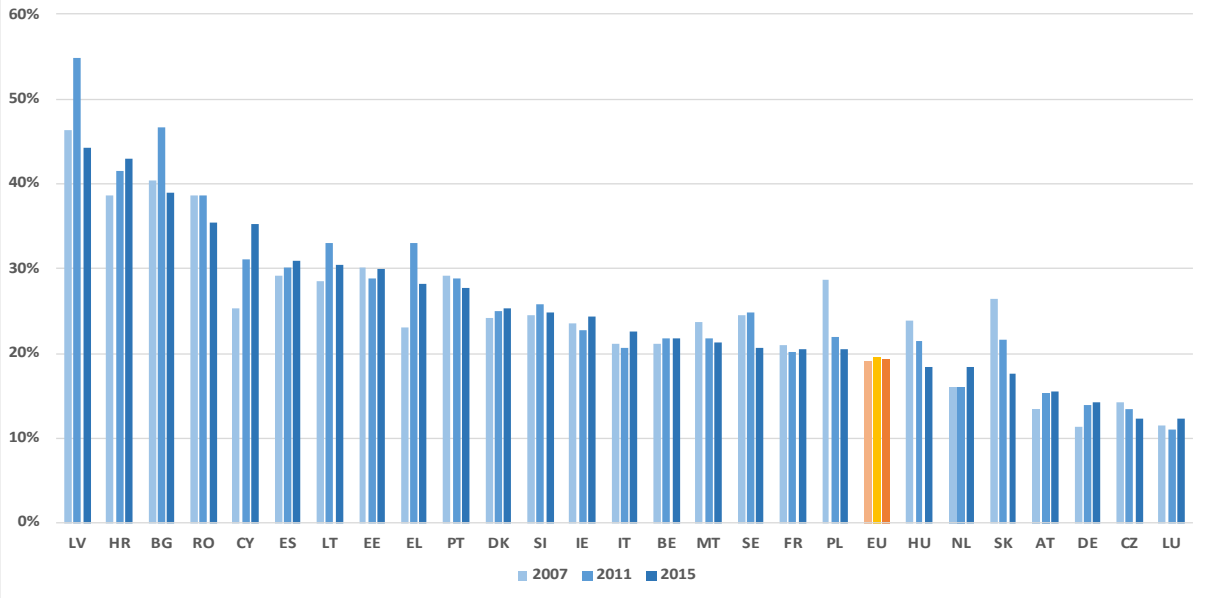
4.2 GE2 - Share of female researcher by sector

The indicator

The share of female researchers by sector is a base calculation of the gender distribution of researchers currently in the labour force. The indicator is available for each of the higher education, government and business sectors at the national level. The availability of sector-specific data will allow for an appreciation of changes in women's participation in research in these various sectors, thus enabling the monitoring of expanding and declining opportunity for women. These data would also be available in both head count and full-time equivalent (FTE) form.[3]

Outcomes

Figure 7 GE2.2 - Share of female researchers: business enterprise sector (2007, 2011, 2015)



Source: Eurostat.
Note: United Kingdom and Finland missing; EU average based on own calculation (excluding UK and FI); BE, FR: Data of 2015 not available, estimated with closest available year; NL: Data of 2007 not available, estimated with closest available year.

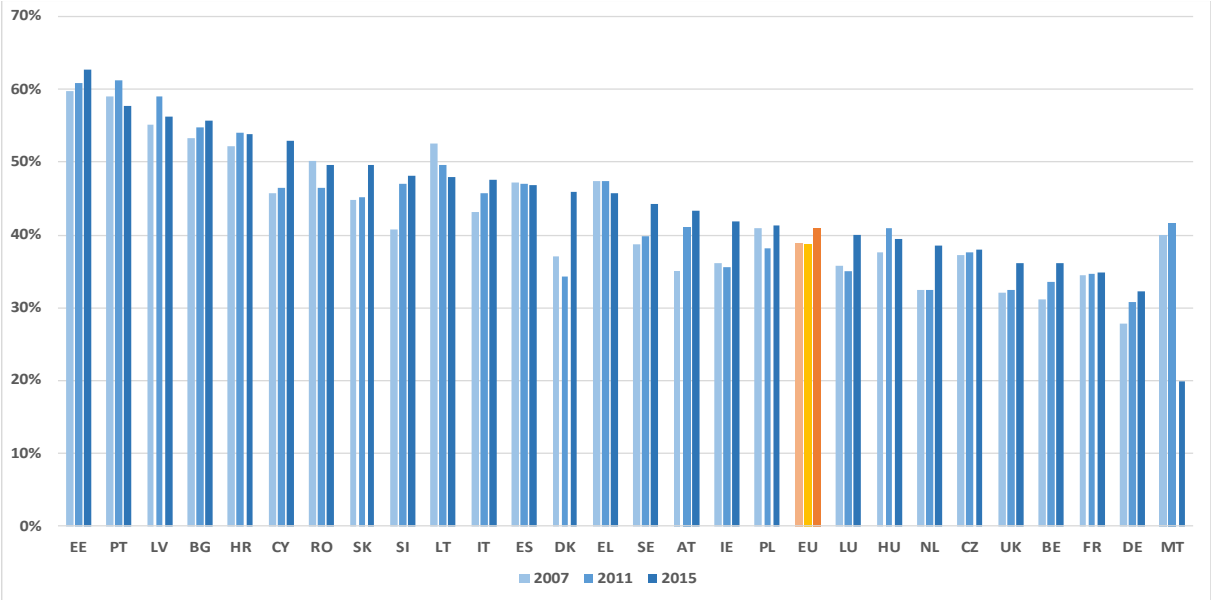
Female researchers are less well represented in the business sector than they are overall (Figure 9). However, a majority of member states (19) performed better than the EU average for this indicator in 2015 (19.4%)[4]. A group of MS performed relatively less well on this indicator, including Luxembourg, the Czech Republic, Germany, Austria, Slovakia, the Netherlands and Hungary. By 2015, women made up more than one-third of the researchers in the business sector in a small group of MS, including Latvia, Croatia, Bulgaria, Romania and Cyprus.

Half of the member states (13) show an increase in the share of female researchers in the business sector when 2007 and 2015 are compared. In this comparison, relatively large falls in the share of women researchers working in the business sector are also apparent in Poland, Hungary and Slovakia.

[3] In principle, this could in future allow for a comparison of the composition of the research workforce in terms of gender participation rate. This may provide an indication of whether there are differences between men and women in terms of 'underemployment' or in the take-up of part-time or 'flexible' labour market arrangements.

[4] The low EU average can be explained by the low score of countries such as Germany (14.3%), the Netherlands (18.4%), France (20.5%), Sweden (20.7%) and Italy (22.5%). These countries combine 71% of the business sector researches in the EU (excluding the United Kingdom and Finland).

Figure 8 GE2.3 - Share of female researchers: government sector (2007, 2011, 2015)



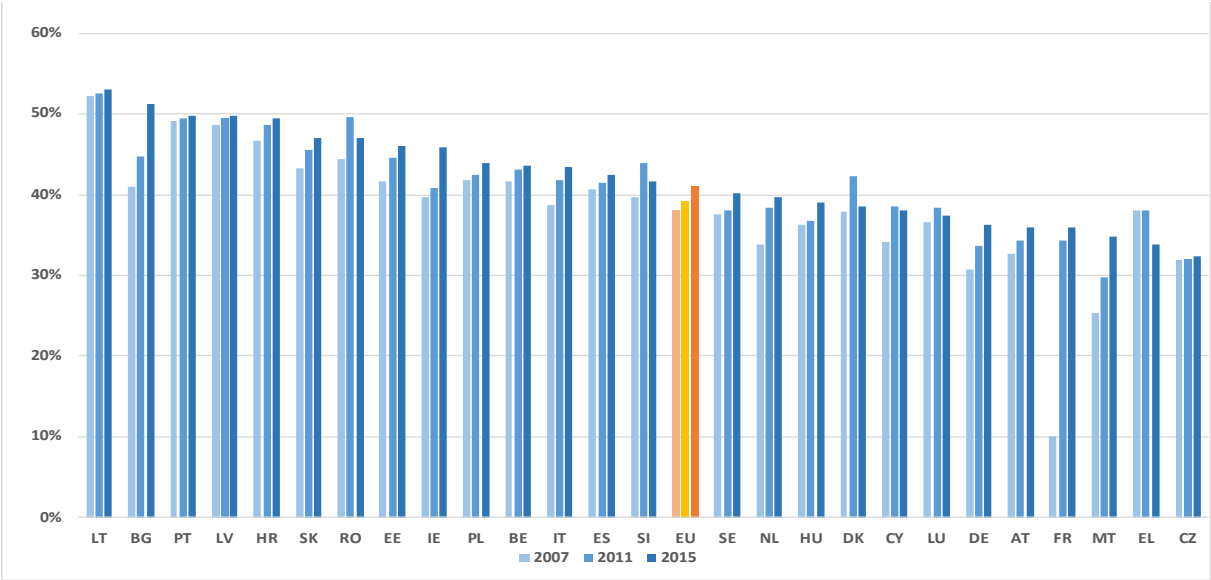
Source: Eurostat.
Note: Finland missing; EU average based on own calculations (excluding FI); BE, NL, FR: Data of 2007 not available, estimated with closest available year; FR: Data of 2015 not available, estimated with closest available year.

Women researchers are better represented in the government sector than they are overall (Figure 9). A majority of member states (18) performed better than the EU average in 2015 (41.0%). Member states performing relatively less well on the GE2.2 indicator include Malta, Germany, France, Belgium and United Kingdom (33.2%).

As of 2015, 6 member states had reached or bettered gender equality in terms of women's participation in government sector research. These MS include Estonia, Portugal, Latvia, Bulgaria, Croatia and Cyprus. Romania and Slovakia were both very close to reaching parity in gender participation in government sector research.

Encouragingly, a vast majority of member states (21) show an increase in the share of female researchers in the government sector when 2007 and 2015 are compared.

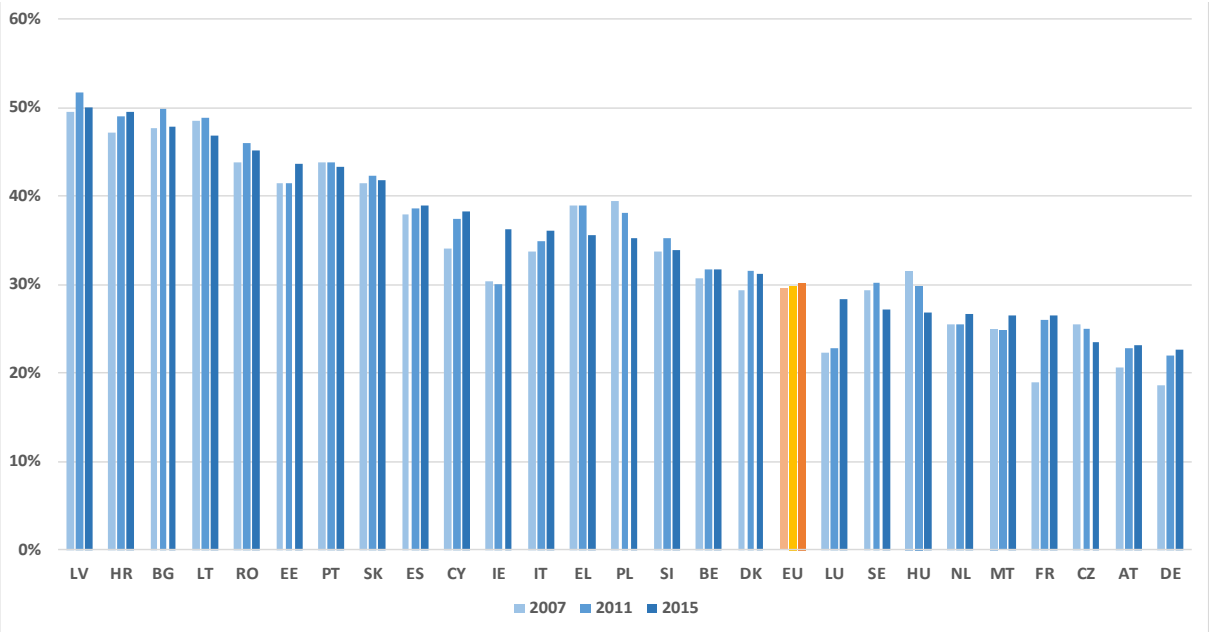
Figure 9 GE2.4 - Share of female researchers: higher education sector (2007, 2011, 2015)



Source: Eurostat.
Note: United Kingdom and Finland missing, EU average based on own calculations (excluding UK and FI); LU, FR, EL: data for 2007 not available, estimated with closest available year; FR: data for 2015 not available, estimated with closest available year.

Female researchers are better represented in the higher education sector than they are overall (Figure 10). A majority of member states (14) performed better than the EU average for in 2015 (41.0%). As of 2015, more than half the researchers in the higher education sector were women in both Lithuania and Bulgaria. Encouragingly, most of the MS with the lowest scores on this indicator also showed improvement across the period. In fact, Greece is the only member state that shows a decrease in the share of female researchers in the higher education sector when 2007 and 2015 are compared.

Figure 10 GE2.1 - Share of female researchers: all sectors (2007, 2011, 2015)



Source: Eurostat.
Note: United Kingdom and Finland missing; EU average based on own calculations (excluding UK and FI); EL, LU, NL, FR: Data of 2007 not available, estimated with closest available year; BE, FR: Data of 2015 not available, estimated with closest available year.

Evolution

Overall across all sectors, less than one-third of researchers are women in the EU. However, if we look at the evolution of the indicator, the majority of member states (17) performed better than the EU average (30.3%) in terms of share of female researchers by 2015. As of 2015, a group of member states that was performing relatively less well on this indicator, including Germany, Austria, France, Malta, the Netherlands and Luxembourg, nevertheless showed an improvement when comparing the initial and final years of the indicator. Only Sweden, Hungary and the Czech Republic showed a decline on this indicator among the less well performing member states.

The presence of some of the oldest and most consolidated science and research systems in the group of member states performing below the EU average suggests that established processes and professional pathways existing in these member states may remain somewhat resistant to effective change in the area of gender equality. In contrast, a group of member states, including Latvia, Croatia, Bulgaria and Lithuania, was relatively close to achieving gender equality on this indicator in 2015.

A clear majority of member states (19) shows an increase in the share of female researchers across all sectors when 2007 and 2015 are compared. This outcome suggests that the positive evolution of this indicator is relatively widespread across Europe.

4.3 GE3 - Share of research-funding organisations promoting gender content in research

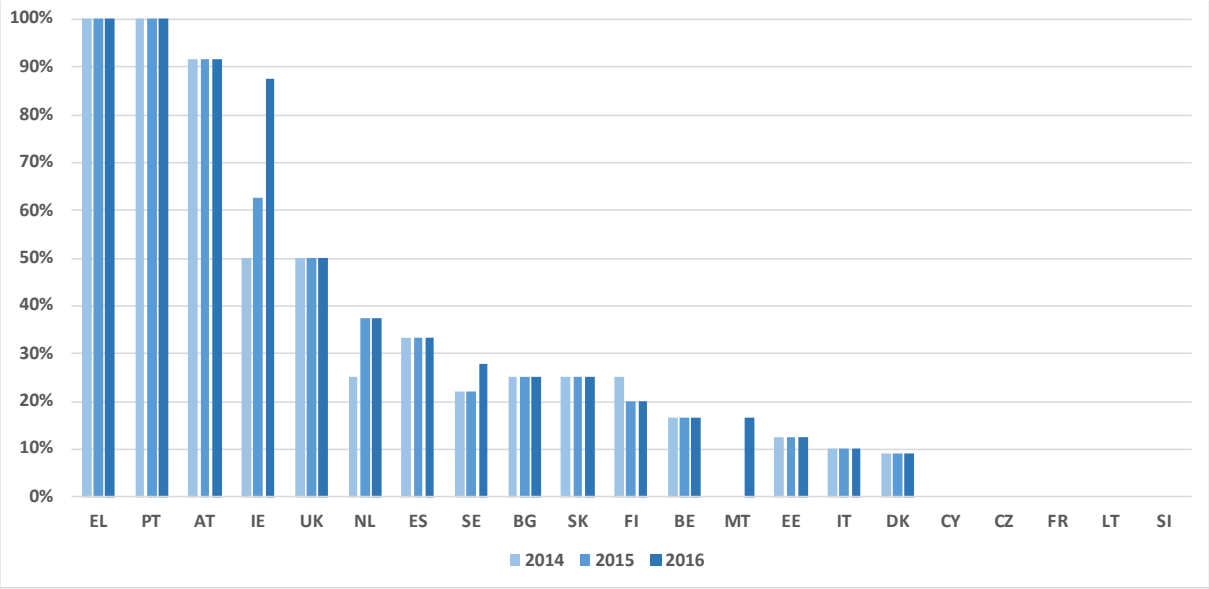
The indicator

The share of RFOs promoting gender content in research, which is the base calculation of the extent to which RFOs take actions to ensure the integration of the gender dimension in research content. This indicator illustrates the integration of gender as part of research design and the research process. It entails sex and gender analysis being integrating into basic and applied research proposals and/or assessments when allocating research and development funding. Data cover RFOs at the MS level.

The indicator is based on one question of the RFO survey (MoRRI, 2017), namely: 'When allocating research and innovation funding in years 2014, 2015 and 2016, did your organisation include the gender dimension in research content?' Respondents were asked to score 'yes, standard criteria', 'yes, specific criterion', or 'no/not applied'.

Outcomes

Figure 11 GE3 - Share of funding organisations promoting gender content in research



Source: RFO survey, MoRRI, 2017.
Notes: IE: change in big RFO from 2014 to 2015; FR: the number of responses was very low, however the major RFO of the country did respond; HR, DE, HU, PL: insufficient responses.

In Greece and Portugal, all responding funding agencies reported the gender content in research is promoted for all 3 years surveyed (2014-2016). In the Portuguese case this result is based solely on the response of the largest main public funding agency in the country. In Austria, and in Ireland by the end of the series, almost all RFOs are promoting gender content in research. In the UK, half the surveyed RFOs reported supporting it. Around one-third of funders reported promoting gender content in the Netherlands and Spain. The RFOs' promotion of gender content in research was lower in the remaining member states, including 5 MS in which no RFO reported supporting it. The number of responding RFOs was insufficient in the cases of 4 further member states.

Evolution

Overall, the results suggest that gender content in research is not yet a major priority for the majority of funding agencies. Change to an indicator that may involve significant policy reform is likely to take time, which can explain the limited transformation evident in the 3-year window available. However, the evolution in this indicator during the period has been in a largely positive direction, including in Ireland, the Netherlands and Sweden.

4.4 GE4 - Dissimilarity index

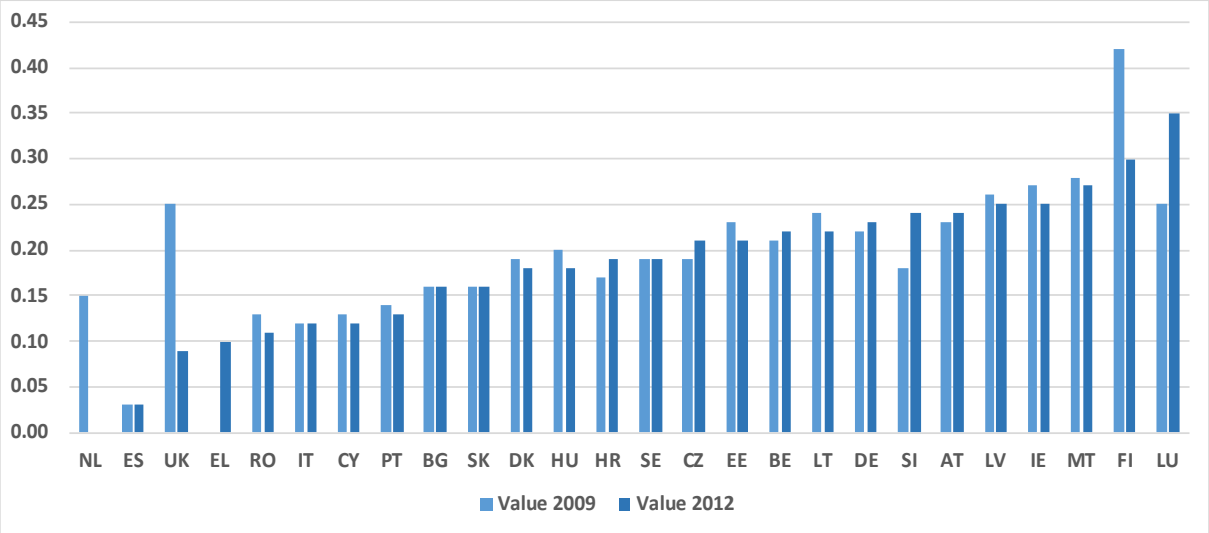
The indicator

The dissimilarity index comprises information on the degree of horizontal gender segregation within the fields of science. It is calculated by estimating the number of women and men who would have to change the field of science in which they currently work in in order to achieve an overall gender-balanced distribution of researchers across all fields. These data are available for the higher education and the government sectors (public sector research) at the national level for the years 2009 and 2012.

Scores on the dissimilarity index (DI) indicator that approach the value of 1 indicate a much higher percentage of researchers who would need to move to achieve gender equality. Thus, the higher the score, the higher the dissimilarity level. The data is collected through the She-Figures data collection process.

Outcomes

Figure 12 GE4.1 - Dissimilarity index: higher education sector (2009, 2012)



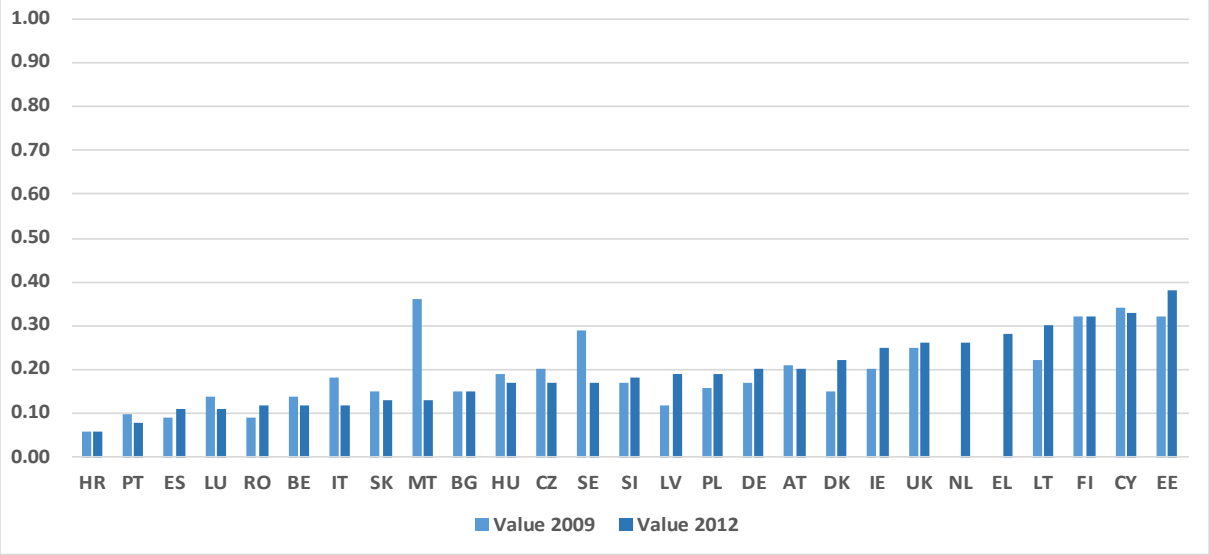
Source: She Figures, 2012 and 2015.
Note: Values 2009: Reference year for PL 2008, UK and FI 2007.
Values 2012: Reference year: 2011: BE, IE, EL, HR, AT, SE; 2010: DK, PL. Data not available for FR.

The dissimilarity index in the higher education sector for 2012 shows that the index is relatively tightly bound between the Netherlands (0.00) and Luxembourg (0.35). As of 2012, the degree of horizontal gender segregation is relatively high in Finland (0.30), Malta (0.27) and Ireland (0.25). The degree of horizontal gender segregation is the lowest in Spain (0.03), followed by the UK (0.09) and Greece (0.10).

Noticeable increases in scores can be seen in Luxembourg and Slovenia on this comparison. Decreases in the scores, indicating a positive change in the degree of horizontal segregation, are most evident in the United Kingdom and Finland, although these changes should also be treated cautiously.

The dissimilarity index in the government sector for 2012 shows a similar range to the higher education sector. As of 2012, the degree of horizontal gender segregation was the highest in Estonia (0.38), Cyprus (0.33), Finland (0.32), Lithuania (0.3), Greece (0.28), the Netherlands (0.26), the United Kingdom (0.26) and Ireland (0.25). As of 2012, the degree of horizontal gender segregation was relatively low in Croatia (0.06) and Portugal (0.08). The very substantial changes in the comparison between 2009 and 2012 in the cases of Malta and Sweden should be treated very cautiously.

Figure 13 GE4.2 - Dissimilarity index: government sector (2009, 2012)



Source: She Figures, 2012 and 2015.
Note: Values 2009: Reference year for PL 2008, UK and FI 2007. Data unavailable for FR.
Values 2012: Reference year: 2011: BE, IE, EL, HR, AT, SE; 2010: DK, PL. Data unavailable for FR and FI.

Evolution

These two data points provide an initial baseline for monitoring, with better evidence of transformations in the indicator awaiting future results. Values for the dissimilarity index remain largely stable in most cases when 2009 and 2012 are compared, indicating that evolution is likely to be incremental and take time, which will be reflected by the changes in the indicator.

Nevertheless, there are two initial observations that can be highlighted. First, there are sector-specific differences in scores within member states. There are significant differences in the degree of horizontal segregation between the government and the higher education sectors for many countries. A partial explanation of these patterns may be linked to the differences in age structures of the researchers in the various countries and sectors (She Figures, 2015). In most countries, the share of men in the >55 age group is very high, while women tend to be more strongly represented in the <35 age group. The retirement of older, mainly male, researchers may thus reduce the index down in a number of countries. Where the age structure is different between sectors within a country the dissimilarity index indicator will vary to some extent.

Second, there appears to be more volatility in the indicator for the government sector compared to the higher education sector. This volatility is not consistent in direction, when comparing countries. In several countries, including Portugal, Luxembourg, Belgium, Italy, Malta, Hungary, the Czech Republic and Sweden, a decrease can be seen when comparing the 2 years. In other countries an increase is recorded in Estonia, Lithuania, Ireland, Denmark and Latvia, starting out from a generally higher level. In other countries, changes are relatively marginal.

4.5 GE5 - Share of research-performing organisations with policies to promote gender in research content

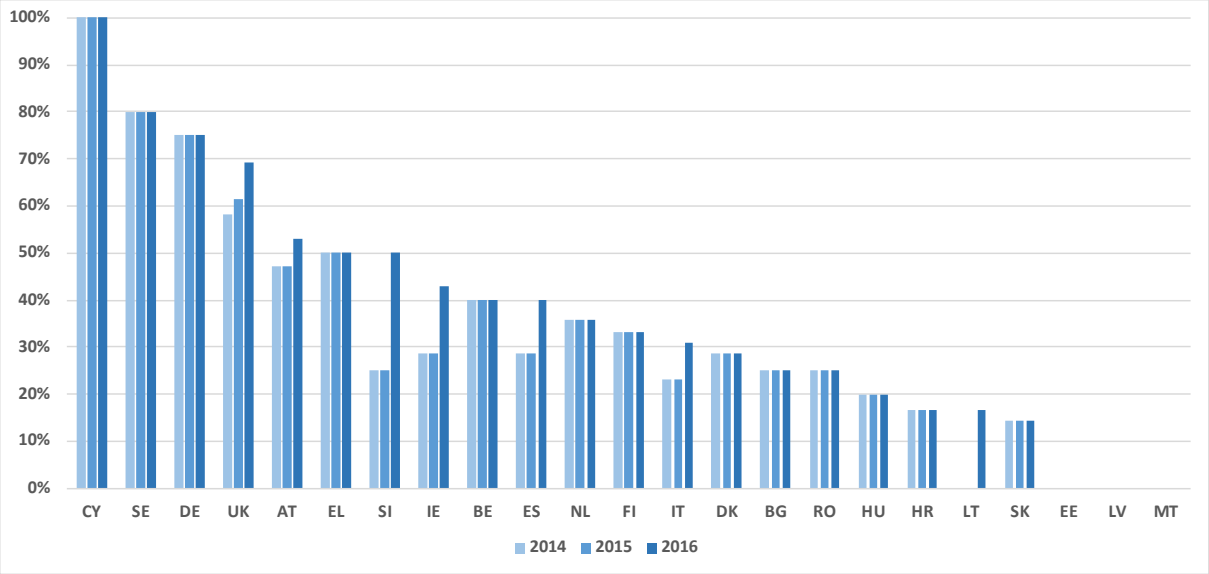
The indicator

This indicator examines the extent to which research-performing organisations take action to integrate the gender dimension in research content. It focuses on the integration of the gender dimension in research programmes and projects.

The indicator is based on one question from the HEI and PRO surveys (MoRRI, 2017), namely: 'Does your organisation have implemented processes to promote the integration of a gender dimension in research and innovation content of projects and studies, for example information and qualification tools or concrete rewards and incentives?' Respondents were asked to choose between 'yes', 'no', 'don't know'.

Outcomes

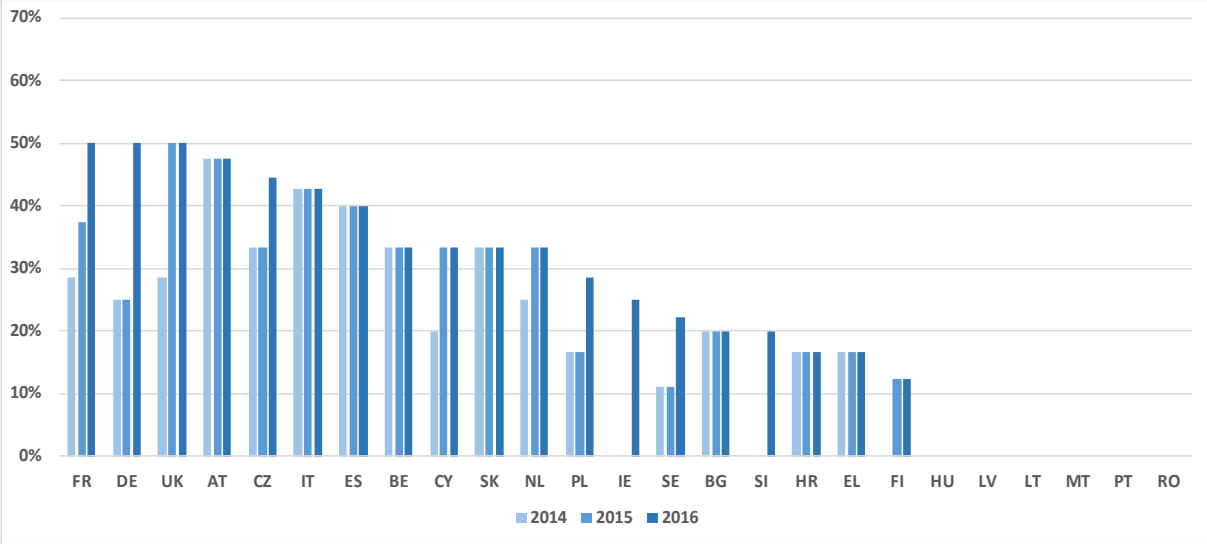
Figure 14 Share of higher education institutions with policies to promote gender in research content, 2014-2016



Source: HEI survey, MoRRI, 2017.
Note: Insufficient number of responses for CZ, FR, LU, PL, PT (see Annexes 4 and 5). In the case of FR, half of the few responding HEIs reported having policies to promote gender content in research in 2016. One respondent for CZ reported a policy on gender in research content for 2016. All PL and PT respondents reported no policies for the gender content in research. No respondents for LU.

As of 2016, there were four member states with a high proportion of responding HEIs that reported having policies to promote gender in research content. These countries are Cyprus, Slovenia, Germany and the United Kingdom. Half of the responding HEIs in Austria, Greece and Slovenia reported having gender content policies. Some volatility is evident in this indicator for a small number of MS, while stable scores across the 3-year period are the norm among countries in the mid and lower-range groups for this indicator.

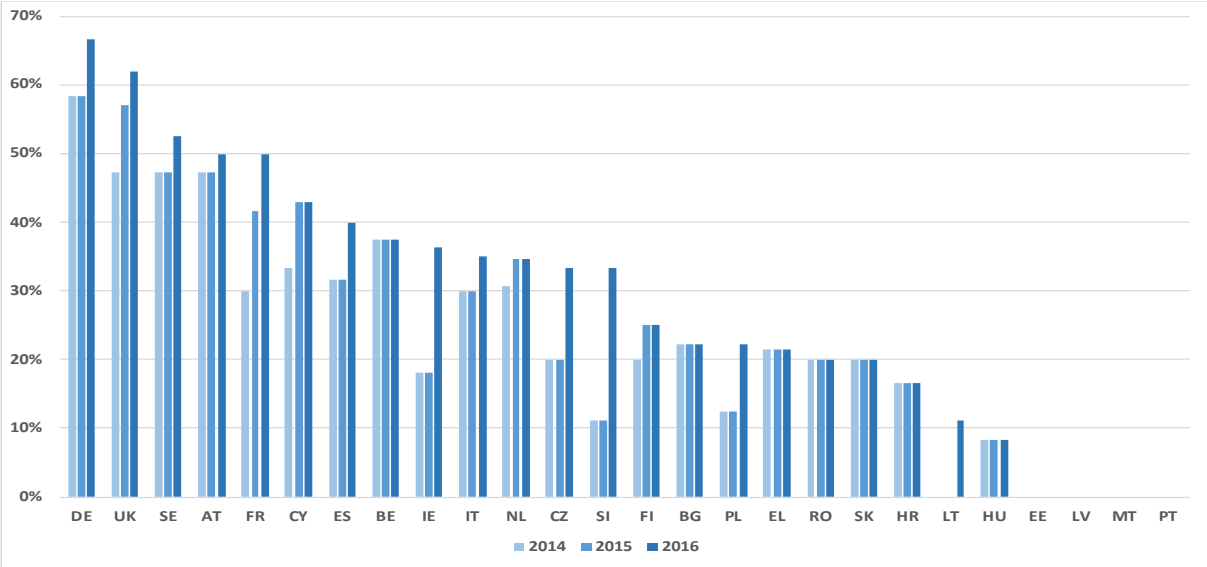
Figure 15 Share of public research organisations with policies to promote gender in research content, 2014-2016



Source: PRO survey, MoRRI, 2017.
Note: Insufficient number of responses for EE, DK, LU (see Annexes 4 and 5).

Overall, a lower rate of respondents in PROs reported having policies to promote gender in research content compared to HEIs. Half of the respondents from France and the United Kingdom reported having such policies. Respondents from a substantial group of member states, including Denmark, Hungary, Latvia, Lithuania, Malta, Portugal and Romania, reported not having policies to promote gender in research content.

Figure 16 GE5 - Share of HEIs and PROs with policies to promote gender in research content, 2014-2016



Source: HEI and PRO surveys, MoRRI, 2017
Note: Insufficient number of responses for EE, DK, LU (see Annexes 4 and 5).

Evolution

Overall, the combined results for HEIs and PROs for this indicator suggest that gender content in research is an emerging priority for public sector research-performing organisations in most member states. Change in the indicator across the available time series is consistently and quite strongly positive. Only a very small number of member states' respondents reported not having policies to promote gender in research content. The better performing countries and the mid-level performers all appear to be progressing in a positive direction on this indicator. There are some very large jumps in scores for some MS, notably Ireland and Slovenia, which may be related to data quality issues. Despite such cautions, a widespread positive evolution in the indicator can be observed.

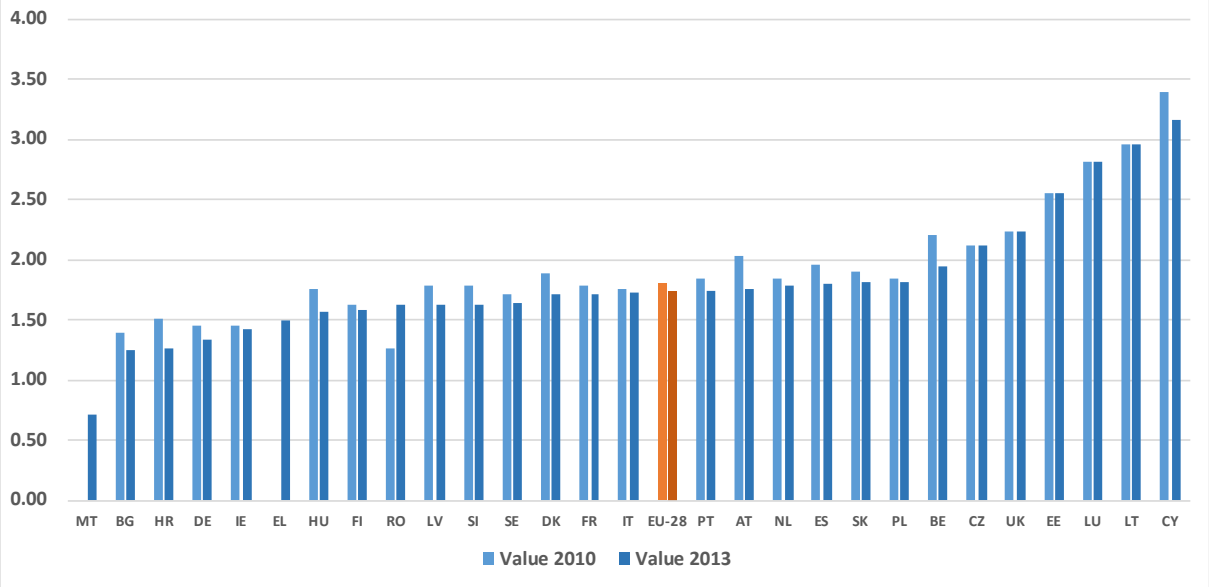
4.6 GE6 - Glass ceiling index

The indicator

The glass ceiling index measures women's chances of reaching the highest academic ranks relative to men's chances. The glass ceiling index (GCI) indicator illustrates the difficulties women have to reach the highest organisational levels within RPOs. The proportion of women at academic levels A, B and C can be compared with the proportion of men at these levels. The share of women at Grade A as a comparison to the share of women in academia overall can be compared with the results for men. These data cover the higher education sector at the national level.

Outcomes

Figure 17 GE6 - Glass ceiling index (2010, 2013)



Source: She Figures, 2012, 2015.
Note: Exceptions to the reference years: AT: 2006-2011; IE, CY, PT, IS: 2010-2012; BE (FL), NL, FI, SE: 2011-2013; PL, SK: 2012-2013; EL, FR: 2012; HR: 2014; MT: 2015; CZ: 2008; EE: 2004 (She Figures, 2012); UK: 2006 (She Figures, 2012); LT: 2007 (She Figures, 2012); LU: 2009 (She Figures, 2012).

A GCI score of 1 would indicate gender equality, but all countries show scores above this value, for all years, with the exception of Malta in 2013. Women encounter a glass ceiling in virtually all countries in relation to promotion to the top rank of academia.

As of 2013, a minority of member states (13) performed worse than the EU-28 average for this indicator. Aside from Malta, the relatively best performing countries on the GCI for 2013 (less than 1.5) were Bulgaria (1.25), Croatia (1.26), Germany (1.34), Ireland (1.43) and Greece (1.49). Hungary, Finland and Romania also performed relatively well. A group of six MS bounded by the Czech Republic (2.12) and Cyprus (3.16) record values showing relatively poor performance on the GE6 indicator. This group of countries also includes the United Kingdom, Estonia, Luxembourg and Lithuania.

Evolution

A majority of member states (20) show decreases in their GCI scores between 2010 and 2013, signalling a positive effect in terms of decreasing inequality. The average in 2010 of 1.95 decreased to 1.81 in 2013.

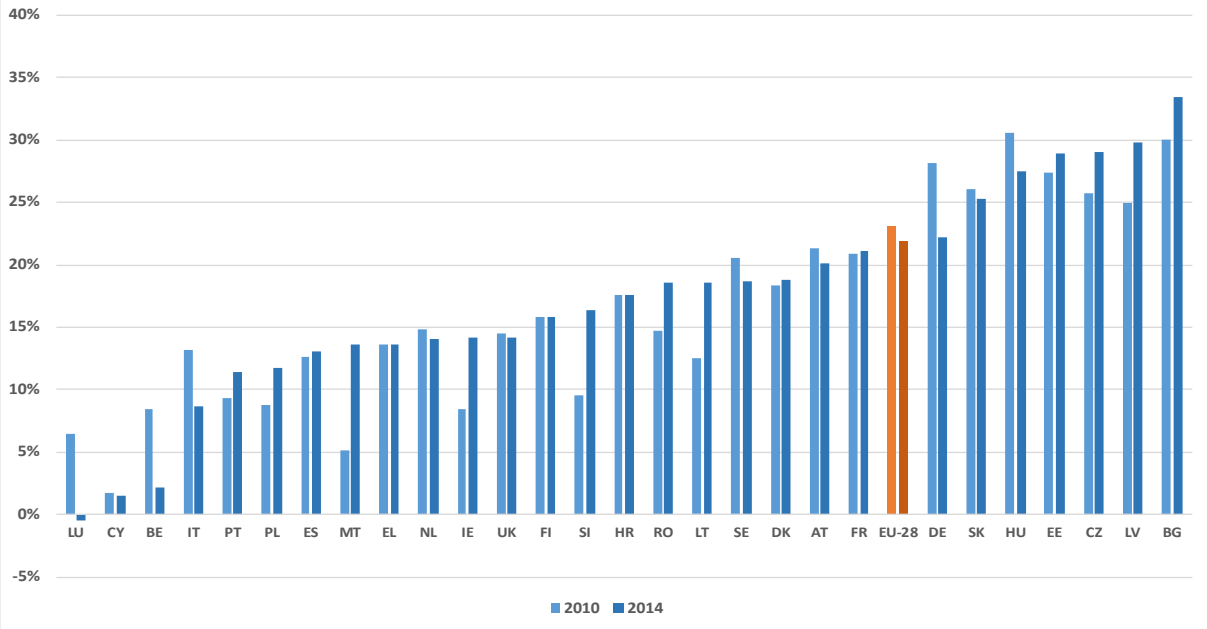
4.7 GE7 - Gender wage gap

The indicator

The gender wage gap indicator measures gender variations with respect to annual and hourly earnings, and is used as a proxy for gender equality in the academic as well as the non-academic research sector. The data is collected via Eurostat.

Outcomes

Figure 18 GE7.1 - Gender wage gap: academic professions (2010, 2014)

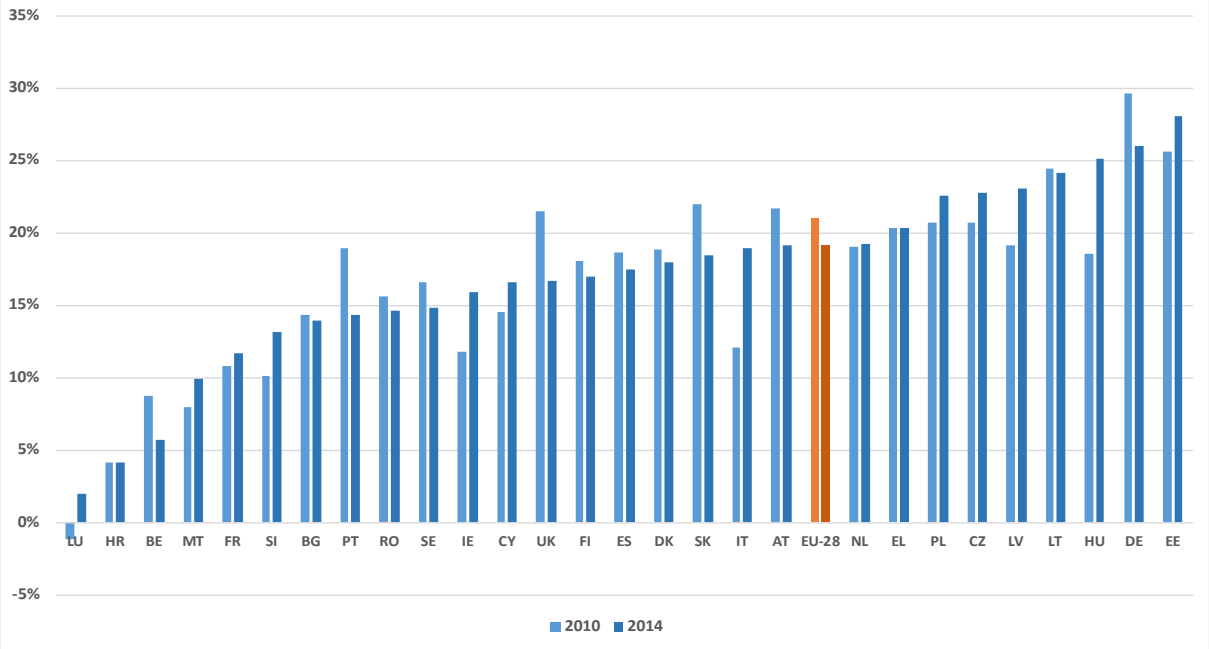


Source: Eurostat.
Note: HR and EL: Values of 2014 estimated with closest available year.

At the EU-28 level, the gender wage gap among academic professionals has decreased slowly, from 23.1% to 21.8%, across the period 2010-2014. In a minority of member states (7) however, the gender wage gap for academics is higher than this average. In Germany, Slovakia, Hungary, Estonia, the Czech Republic, Latvia and Bulgaria, the gap was considerably higher as of 2014. In a large group of MS (13), the indicator suggests the gender wage gap grew over the period. In some MS, the gap increased several percentage points, such as Malta (8.5), Slovenia (6.9), Lithuania (6) and Ireland (5.7). Significant drops can be found in Belgium (-6.3) and Germany (-5.9), and in Luxembourg, the gender wage gap in 2014 dropped below 0%, indicating a reverse tendency (women in academic professions earn more than men).

In the group of technicians and associate professionals, the gender wage gap was higher than the average of 21.8% in 2014 in nine member states – the largest gap can be found in the Netherlands, Greece, Poland, the Czech Republic, Latvia, Lithuania, Hungary, Germany and Estonia. Only in Sweden is there a consistent trend toward the reduction of the gender wage gap among technicians and associate professionals, although in a number of other MS the gap appears to be relatively stable across the data points available for this indicator.

Figure 19 GE7.2 - Gender wage gap: technicians and associate professionals (2010, 2014)



Source: Eurostat.

Evolution

At the EU-28 level, the gender wage gap among technicians and associate professionals has decreased slowly, from 21.1% to 19.2%, across the period 2010-2014. The overall gender wage gap is very similar to that found in the academic workforce, where the average decreased from 23.1% to 21.8%.

4.8 GE8 - Share of female heads of research-performing organisations

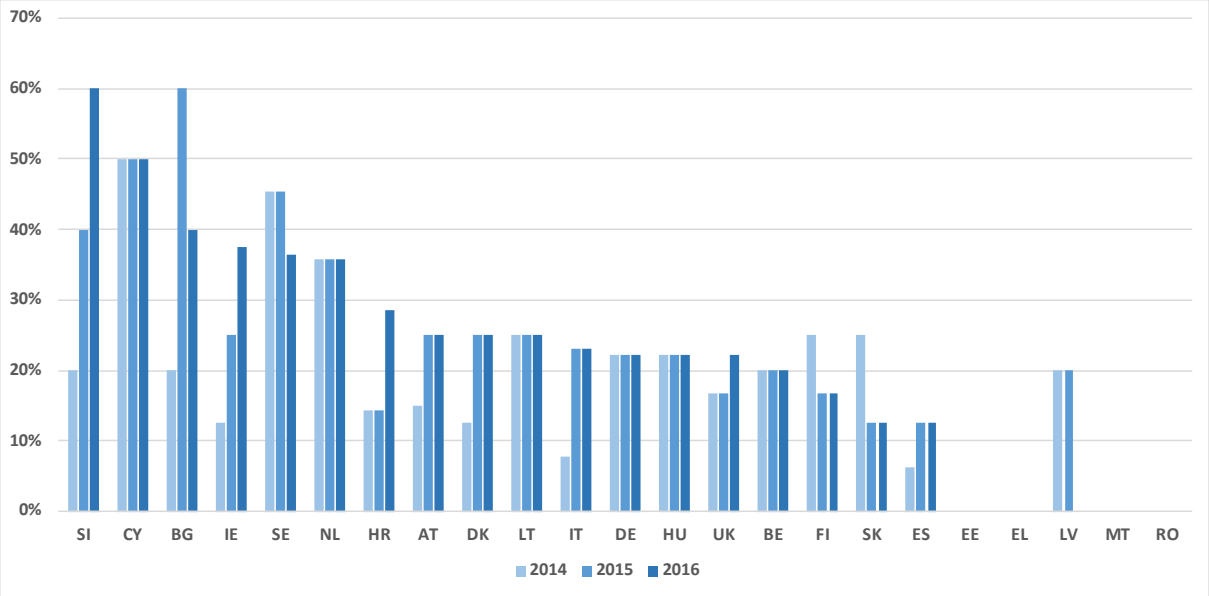
The indicator

The share of female heads of research-performing organisations captures the share of those headed by women. It can be interpreted as an indicator of gender balance in decision-making and, therefore, the structural setting for gender equality. The following only provides information at the higher education level.

The indicator is calculated from one question of the HEI and PRO surveys (MoRRI, 2017), namely: 'Please specify the gender of the person who was/is head of your organisation in 2014, 2015 and 2016 (Head of organisation: highest decision-making official in the organisation, e.g. rector or equivalent in the academy, president or equivalent in non-academic research organisations)'.

Outcomes

Figure 20 Share of female heads of higher education institutions, 2014-2016

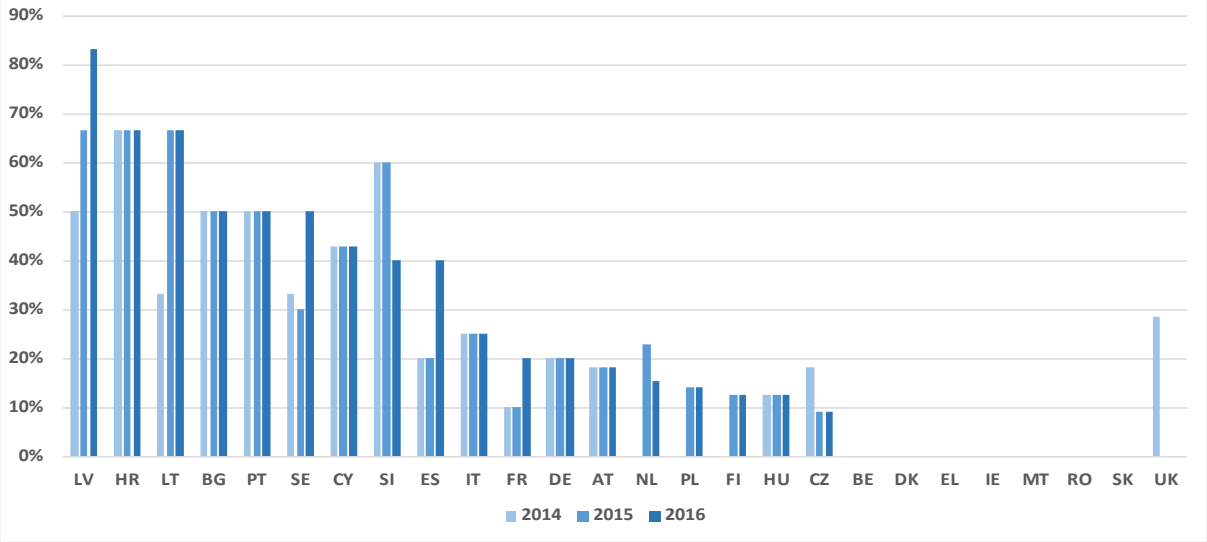


Source: HEI Survey, MoRRI, 2017.
Note: Insufficient responses for CZ, FR, LU, PL and PT. Trend should be assessed with caution; this indicator should be observed for a longer period of time. In countries with a low response rate, a change in the response can translate to significant changes in the country score, which does not translate the real magnitude of the change at country level.

The share of female heads reaches 50% in just 2 member states, Slovenia and Cyprus, in 2016. Other relatively well performing countries on this indicator include Bulgaria, Ireland, Sweden and the Netherlands. Respondents from many member states report that between one-fifth and one-quarter of heads of higher education institutions are female.

Relatively low levels on this indicator are apparent for a group of countries including Latvia, Spain, Slovakia and Finland. For several countries, no female heads of a higher education institution were reported in any years of the series, including Estonia, Greece, Malta and Romania.

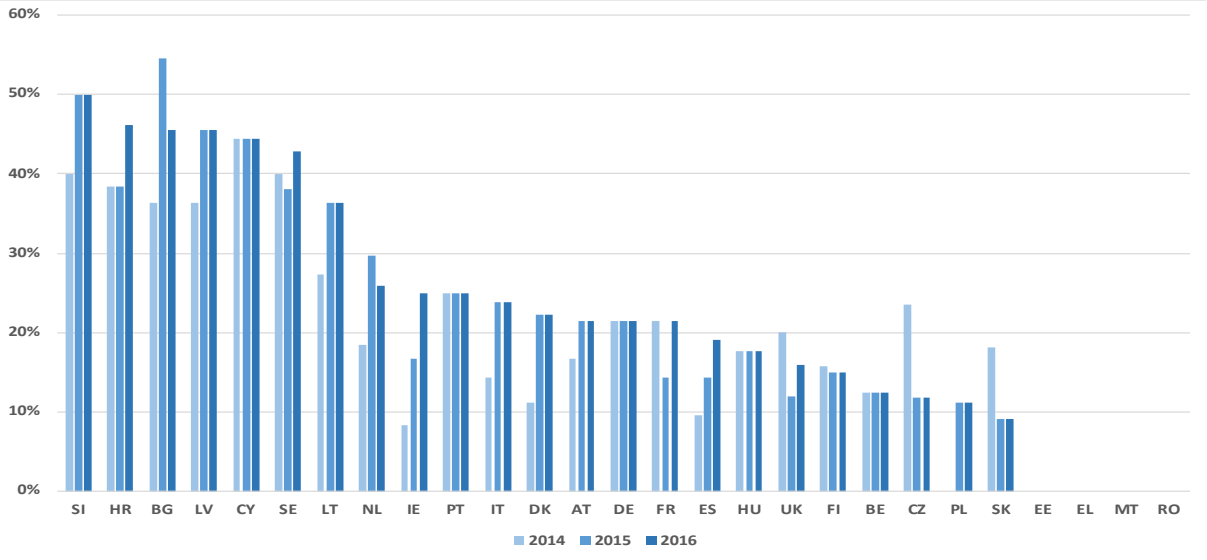
Figure 21 Share of female heads of public research organisations, 2014-2016



Source: PRO Survey, MoRRI, 2017.
Note: Insufficient responses for EE, DK and LU. Trend should be assessed with caution; this indicator should be observed for a longer period of time. In countries with a low response rate, a change in the response can translate to significant changes in the country score, which does not translate the real magnitude of the change at country level.

The share of female heads in PROs is 50% or above in a substantial number of member states as of 2016, including Latvia, Croatia, Lithuania, Bulgaria, Portugal and Sweden. Cyprus and Slovenia also perform well on this indicator. Relatively low rates of female heads of PROs were reported in France, Austria, Netherlands, Poland, Finland, Hungary and Czech Republic. Respondents from another large group of countries report no female heads of PROs for any years in the series.

Figure 22 GE8 - Share of female heads of HEIs and PROs, 2014-2016



Source: HEI and PRO Surveys, MoRRI, 2017.
Note: Insufficient response for LU. Trend should be assessed with caution; this indicator should be observed for a longer period of time. In countries with a low response rate, a change in the response can translate to significant changes in the country score, which does not translate the real magnitude of the change at country level.

Evolution

The share of female heads of public sector research organisations (HEIs & PROs) is relatively low. A group of 7 member states has made more progress on this indicator: Slovenia, Croatia, Bulgaria, Latvia, Cyprus, Sweden and Lithuania. Respondents from 4 member states failed to report a single female head of a higher education institution or a PRO. Encouragingly, a positive evolution in this indicator is evident in most member states. Nevertheless, considerable transformation with regards to this indicator is required to approach a situation of relative gender equality.

4.9 GE9 - Share of gender-balanced recruitment committees at research-performing organisations

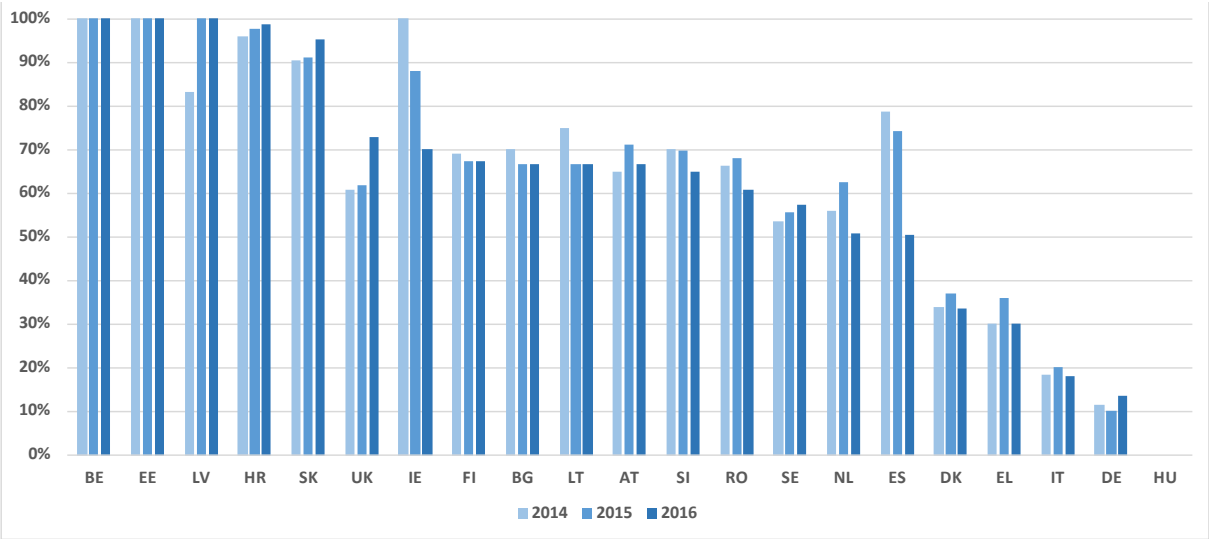
The indicator

This indicator monitors female participation in decision-making. The indicator captures the share of recruitment committees for internationally recognised researchers that are gender balanced, which can be interpreted as an indicator of the gender balance of the decision-making process. Data cover RPOs at the country level.

This composite indicator is built from two questions of the HEI and PRO surveys (MoRRI, 2017), namely: 'How many recruitment committees for leading researcher positions did your organisation set up in 2014, 2015 and 2016 for the recruitment of researchers?' and 'How many recruitment committees for leading researcher positions in the share of female members was equal or higher than 40% of the total committee members?' The data were normalised and transformed to an index.

Outcomes

Figure 23 Share of gender-balanced recruitment committees at higher education institutions, 2014-2016

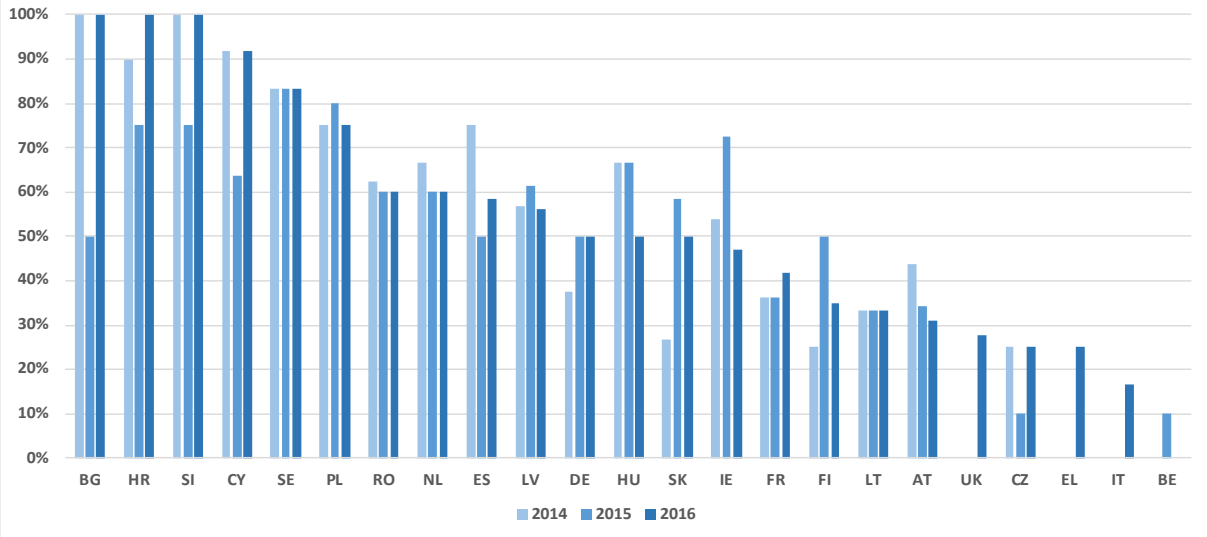


Source: HEI Survey, MoRRI, 2017.
Note: Insufficient responses for CY, CZ, FR, LU, MT, PL and PT.

As of 2016, two member states, Belgium and Estonia, reported results at the same level for all 3 years surveyed, whilst Latvia did so for 2015 and 2016. Croatia and Slovakia were also performing particularly well on this indicator. Italy, Germany and Hungary were the least well-performed MS across all 3 years.

A large group of member states' HEI respondents reported that between 50% and 70% of their recruitment committees were gender balanced.

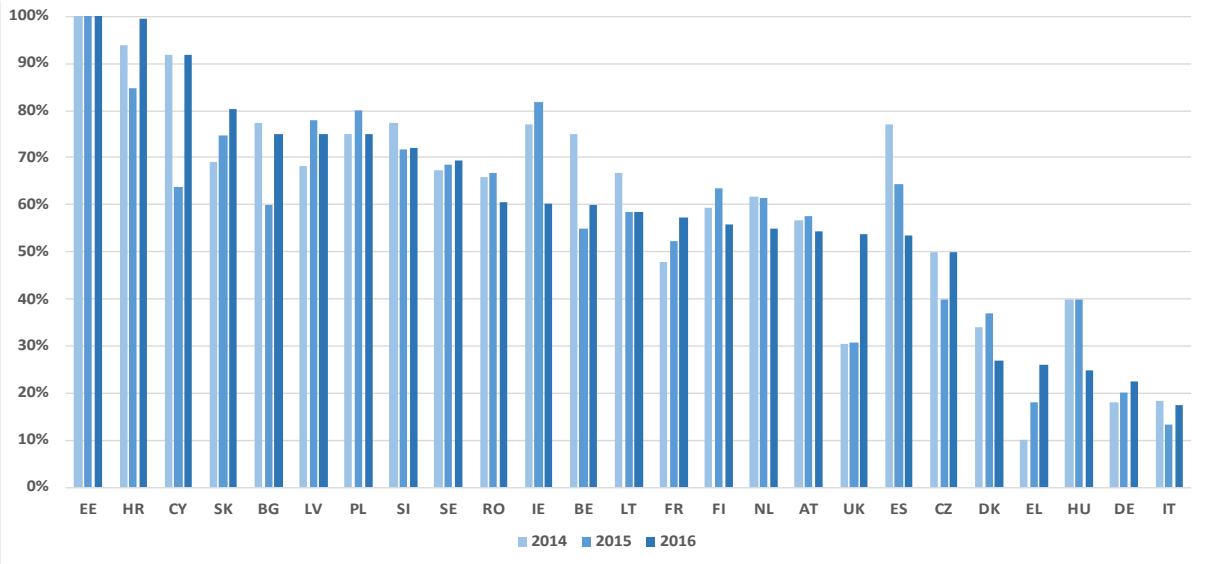
Figure 24 Share of gender-balanced recruitment committees at public research organisation, 2014-2016



Source: PRO Survey, MoRRI, 2017.
Note: Insufficient responses for EE, DE, LU and MT.

The reported results for gender-balanced recruitment committees in PROs vary considerably across the years for several member states. These results likely reflect a rather small number of responses in some cases. Overall, the results for PROs appear slightly lower in comparison to HEIs, and some MS results are very different – with the most extreme example of this being Belgium. Croatia, on the other hand, is a leader on this indicator for both HEIs and PROs.

Figure 25 GE9 - Share of gender-balanced recruitment committees at HEIs and PROs, 2014-2016



Source: HEI and PRO Surveys, MoRRI, 2017.
Note: Insufficient responses for LU, MT and PT.

Evolution

The overall indicator for gender-balanced recruitment still reflects some of the volatility from the small numbers of RPO responses. The best-performed member state on this indicator is Croatia. (Insufficient responses were received for Estonia for PROs; Figure 21 gives a reflection of HEIs for Estonia.) This volatility makes interpreting the evolution of this indicator largely premature until further data points can be collected.

4.10 GE10 - Share of female inventors and authors

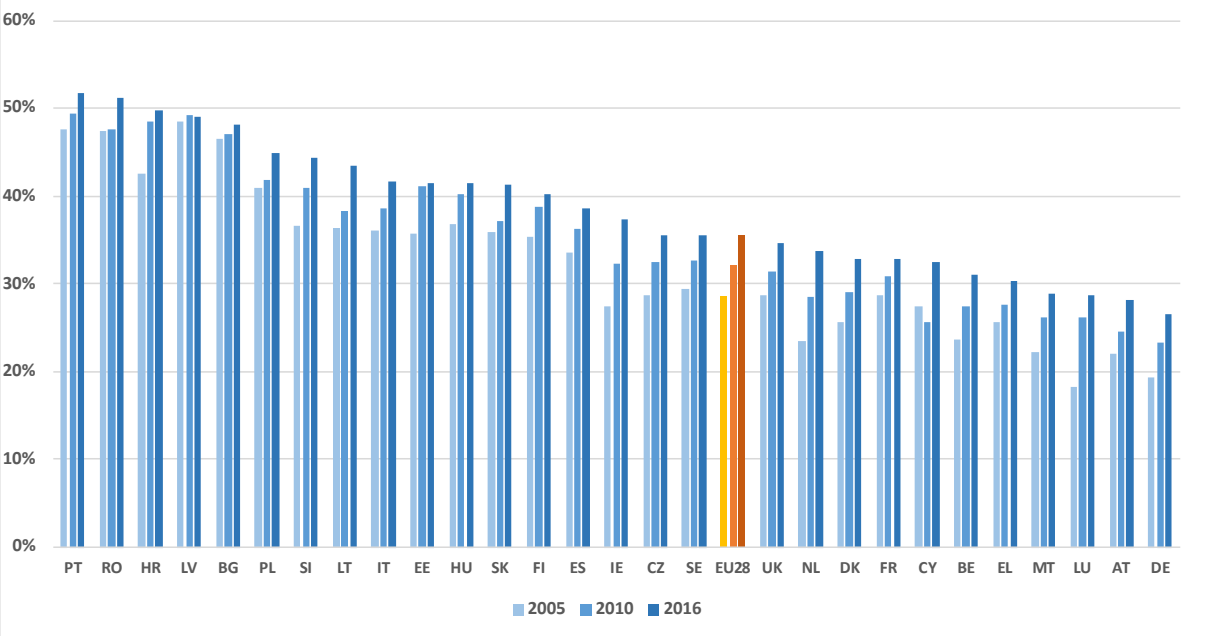
The indicator

The share of female inventors and authors illuminates developments in women's representation across fields and sectors over time, on the basis of bibliometric data and patent counts. It captures the share of female authors for scientific publications by scientific discipline, and the share of female inventors for patents by sector of activity.

The indicators are based on own calculations within the MoRRI consortium using Scopus for the publications and Patstat for the number of patents.

Outcomes

Figure 26 GE10.1 - Share of female authors (2005, 2010, 2016)



Source: Scopus. Calculations: Fraunhofer ISI (see data tables in Annex 7).

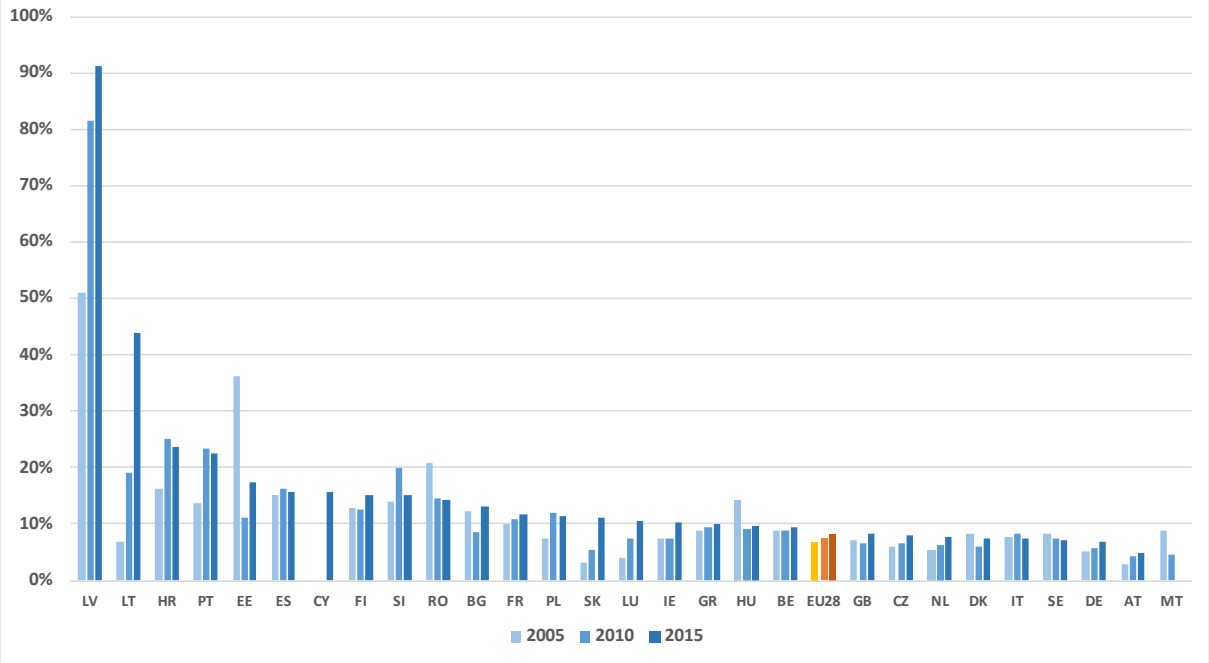
At the EU-28 level, the share of scientific publications that include a female author has expanded from 28.6% in 2005 to 35.5% in 2016, with the majority of member states (17) performing better than the EU-28 average as of 2016. In that year, in particular, Portugal and Romania had reached gender parity on this indicator and Croatia, Latvia and Bulgaria were close. Germany, Austria, Luxembourg and Malta were the MS with the weakest outcomes for this measure.

The share of patents that include a female inventor has expanded at the level of the EU-28 from 7.0% in 2005 to 8.3% in 2015, with the majority of member states (19) performing better than the EU-28 average as of 2016. The results for Lithuania, Latvia, Croatia, Estonia, Cyprus, Romania, Bulgaria, Slovakia and Luxembourg are based on total numbers of patents of between 1 and 9 per year.

The results for these member states can thus change substantially with the inclusion or exclusion of just a single patent with a female inventor. Among countries generating more substantial numbers of patents, Portugal, Spain and Finland have the strongest representation of women on this indicator as of 2016.

Overall, the share of patents with a female inventor is much lower than the share of publications including female authors.

Figure 27 GE10.2 - Share of female inventors (2005, 2010, 2015)



Source: Patstat. Calculations: Fraunhofer ISI (see data tables in Annex 7).

Evolution

A positive change in the female authorship of scientific publications is clearly evident across all member states, with all MS improving their performance on this indicator in every year of the series. Many of the countries that were relative underperformers grew the share of publications with women authors substantially. The change in this indicator is directly linked to the increased share of women working in the higher education sector in all MS (see Figure 9).

Evidence regarding female inventors at the level of member states is more mixed. Encouragingly, an increasing number of female inventors is evident among the MS that produce the largest numbers of patents. For example, the proportion of patents with female inventors in Germany increased from 5.1% in 2005 to 6.7% in 2015, in France from 9.9% in 2005 to 11.6% in 2015, and in the United Kingdom from 7.3% in 2005 to 8.2% in 2015. This suggests that, overall, the evolution of this indicator is in a positive direction in that there are more female inventors in the EU-28 in 2015 than was the case in 2005.

Gender equality

Main observations

Female researchers

- Well above the EU-average of 30 % share in the Eastern MS.
- Lowest shares are in Germany, Austria and the Czech Republic.
- A small drop can be observed in recent years in EU-13 MS.
- France saw a considerable increase of female researchers in the higher education sector recently.

Equality plans

- Over the past years, improvements can be observed in 15 MS.
- More than 90 % of research performing organisations in Sweden, Germany and the UK have gender equality plans.
- In eastern MS , 0-30 % of organisations have plans.

Gender content

- It is an emerging priority in research performing organisations all over Europe.
- At least 50% of the research performing organisations in Germany, the UK, and Sweden promote gender content.
- Generally no priority in funding organisations - with the exception of Greece, Portugal, and Austria.

Glass ceiling

- Chances to reach top level positions in research are the highest in Malta and Bulgaria and the lowest in Luxembourg, Lithuania, and Cyprus.
- Slow overall decreases in GCI between 2010-2013 from 1.95 to 1.81.

Wage gaps

- On average across the EU, female academic professionals obtain 22 % less then men.
- There remains considerable variation at MS-level, e.g:
- The gap increased several percentage points, e.g., in Malta (8.5), Slovenia (6.9), Lithuania (6.0) and Ireland (5.7)
- Significant drops can be found in Belgium (-6.3), Germany (-5.9)
- In Luxembourg, there is no gender wage gap rather than a small surplus for female researchers

Authors & inventors

- 34 % of all publications contain a female author (EU average).
- Countries with higher shares are mostly from Eastern Europe.
- Germany, Luxembourg and Austria do rather poor.
- Share of female inventors is 8%.
- Latvia is an exception with 65% of female inventors.

5 Science literacy and science education

Science literacy and science education (SLSE) is defined as being generated through 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 policy making.

The definition includes three aspects of SLSE, which are based on the main mechanisms through which the SLSE abilities are built: science education, science communication and the co-production of knowledge.

Number	Name of indicator	Note
SLSE1	Importance of societal aspects of science in science curricula for 15 to 18-year-old students	Conducted via desk research and interviews by the pool of country correspondents. Year of reference 2016.
SLSE2	RRI-related training at higher education institutions	HEI survey
SLSE3	Science communication culture	Remained unchanged from 2015 report
SLSE4	Citizen science activities in research-performing organisations	Available for 2015, 2016. Data sources: ECSA, Scopus.
-SLSE4.1	Organisational memberships in ECSA	Source: ECSA
-SLSE4.2	Citizen science publications	Source: Scopus

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

The indicator

SLSE1 looks at controversial science topics and their coverage in the curricula of 15 to 18-year-old students. The data were collected through a network of 28 country correspondents (one per EU country) and the reference year was 2016.

The following questions were asked: 'Does the curriculum address the controversial character of either one of the two topics GMO and nuclear energy?' This was further broken down to ask for societal, environmental and ethical aspects. Another question was asked on the degree of coverage (substantially/superficially/not at all). The information was brought together in this index indicator.

Outcomes

Figure 28 SLSE1 - Importance of societal aspects of science in science curricula for 15 to 18-year-old students

Source: Desk research and interviews conducted in 2016 by MoRRI country correspondents (28 correspondents, one per EU country). See Annex 2 for more information about the collection method.
Key: Green: The lighter the green, the more the aspect is covered; darker green (medium-low coverage); red (no coverage). Note: No data for DE.

No EU member state covers societal aspects and the various impact areas of both critical sciences in their curricula substantially. From a range of between 0 and 1, there are 11 countries that score the mean: Croatia, Denmark, Finland, Latvia, Lithuania, Malta, Poland, Portugal, Slovakia, Spain, and Sweden. Austria, Italy, Luxembourg, the Netherlands and Romania do not cover these items officially in their curricula.

5.2 SLSE2 - RRI-related training at higher education institutions

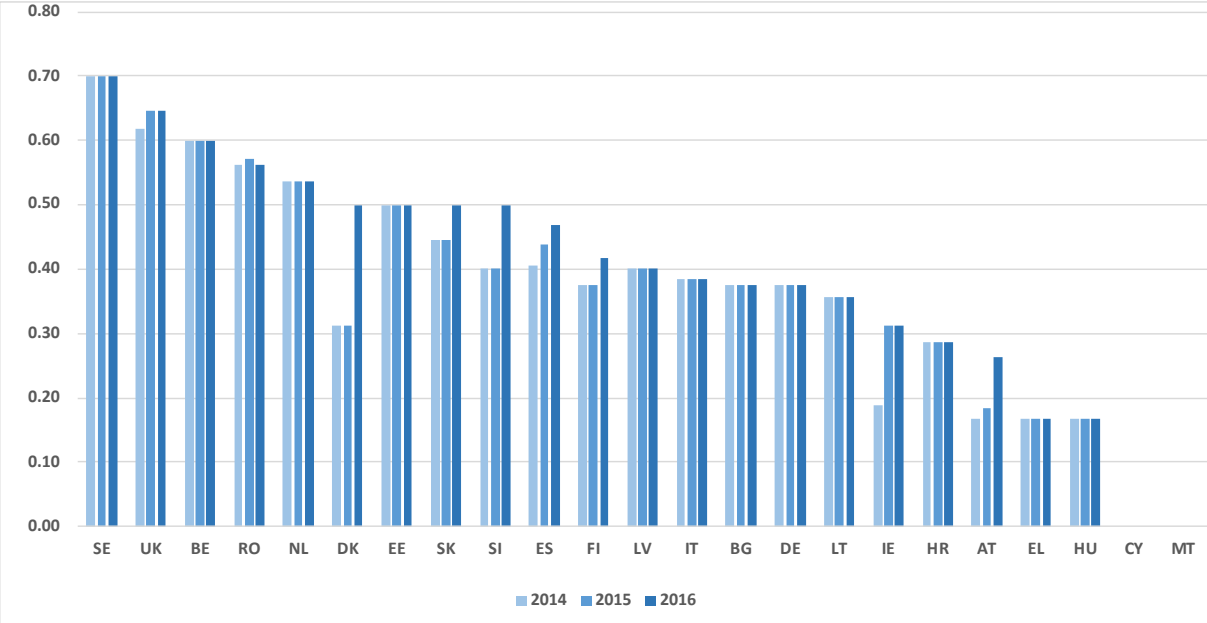
The indicator

SLSE2 provides information on the extent that RRI-related aspects, such as ethical, economic, environmental, legal and social aspects (EEELSA), are part of the education of young researchers.

The information for this indicator comes from the survey of higher education institutions (MoRRI, 2017) and is based on the question: 'Did PhD students' training include RRI-related aspects (such as ethical, economic, environmental, legal and social aspects)?' Answer categories were yes, mandatory; yes, voluntary; and no/not applicable.

Outcomes

Figure 29 SLSE2 - RRI-related training at higher education institutions



Source: HEI Survey, MoRRI, 2017.
Note: Insufficient responses for CZ, FR, LU, PL and PT.

In 2016, half of the respondents in 9 member states reported that RRI retraining was available in their HEI. Leading performers on this indicator are Sweden, the United Kingdom, Belgium, Romania and the Netherlands. The majority of MS (16) reported that RRI-related training was available in at least one-third of HEIs. However, less than 1 in 5 HEIs reported RRI-related training in Greece and Hungary, while no RRI-related training was reported in Cyprus or Malta.

Evolution

The development of RRI-related training is progressing in a positive direction according to this indicator. Several mid-ranked countries, including Denmark, Slovakia, Slovenia, Spain and Finland, reported that the availability of RRI-related training had increased in the course of the available 3-year time period. Improvements in this indicator were also evident in Ireland and Austria. Introducing RRI-related training in HEIs thus appears to be evolving in a positive direction in many parts of Europe, whilst levels of availability were maintained elsewhere.

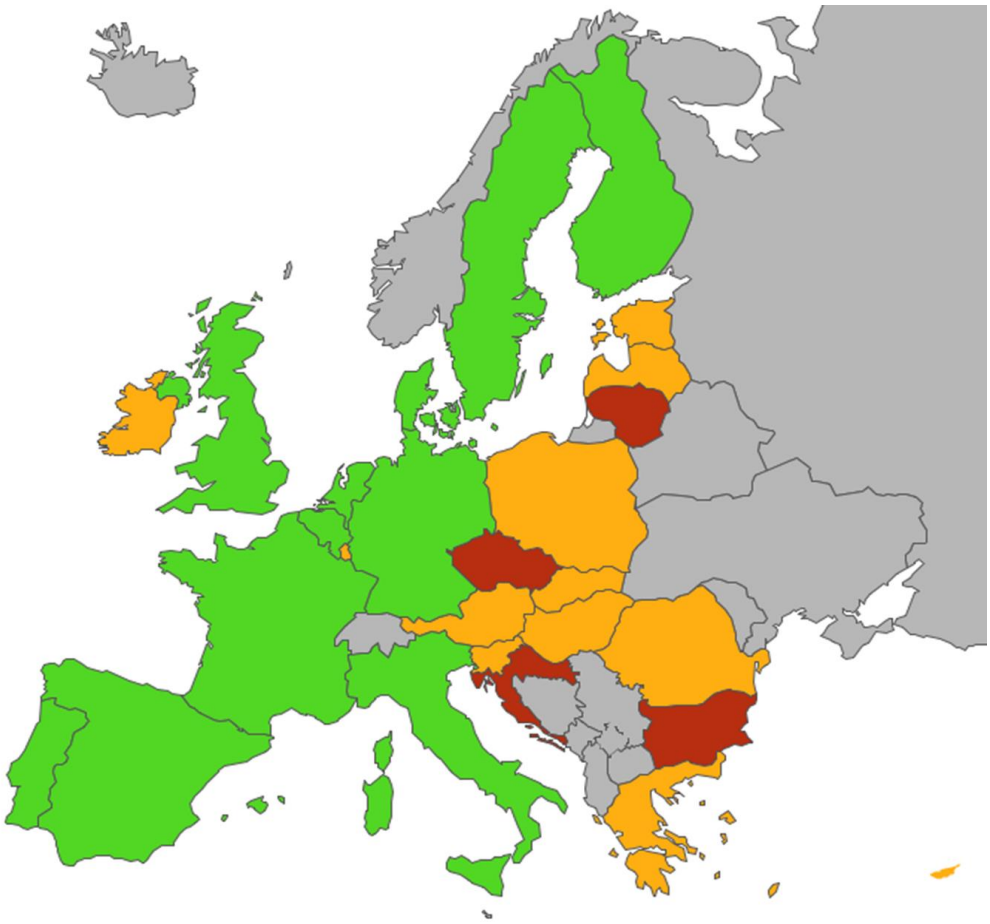
5.3 SLSE3 - Science communication culture

The indicator

Science communication culture uses secondary data from the MASIS project to monitor national science communication cultures (2012). The data were collected via a network of country experts. Countries were placed in one of three categories: consolidated science communication culture, developing science communication culture, and fragile science communication culture. The categorisation was based on 6 parameters that capture the central elements of science communication cultures: the national science communication infrastructure; political attention to science communication; the number and diversity of actors involved in science communication; academic traditions for dissemination of scientific results; attitudes towards science and the acquisition of knowledge in the public; and the science journalism situation in the country in question.

Outcomes

Figure 30 SLSE3 - Science communication culture



Source: MASIS, 2012.
Key: Green: consolidated science communication culture; red: fragile science communication culture; orange: intermediate category indicating a developing science communication culture.

This graphic indicates a rather East-West divide. Almost all of the old EU member states with the exception of Ireland, Austria and Greece have a consolidated science communication culture, while 9 new MS are developing one and 4 have a fragile one in place.

5.4 SLSE4 - Citizen science activities in research-performing organisations

The indicator

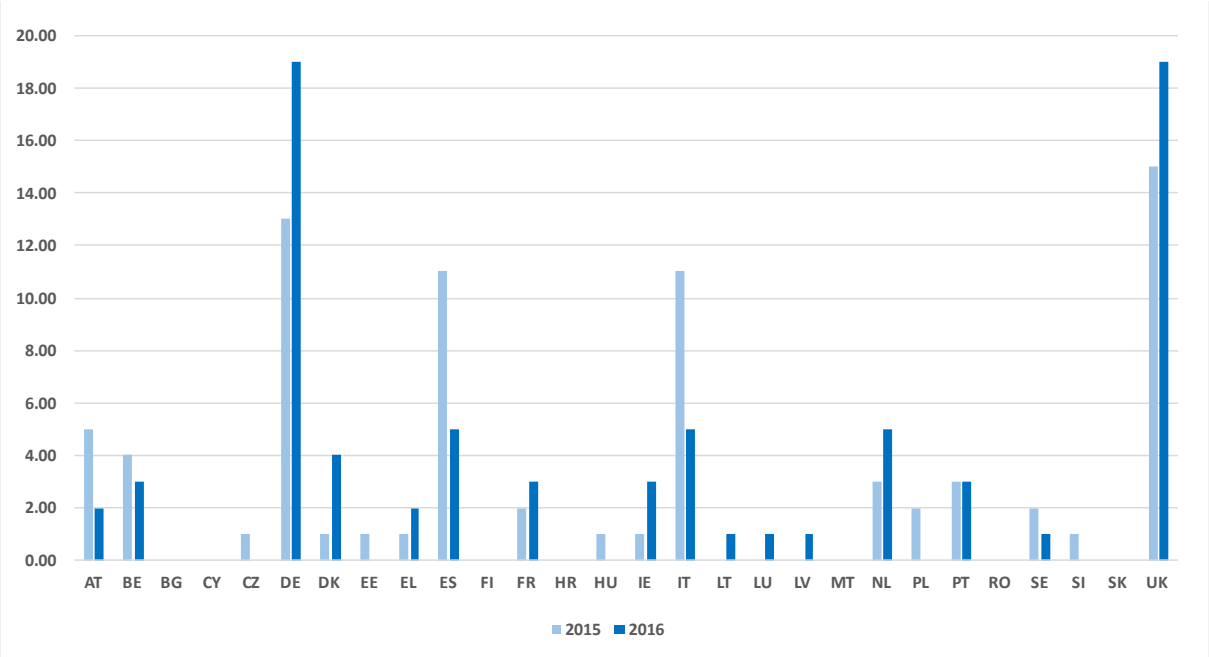
SLSE4 captures whether research-performing organisations are engaged in citizen science in projects or via scientific publications on the subject. Since the indicator basis concerns rather small numbers, the indicator is presented in absolute numbers for the two aspects, namely:

- the number of member organisations in the European Citizen Science Association (ECSA);
- the number of scientific publications concerning 'citizen science'.

Given the low numbers and the fact that there are only 2 years available, it seems premature to discuss an evolution.

Outcomes

Figure 31 SLSE4.1 - Organisational membership in ECSA, 2015-2016



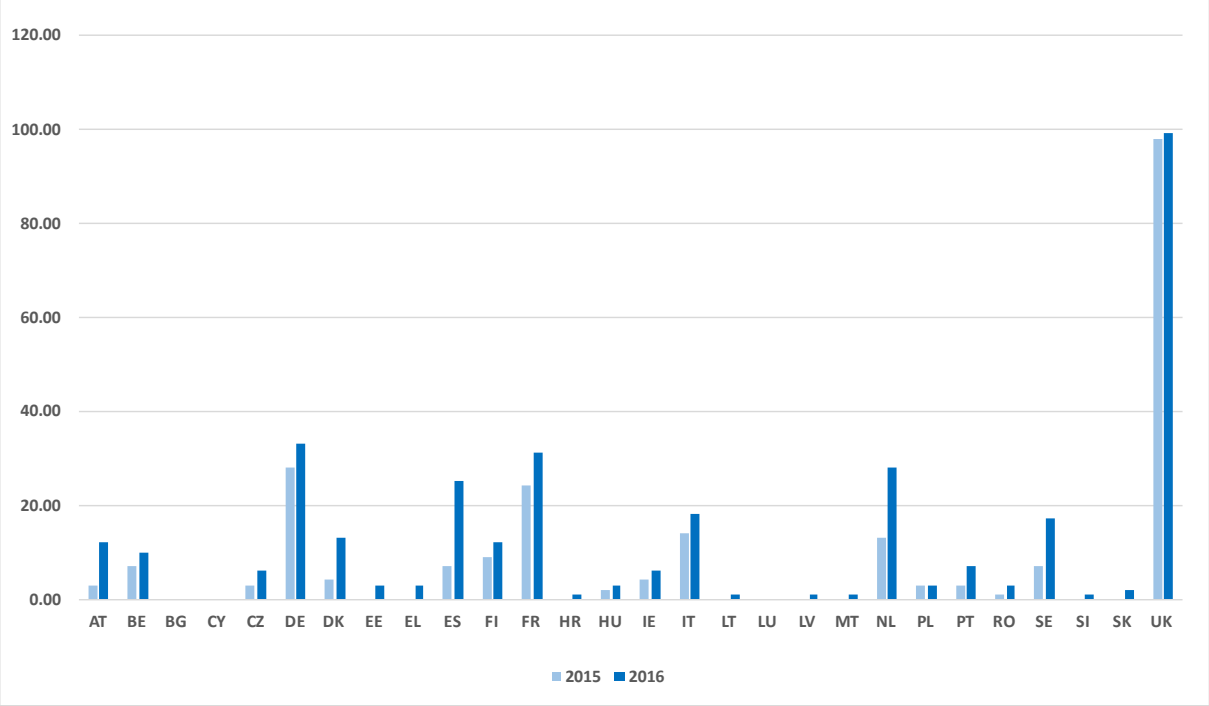
Source: ECSA, annual reports,

According to the annual reporting data of ECSA, an umbrella organisation based in Germany, the majority of its organisational members are located in the United Kingdom and Germany (both listing 19 in 2016), followed by the Netherlands, Italy and Spain. In 2106, 12 member states were not represented in this umbrella organisation; several others had 1 or 2 members.

In terms of citizen science publications (Figure 32), one can observe a lead by the United Kingdom with almost 100 publications in 2015 and in 2016, while the other large publishing countries of Germany, France the Netherlands Spain and Italy follow. In many small and eastern MS, the publication numbers are insignificant or zero.

The outcome of this indicator suggests that citizen science activities are currently in an emergent phase of development across Member States. Underlying developments seem positive, 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.

Figure 32 SLSE4.2 - Citizen science publications, 2015-2016



Source: Scopus, calculations: Technopolis Group.

Science literacy and science education

Main observations

Critical science in curricula

- No EU Member State covers societal aspects and the various impact areas of critical sciences in their curricula substantially.
- It is not covered officially in Austria, Italy, Luxembourg, the Netherlands and Romania.

Training in RRI

- Training in the RRI dimensions can be found in almost all of the Member States' higher education institutions.
- Very limited are only Malta and Greece.
- Slovenia and Croatia offer many training opportunities.

Citizen science

- Citizen science activities at higher education institutions are gaining in importance in many Member States but the level of activity is still rather low.
- Leading countries are the Netherlands, Ireland, the UK, and Denmark.
- Less developed countries are France, Hungary, and Poland.

Science communication culture

- An East-West divide was stated in terms of science communication culture.
- Among old Member States, Ireland, Luxembourg, Austria and Greece were labeled fragile.

6 Public engagement

Public engagement (PE) is defined through activities where there is a distinct role for citizens and/or societal actors in research and innovation processes. A defining characteristic is the complexity of objectives for PE and the variation in mechanisms for engagement.

The following indicators are included:

Number	Name of indicator	Note
PE1	Models of public involvement in science and technology (S&T) decision-making	MASIS
PE2	Policy-oriented engagement with science	Eurobarometer
PE3	Citizen preferences for active participation in S&T decision0making	Eurobarometer
PE4	Active information search about controversial technologies	Eurobarometer
PE5	Public engagement performance mechanisms at the level of research-performing organisations	Data available for 2014, 2015, 2016. Composite index based on HEI and PRO surveys of MoRRI consortium, 2017.
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 of MoRRI consortium, 2017.
PE8	Public engagement elements as evaluative criteria in research proposal evaluations	Data available for 2014, 2015, 2016. Composite index based on RFO survey of MoRRI consortium, 2017.
PE9	Research and innovation democratisation index	SiS survey.
PE10	National infrastructure for involvement of citizens and societal actors in research and innovation	SiS survey.

6.1 PE1 - Models of public involvement in S&T decision-making

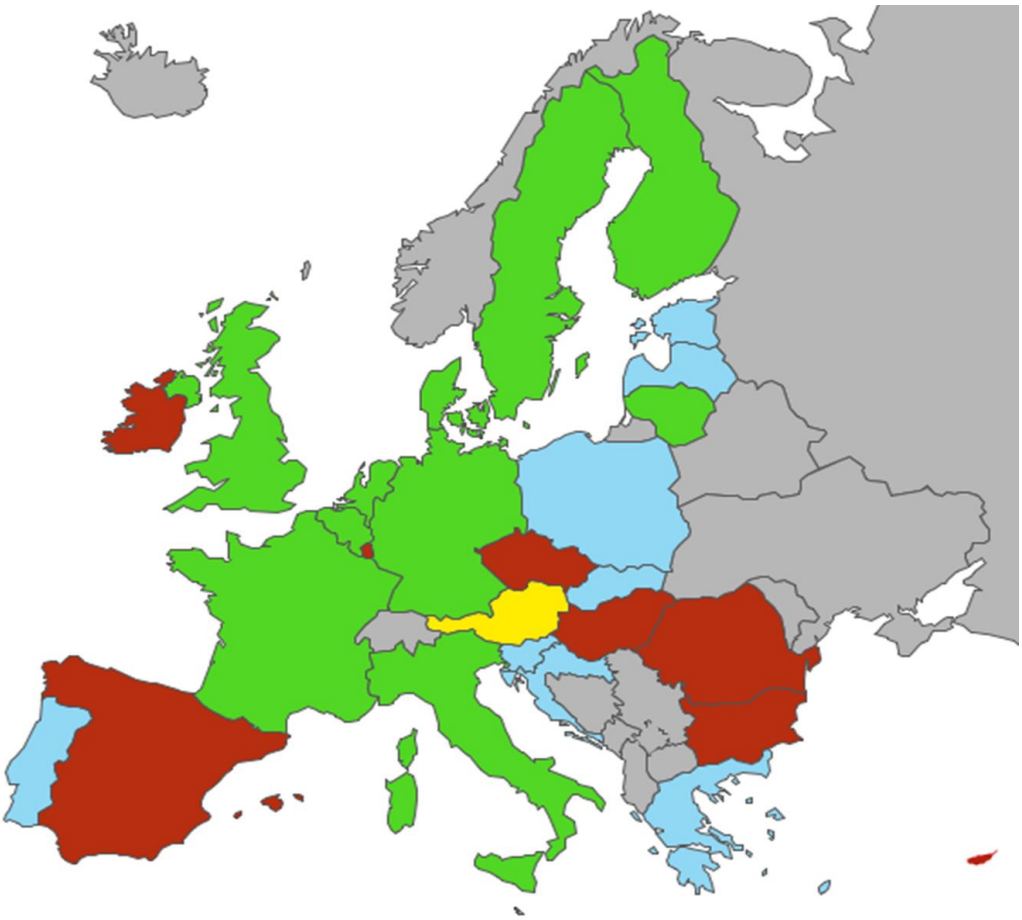
The indicator

Models of public involvement in S&T decision-making are a two-dimensional indicator based on secondary data from the MASIS project. The data collected via a network of country experts identify formal procedures for citizen involvement and also assess the actual degree of citizen involvement in science and technology decision-making. On one dimension is the degree of formalisation of structures and mechanisms, at the national level, for the involvement of citizens in decisions about science and technology. On the second dimension is the degree to which citizens are involved in making decisions. The two dimensions are considered to reflect the degree of overall democratisation of science and technology decision-making. On the basis of these two dimensions, member states are grouped into a four-category typology. Coverage includes the EU-27 except Malta.

This indicator was collected only once and thus the developments since 2012 are not known.

Outcomes

Figure 33 PE1 - Models of public involvement in S&T decision-making, 2012



Source: MASIS, 2012.
Key: Green: formalised/ high involvement; blue: formalised/ low involvement; yellow: not formalised/ high involvement; Red: not formalised/ low involvement.

The indicator divides European countries into three even groups. Ten EU member states from central, western and northern European countries together with Italy are included in the best performing group in which formalisation of participation mechanisms and high levels of citizen participation go together (coloured in green). A second group of 8 countries, including much of eastern Europe, Greece and Portugal have formalised structures in place, but participation can be further raised (light blue). Another 8 EU MS have neither formalised mechanisms for decision-making involvement nor high involvement of citizens in actual decisions (in red). The residual category of low formalisation but high public involvement in decision-making includes only Austria.

6.2 PE2 - Policy-oriented engagement with science

The indicator

Policy-oriented engagement with science is an individual-level indicator of the reported actual engagement of citizens. It combines three items from the 2010 Eurobarometer on 'Europeans, science and technology':

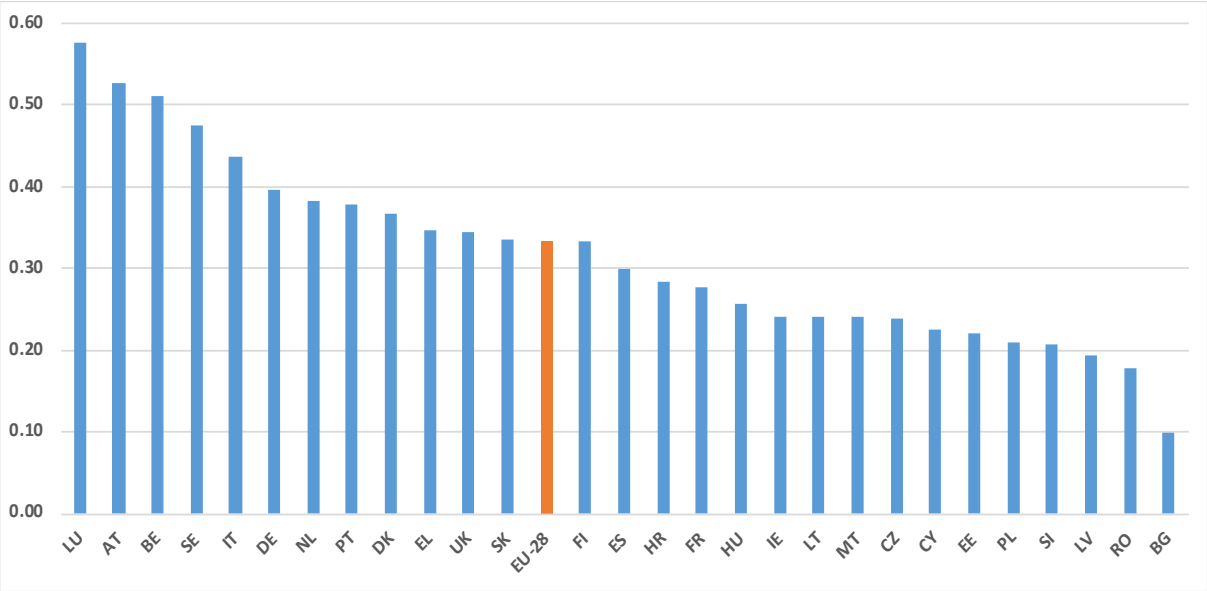
- Do you attend public meetings or debates about science and technology?
- Do you sign petitions or join street demonstrations on matters of nuclear power, biotechnology or the environment?
- Do you participate in the activities of a non-governmental organisation dealing with science and technology-related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

The indicator is calculated as a mean national score aggregated from a representative sample of citizens by country. Coverage includes the EU-28 plus.

This indicator was collected only once and thus the developments since 2010 are not known.

Outcomes

Figure 34 PE2 - Policy-oriented engagement with science, 2010



Source: Eurobarometer 340, (2010).
Note: In this case the EU-28 value corresponds to the mean score of all EU-28 respondents.

A majority of countries (16) perform worse than the EU-28 average (0.33) on this indicator. Eleven of these countries bounded by Ireland (0.24) and Bulgaria (0.99) record values that are a considerable distance below this average. Spain (0.30), Croatia (0.28), France (0.28) and Hungary (0.26) also record values well below the EU-28 average. Another group of 11 countries bounded by Luxembourg (0.58) and Denmark (0.40) record values well above the EU-28 average. It is apparent from these results that there is a significant split in performance on the 'policy-oriented engagement with science' indicator.

6.3 PE3 - Citizen preferences for active participation in S&T decision-making

The indicator

This indicator is derived from the special Eurobarometer on RRI, which reads: 'What is the level of involvement citizens should have when it comes to decisions made about science and technology?' with the following response categories:

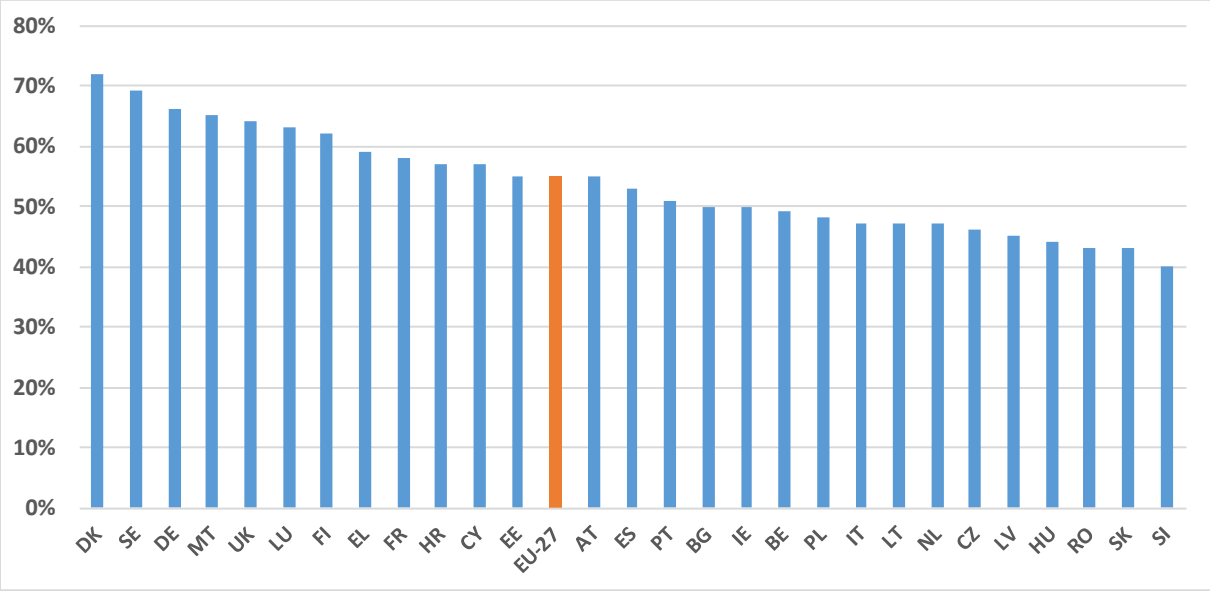
- citizens do not need to be involved or informed;
- citizens should only be informed;
- citizens should be consulted and their opinions should be considered;
- citizens should participate and have an active role;
- citizens' opinions should be binding;
- don't know.

The indicator reports the share of citizens at the national level expressing a preference for active participation. Coverage includes all EU-28 member states.

This indicator was collected only once and thus the developments since 2013 are not known.

Outcomes

Figure 35 PE3 - Share of citizens expressing a preference for active participation in S&T decision-making, 2013



Source: Eurobarometer 401 (2013).

In a majority of member states (16), the share of citizens expressing a preference for active participation in S&T decision-making is less than the EU-27 average (55%). A majority of citizens expresses a preference for active participation in 17 countries. A group of 11 countries, bounded by Belgium (49%) and Slovenia (40%), recorded values for this indicator, showing that a minority of citizens have a preference for active participation in S&T decision-making. The strongest preference for active participation is expressed in Denmark (72%) and Sweden (69%). Germany (66%), Malta (65%), the United Kingdom (64%), Luxembourg (63%) and Finland (62%) also record strong values for the indicator.

6.4 PE4 - Active information search about controversial technologies

The indicator

This indicator is built as a composite measure based on three individual items from the 2010 Eurobarometer on biotechnology. It divides respondents into three categories depending on their responses to background items concerning genetically modified (GM) food. The three categories of responses are:

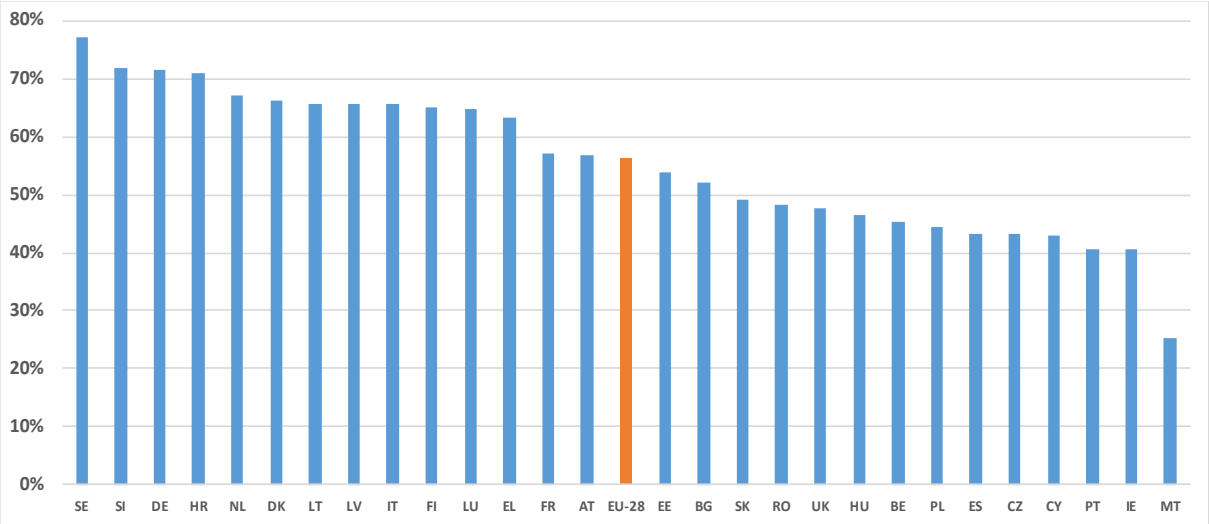
- have heard of and talked about and/or searched for information on GM foods;
- have heard of but not talked about or searched for information on GM foods;
- have not heard of (or talked about or searched for information on) GM foods.

The indicator is calculated as the share of respondents that have heard of and have talked about and/or searched for information on GM foods. The indicator taps into degrees of active information search, or what could be considered horizontal engagement, around controversial technologies.

This indicator was collected only once and thus the developments since 2010 are not known.

Outcomes

Figure 36 PE4 - Share of citizens active in information search about controversial technologies, 2010



Source: Eurobarometer 341 (2010).
Note: In this case the EU-28 value corresponds to the mean score of all EU-28 respondents.

In a majority of member states (14), the share of citizens who have heard or talked about, or searched for information on controversial technologies is higher than the EU-28 average (55.3%). A majority of citizens expresses a preference for active participation in 17 MS. A group of 12 MS, bounded by Slovakia (49.2%) and Malta (25.4%), recorded values for this indicator, showing that a minority of citizens have heard or talked about, or actively searched for information on, controversial technologies. The highest values recorded here are in Sweden (77.71%), Slovenia (71.7%), Germany (71.7%) and Croatia (71.0%). Malta (25.4%) is an outlier value on the indicator, with all other countries recording levels above 40%.

6.5 PE5 - Public engagement performance mechanisms at the level of research-performing organisations

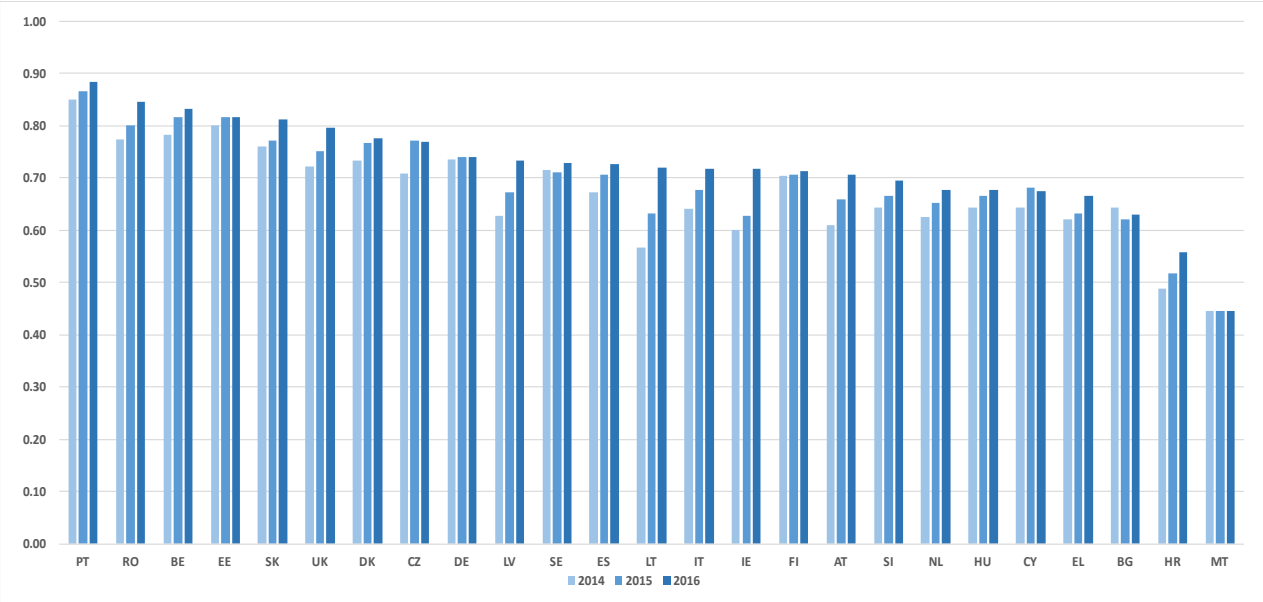
The indicator

This is a composite indicator based on two questions in the survey on RRI conducted for higher education institutions and public research organisations (MoRRI, 2017). The survey asked for information about the situation for 2014, 2015 and 2016. The values are between zero and one.

The questions concerned: 'Which mechanisms does your institution apply in order to interact with citizens and societal stakeholders?' (14 answer categories provided[5]) and 'Which level of strategic priority has public engagement at your research institution?' (high/ moderate/ no priority).

Outcomes

Figure 37 PE5 - Public engagement performance mechanisms at higher education institutions and public research organisations 2014-2016



Source: HEI and PRO surveys, MoRRI, 2017.

In this composite index, the country values can lie in the range of zero to one. High scores thus indicate prioritatisation and use of a broad range of public engagement mechanisms. All EU member states except Malta are above the midpoint of 0.50.

In 2016, Portugal, Romania, Belgium, Estonia and Slovakia were above the 0.80 mark, indicating that in those countries research-performing organisations had on average more than 80% of the public engagement performance mechanisms.

Evolution

In 2014, the average of the EU member states covered obtained a value of 0.67; by 2015, an increase to 0.70 was recorded and in 2016, a further increase to 0.72 occurred. In almost all countries, there was progress or stability. Sweden and Bulgaria experienced a small decrease between 2014 and 2015, and between 2015 and 2016, Portugal and Cyprus decreased mildly.

[5]Research projects in partnership with non-academic organisations; Collaboration with NGO's and local government bodies; Participation in EU projects/networks about Public Engagement; Community representatives in boards or committees; Specific activities involving schools children visiting the institution; Meetings / conferences addressed primarily to the public; Implementation of specific action plans targeting Public Engagement at your institution; Salary incentives for public outreach activities; Awards for science communication; Availability of a press and/or Public Relations office; Public Engagement as a criterion for promotion; Public availability of information regarding completed and ongoing research activities; Publications addressed primarily to the public; Organisation of outreach incentives such as 'open days' 'university festivals', etc.

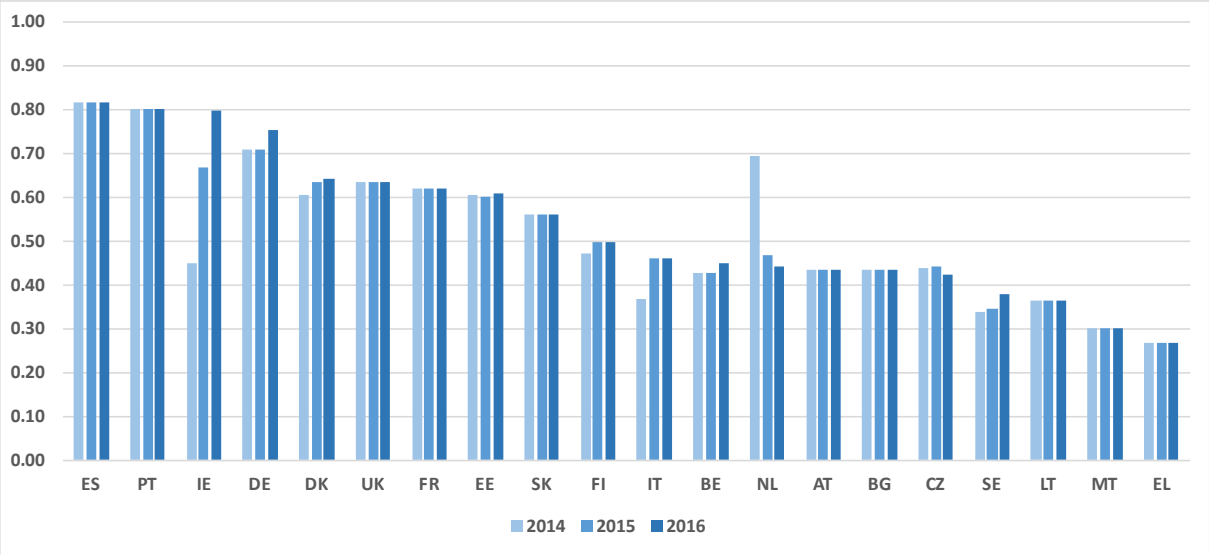
6.6 *PE7 - Embedding of public engagement activities in the funding structure of key public research-funding agencies*

The indicator

The indicator describes whether a country's largest and most prominent funding organisations allocate competitive funding to explicit public engagement activities. This composite index indicator is constructed based on two questions from the survey of research-funding organisations (MoRRI, 2017), namely on 'activities supported by targeted funding schemes' (dissemination to citizens or societal stakeholders; involving citizens or societal stakeholders in research activities; research projects on Public Engagement) and 'the extent to which the funding agency has engaged with citizens and societal actors when developing its funding strategies'. The responses were collected through the dedicated survey of funding organisations (MoRRI, 2017).

Outcomes

Figure 38 PE7 - Embedding of public engagement activities in the funding structure of key public research-funding agencies, 2014-2016



Source: RFO survey, MoRRI, 2017.
Note: LU and RO missing.

This index allows a spread of the member states between zero and one, where high scores likely indicate both depth of engagement with citizens and societal actors and breadth in terms of types of activities. For 2016, the range was between 0.27 (Greece) and 0.82 (Spain). The median for 2015 and 2016 was almost 0.50; for 2014 it was slightly lower with 0.47.

Evolution

For the period covered, 10 member states remained quite stable, such as Spain and Portugal in the leading group, as well as Malta and Greece at the lower end. In most other countries, the annual changes were moderate but positive. Only 3 MS have a somewhat divergent development: in Ireland, we can observe the highest year-to-year increases; in the Netherlands, there was a significant drop from 2014 to 2015; and in the Czech Republic there is a small decrease from 2015 to 2016.

It is interesting to note that member states with an already limited uptake of public engagement activities in funding structures do not even see a moderate change. Beside the Czech Republic and Hungary, the funding agencies remain with their limited embedding of public engagement activities.

6.7 PE8 - Public engagement elements as evaluative criteria in research proposal evaluations

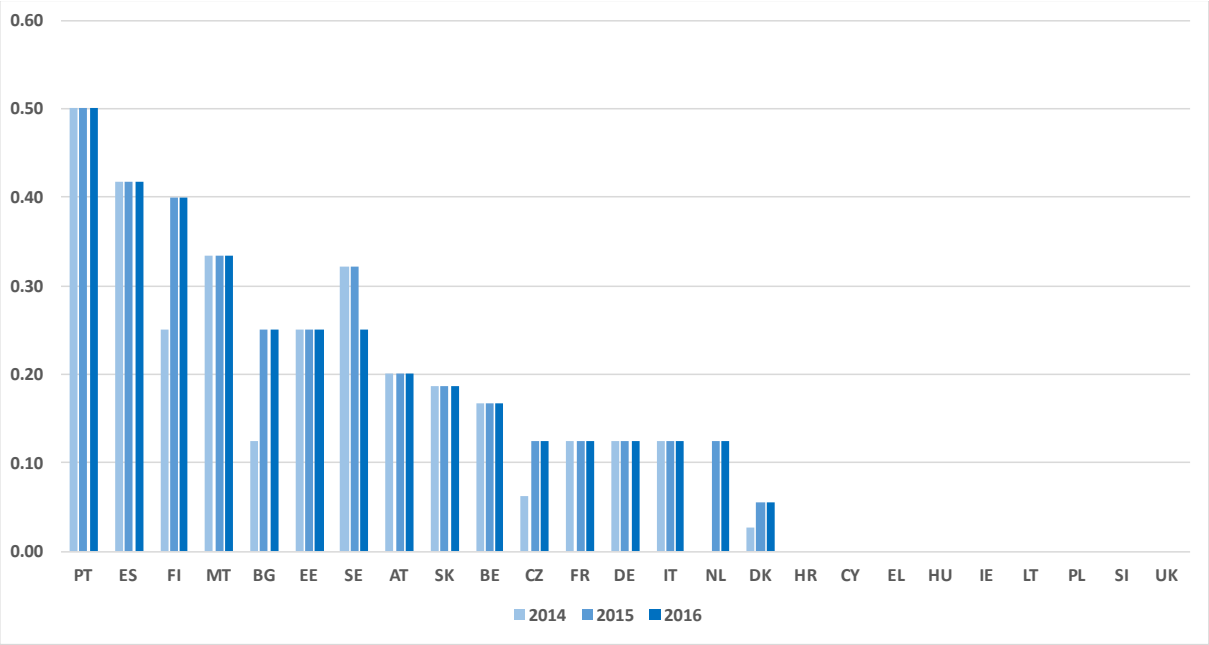
The indicator

This indicator describes whether a country's largest and most prominent funding organisations take public engagement elements into account for the evaluation of research and (to some limited extent) innovation projects.

This indicator is derived from one question of the research-funding organisations' survey (MoRRI, 2017): 'Please indicate the extent to which public engagement has been a criterion for the appraisal of research applications'. (A five-point scale from very small or no extent to very large was used). The responses were normalised (0 to 1).

Outcomes

Figure 39 PE8 - Public engagement elements as criteria in research proposal evaluations, 2014-2016



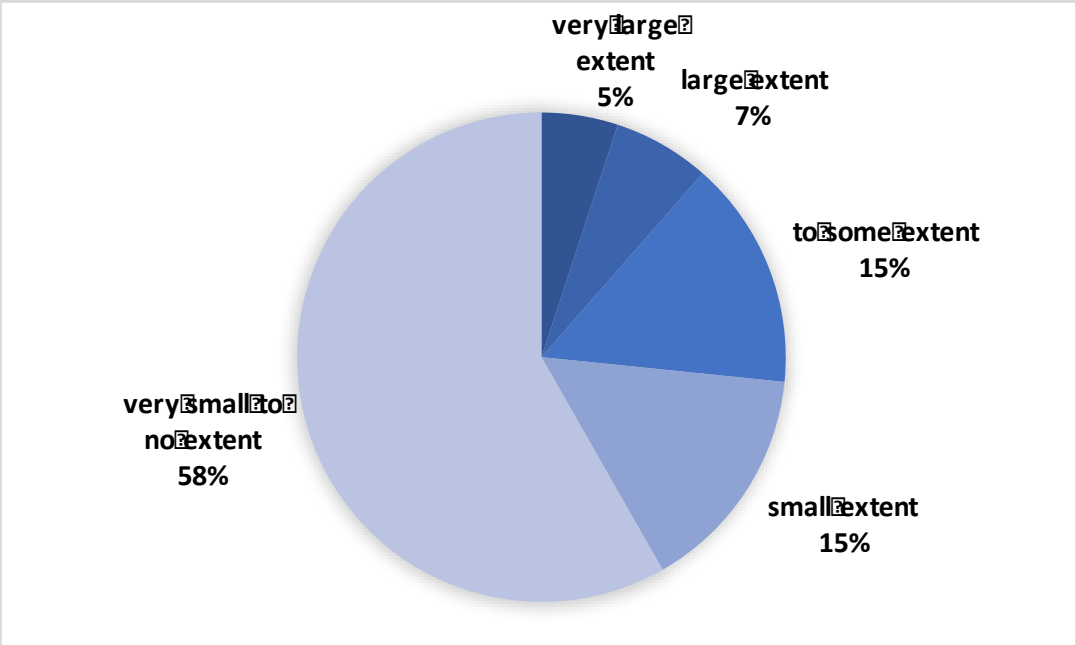
Source: RFO survey, MoRRI, 2017.
Note: LU and RO missing.

Public engagement elements are only marginally used as criteria in research proposal evaluations in Europe. It is not a criterion at all in 9 member states; for the remaining ones almost 60% of the responses were 'to a very small to no extent'. In a few cases, the criterion is used to a 'large' or 'very large' extent – these funding agencies are predominantly in the Nordic countries.

Evolution

This indicator is characterised by stability and a very low uptake. Public engagement has not been introduced in several countries' funding organisations as a criterion, and where it is a criterion the use is generally limited. In the 2014-2016 period, about 60% of the responding funding agencies used it to a 'very small to no extent' while the share of 'large' or 'very large' extent remained with 7% and 5% limited.

Figure 40 Extent to which public engagement has been a criterion in research proposal evaluations, 2014-2016



Source: RFO survey, MoRRI, 2017.

6.8 PE9 - Research and innovation democratisation index

The indicator

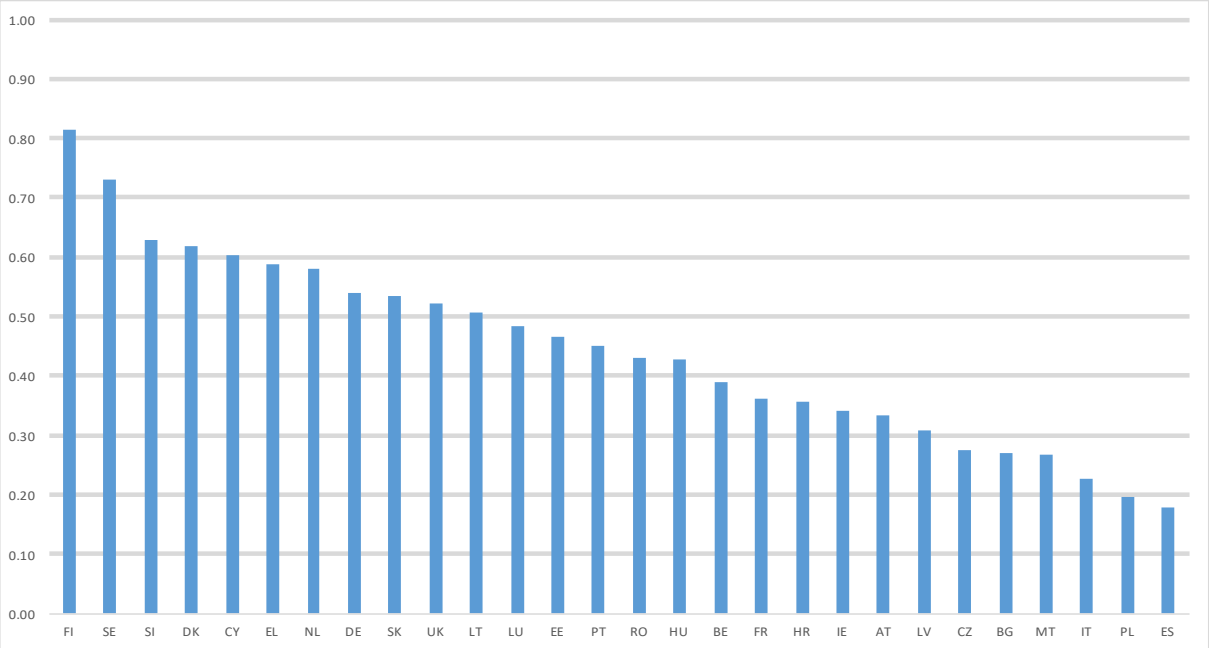
This indicator is based on opinions from public stakeholders about the degree of engagement by citizens and societal actors in research and innovation processes.

This composite indicator is based on two questions in a dedicated Science in society (SiS) survey (MoRRI, 2017), which asked for the present situation as well as opinions on changes during the previous 2 years. The questions were set as statements for citizens and civil society organisations (CSOs), namely if they were (1) informed, (2) consulted, (3) if their opinions had a significant impact on political decisions on research and innovation (R&I), and (4) if their values and expectations played an important role in R&I agenda setting. To all these questions, respondents were asked to what extent they agreed and whether or not the situation had improved/ worsened/ remained unchanged. The second question asked about awareness of legal frameworks in a given country, requiring citizen and CSO participation in S&T decision-making.

The indicator scores were normalised (0 to 1). It was collected through a dedicated SiS survey (2017).

Outcomes

Figure 41 PE9 - R&I democratisation index, 2016



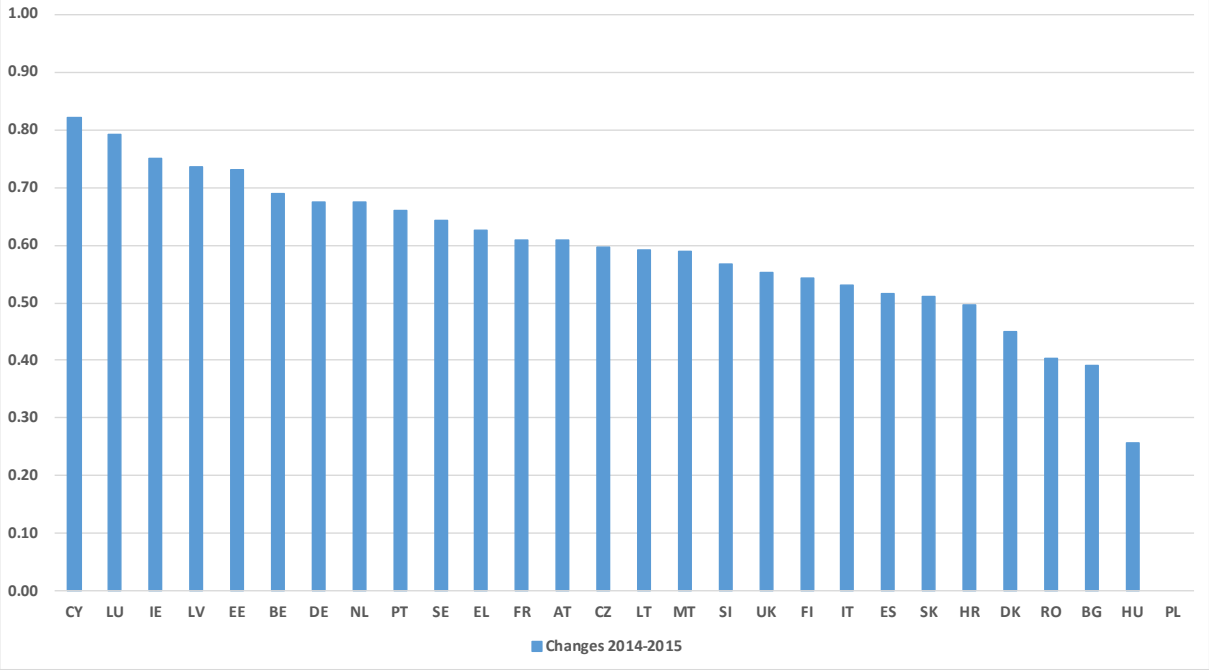
Source: SiS survey, MoRRI, 2017.

Figure 41 indicates the situation of a broader involvement of citizens and CSOs in science, research and innovation policy decisions in 2016. Since this is an index, there are marked differences between the member states, where high scores indicate extensive citizen and CSO participation in S&T decision-making. There are 13 MS that are equal to or above the mean of 0.50 with Nordic countries leading: Finland leading at 0.77, followed by Sweden (0.67) and Denmark (0.61). At the lower end, Italy (0.22), Spain (0.19) and Poland (0.16) suggest a rather low level of involvement of citizens and CSOs in political procedures within science, research and innovation policies.

Evolution

The survey also asked about the changes during 2014 and 2015. If one compares the perceived changes, there are about 15 countries that did not see a change in the situation. These are the countries whose columns are between 0.4 and 0.6. The countries that saw the situation improving are those closer to 1.00 and here, in particular Cyprus, Luxembourg, Ireland, Estonia and Latvia indicated positive changes. Negative changes are signalled by shorter columns, i.e. Bulgaria, Hungary and in particular Poland.

Figure 42 R&I democratisation index: changes, 2014-2015



Source: SiS survey, MoRRI, 2017.

6.9 PE10 - National infrastructure for involvement of citizens and societal actors in research and innovation

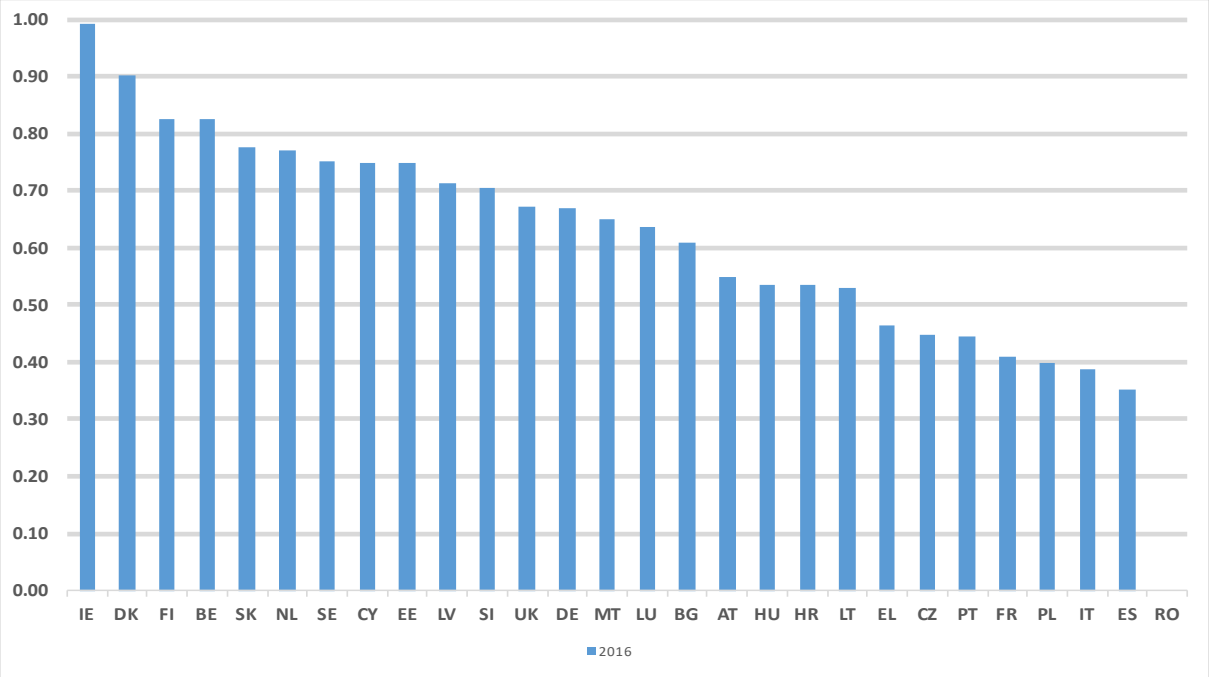
The indicator

This indicator is based on opinions from public stakeholders on the organisational landscape, which enable the engagement of citizens and societal actors in research and innovation processes.

This indicator is based on one question in the dedicated SiS survey (MoRRI, 2017), which asked for the present situation as well as opinions on changes during the previous 2 years. The following statements on citizens and civil society organisations were taken into account for calculating the indicator: (1) access, (2) representation, (3) availability of multiple channels for interaction. To all of them, respondents were asked to what extent they agreed and if the situation had improved/worsened/remained unchanged during the previous 2 years. The second question asked about awareness of legal frameworks in a given country, requiring citizens and CSO participation in S&T decision-making. The data was normalised (0 to 1). It was collected through a dedicated SiS survey (2017).

Outcomes

Figure 43 PE10 - National infrastructure for involvement of citizens and societal actors in research and innovation, 2016



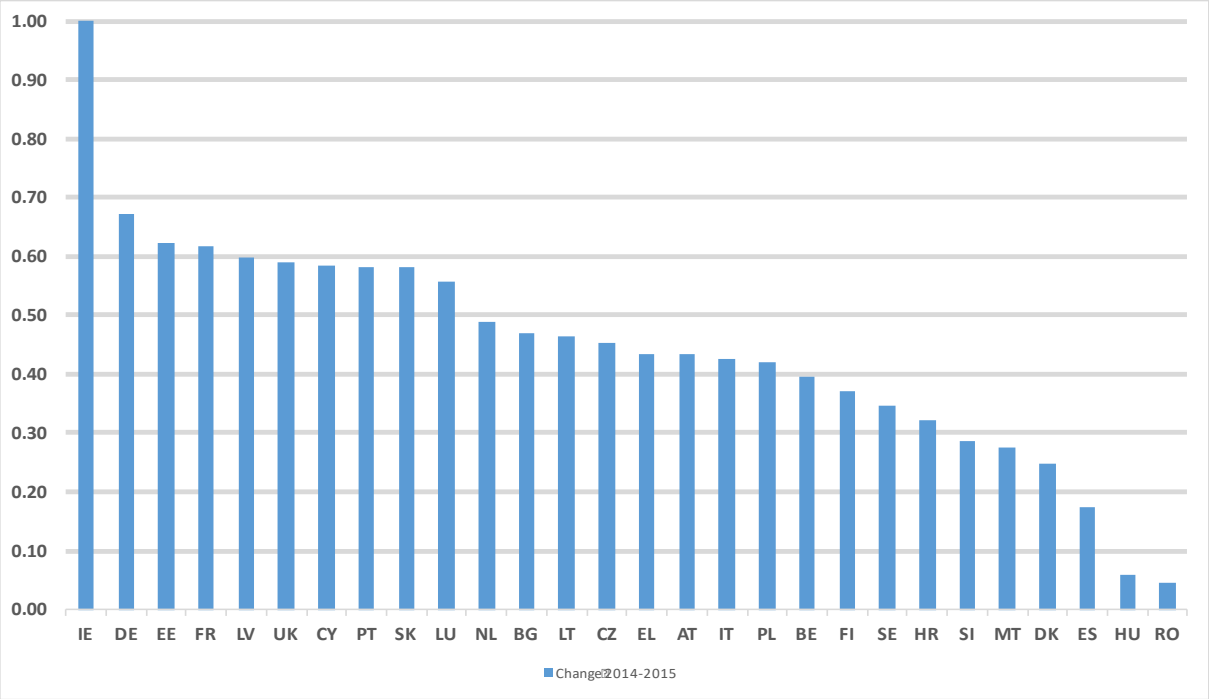
Source: SiS Survey, MoRRI, 2017.

Among the EU member states, Ireland was the only country for 2016 where respondents highly agreed that citizens and civil society organisations had resources (infrastructures) enabling them to be taken into account for research and innovation processes. In countries such as Denmark, Finland and Belgium, the level of agreement was also high. In the majority of EU member states, resources for engagement seem to exist. It was only in a few countries that agreement was clearly more limited, namely in France, Poland, Italy, Spain and Romania. In the latter, these resources seem to exist only marginally.

Evolution

It is interesting to note the perceived changes: the majority of countries did not experience a big shift – this is signalled by the columns 'around' the 0.50 mark (i.e. between 0.40 and 0.60). However for Ireland and Germany, the situation has markedly improved, while for about 10 member states the situation worsened, particularly in Spain, Hungary and Romania.

Figure 44 National infrastructure for involvement of citizens and societal actors in research and innovation: changes 2014-2015



Source: SiS Survey, MoRRI, 2017.

Public engagement

Main observations

Higher education

- Most institutions interact with citizens using various channels.
- A high variety can be seen in Latvia, Lithuania, Portugal, and Poland while Malta uses only a limited number.
- Lots of changes in the past three years can be seen in several countries such as Croatia, France, Italy, Austria, Spain, Belgium and the UK.

Funding structures

- Funding organisations in Spain and Portugal target public engagement to a large extent.
- In Sweden, Latvia, Malta and Greece public engagement is targeted to a much lesser extent.
- Ireland saw considerable change in the past three years,.

Evaluation criteria

- Public engagement is not an evaluation element in about nine EU Member States.
- In some countries such as Malta, Portugal, Spain or Estonia, a few funders take it into account.

Democratisation

- Citizens are involved in research and innovation processes to a high extent in Finland and Sweden and to a low extent in Poland and Spain.
- Most countries experienced a positive change in recent years with the exception of Hungary and Poland.

Infrastructures

- The organisational landscape enabling engagement of citizens is well developed in Ireland, Denmark, Finland, and Belgium but much less so in France, Poland, Italy, Spain and Romania.

7 Open access

Open access (OA) is the idea of making research results freely available to anyone who wants to access and re-use them (e.g. for full text mining). One of the main drivers of the impetus behind OA is to make publicly funded research accessible to the general public. In the academic sense, the term 'open access' referred originally to the provision of free access to peer-reviewed academic publications. OA is separated into 'gold' and 'green', where gold indicates OA journals and green indicates OA through self-archiving.

Open access was initially treated within MoRRI with two dimensions, namely open access publications and open data. However, for the latter, the concept needs further clarification in order to develop data sources and relevant indicators (Robinson-Garcia et al., 2017)[6].

The following indicators (with breakdowns) are included:

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.

[6] See reference: https://www.sciencedirect.com/science/article/pii/S1751157717300834?via%3Dihub.

7.1 OA1 - Open access literature

The indicator

The indicator informs about the number and share of sustainable and legal open access publications, instead of the mere identification of publications whose full text can be retrieved online. Differentiation was made between the access paths (green, gold) for the years 2009 to 2014.[7]

The main data sources used were the DOAJ list (Directory of Open Access Journals), PMC (PubMed Central), the ROAD list (Directory of Open Access scholarly Resources), CrossRef, and OpenAIRE, which all fulfil the requirements of sustainability and legality. Sustainable, in this context, means that it should, in principle, be possible to reproduce repeatedly the OA labelling from the various sources used, in an open fashion, with a relatively limited risk of the source disappearing behind a pay-wall. Legal relates to the usage of data sources that represent true open access evidence for publications, and does not offer open access to rogue or illegal open access publications. Other popular 'apparent' OA sources such as ResearchGate and SciHub fail to meet these two principle requirements. Thus, this approach aims at informing policies of open access based on the above-mentioned principles, in contrast with other approaches that provide a picture of overall online access to the full text of scientific publications.

Outcomes

The share of open access publishing among the total number of scientific publications is shown in Figure 45 and Figure 47. The total number as well as the share of publications is based on fractional counting, i.e. giving equal weight to all co-authors of a publication.

The total number of publications in the EU-28 increased from ~370 000 publications in 2009 to around 434 000 publications in 2016. In this period, the average share of OA publishing in the EU-28 increased from 21% to 31% in 2014, remaining stable in 2015 and 2016. In the last 3 years (2014, 2015, 2016), the relative share of gold open access has increased more strongly in relation to the share of green open access.

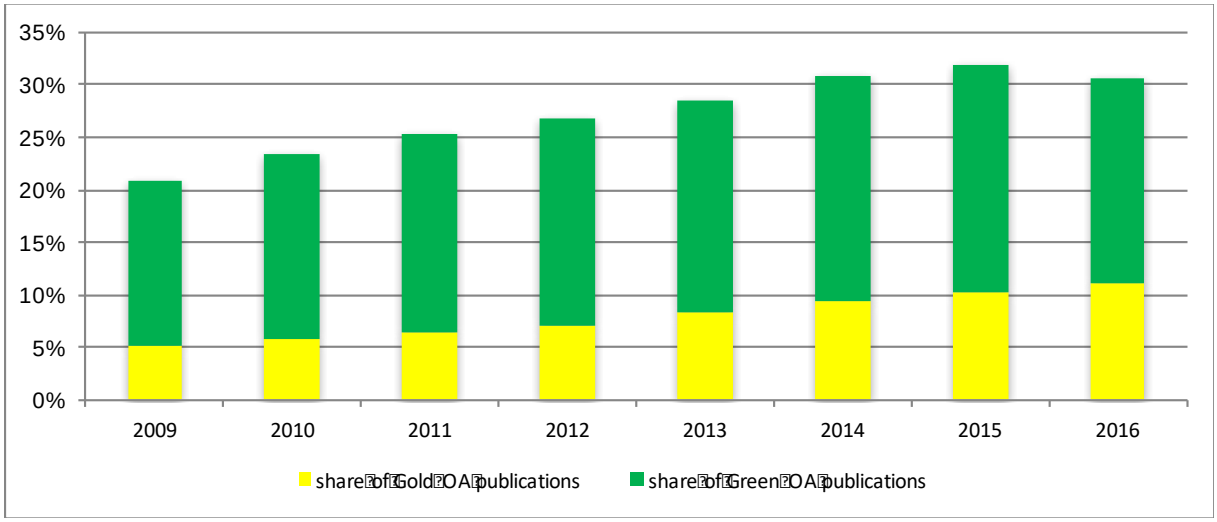
The share of OA publishing in the EU member states in 2016 was between 15% (Latvia) and 46% (United Kingdom). In comparison, OA publishing in the USA, Japan and China is 34%, 24% and 23% respectively. In general, it is higher in countries that publish a great deal. Among the high publishing countries, the share of OA is the lowest in Italy and highest in the United Kingdom.

Between 2010 and 2016, the share of OA publications increased in most countries. From 2014, the share slightly increased in 2015, and decreased in 2016 (as also shown in Figure 45). Exceptions from the EU member states are Austria, Luxembourg, the United Kingdom, Lithuania and Slovakia. Internationally, China and Japan continually increase their share of OA publications.

The explanation for the slow increase in OA publishing in 2015 and 2016 is most likely that it is not almost at a standstill, but is related to delays in the updating of the underlying databases. This means that when the years 2015 and 2016 are analysed again, say in late 2018, the shares will probably be higher due to the progressive completion of previous years. This also strongly suggests that the most recent years should not be included, in order to avoid interpreting inaccurate preliminary data.

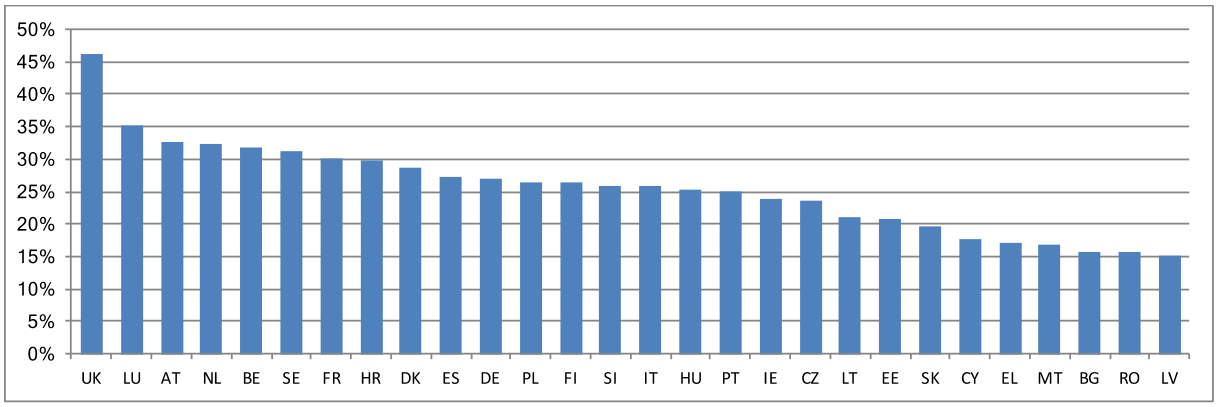
[7] The methodology is identical to the one used for data collection of OA under a current study contract with DG-RTD 'Key technology domains'. OA is defined by the various sources used for the labelling of Web of Science covered publications. Gold OA is defined by the appearance of a journal on the DOAJ or ROAD journal list. Green OA is defined by the presence of publications in CrossRef, PubMedCentral or OpenAIRE. Hierarchically, Gold OA is set above Green OA, in a sense that whenever publications are found through Gold and Green, Gold has priority over Green. Gold and green thus are mutually exclusive in the dataset.

Figure 45 Share of OA publishing, 2009 to 2016 (world)



Source: CWTS, MoRRI, 2017.

Figure 46 OA1.1 - Shares of OA publishing in 2016 (EU member states)

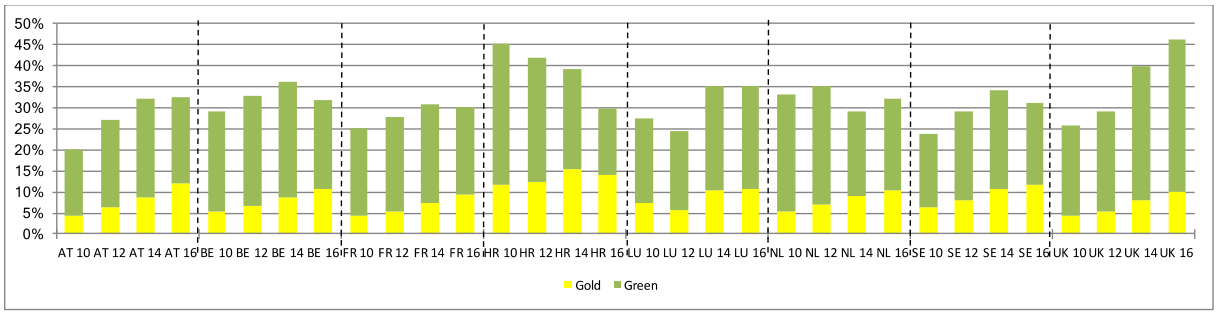


Source: CWTS, MoRRI, 2017.

The share of gold open access in EU member states ranged between 8% and 14% of all publications. For the share of green open access publishing the range is wider: the lowest can be found in Latvia with 7%, while the United Kingdom has the highest with 36%.

The EU-28 member states were divided into 3 groups to analyse in greater depth the evolution of gold and green open access publishing. Figure 47 shows the EU-28 member states with the highest share of OA publishing (>30% in 2016). In this group of countries, gold open access is the highest in Croatia (14%), Austria and Sweden (both 12%). In the United Kingdom the share of green OA publishing is relatively high (36%). Overall, there is a gradual increase in gold open access publishing.

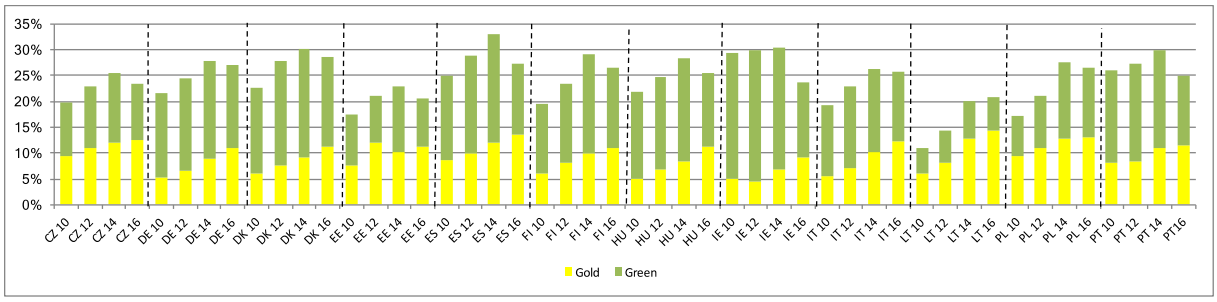
Figure 47 OA1.1 - Shares of OA publishing by type and member state, 2010-2016



Source: CWTS, MoRRI, 2017.

Figure 48 shows the EU-28 member states with an average share of OA publishing. Similar to the group of highest shares of OA, this group sees a similar trend in increased gold OA publishing. This increase is particularly strong in Lithuania.

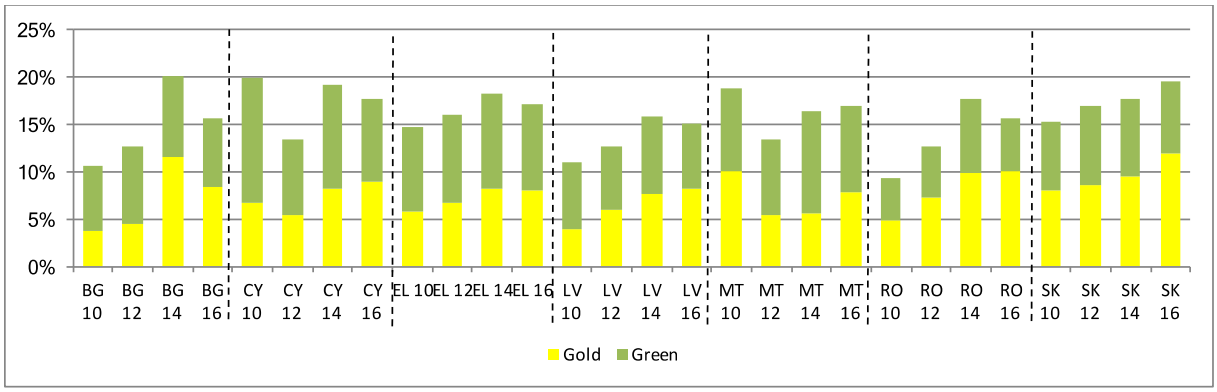
Figure 48 OA1.1 - Share in OA publishing by type and member state, 2010-2016



Source: CWTS, MoRRI, 2017.

Figure 49 shows the evolution of green and gold open access publishing in the countries where OA publishing is less than 20%. Also in this group, gold OA is increasing, except for Bulgaria.

Figure 49 OA1.1 - Share in OA publishing by type and member state, 2010-2016



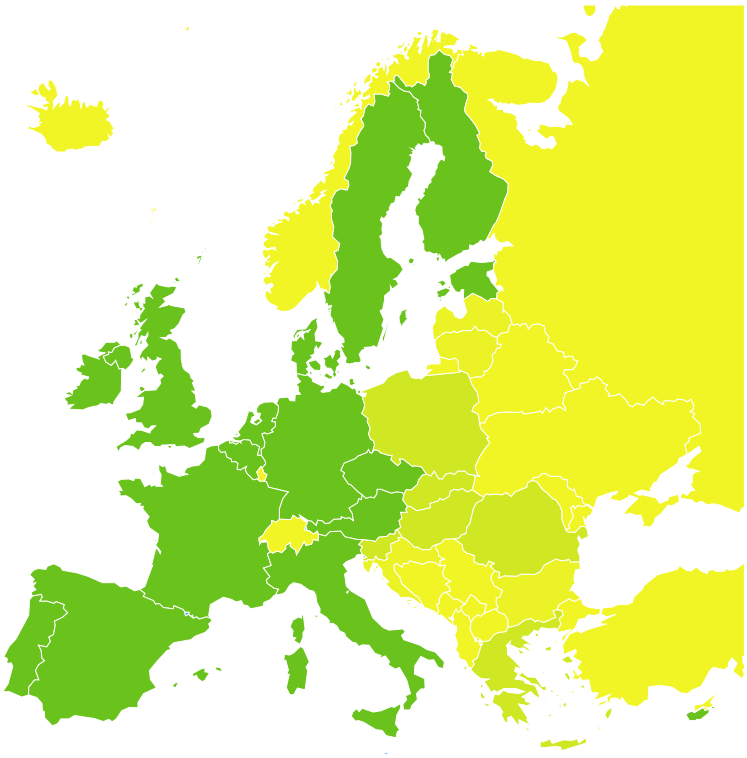
Source: CWTS, MoRRI, 2017.

The indicator 'mean normalised citation score' (MNCS) is used as a field-normalised scientific impact indicator.[8] Annex 8 provides an overview of this impact indicator for the years 2010 and 2014 for all open access publications, as well as green and gold OA routes. A score of 1 reflects world average, a score of >1.2 is considered above world average, and a score below 0.8 is considered below world average.

This impact indicator differs among EU member states. In 16 out of the 28 MS it increased between 2010 and 2014, whereas in the other 12 it decreased. With regard to all OA publications, the indicator was above 1.2 in 17 MS in 2014 (indicated as dark green in Figure 50), close to the world average in 5 of them, and below in the remaining 6 MS. The high open access mean normalised citation score (MNCS) is almost entirely related to green OA. Gold OA publishing is not linked to a higher MNCS, with the exception of the United Kingdom in 2010. In fact, in 2014, 15 EU member states were below the world average for gold OA publishing. The MNCS is generally accepted as an indicator of citation impact that corrects for field differences. It does not take into account citation practices of researchers across Europe.

[8] To know more about field normalisation of citation indicators, see Waltman & van Eck (2018): https://arxiv.org/ftp/arxiv/papers/1801/1801.09985.pdf.

Figure 50 OA1.2 - Citation scores for OA publications



Source: CWTS, MoRRI, 2017.
Key: Dark green: field normalised citation score above 1.2; light green: below 0.8. All others, around world average.

7.2 OA3 - Social media outreach/take-up of OA literature

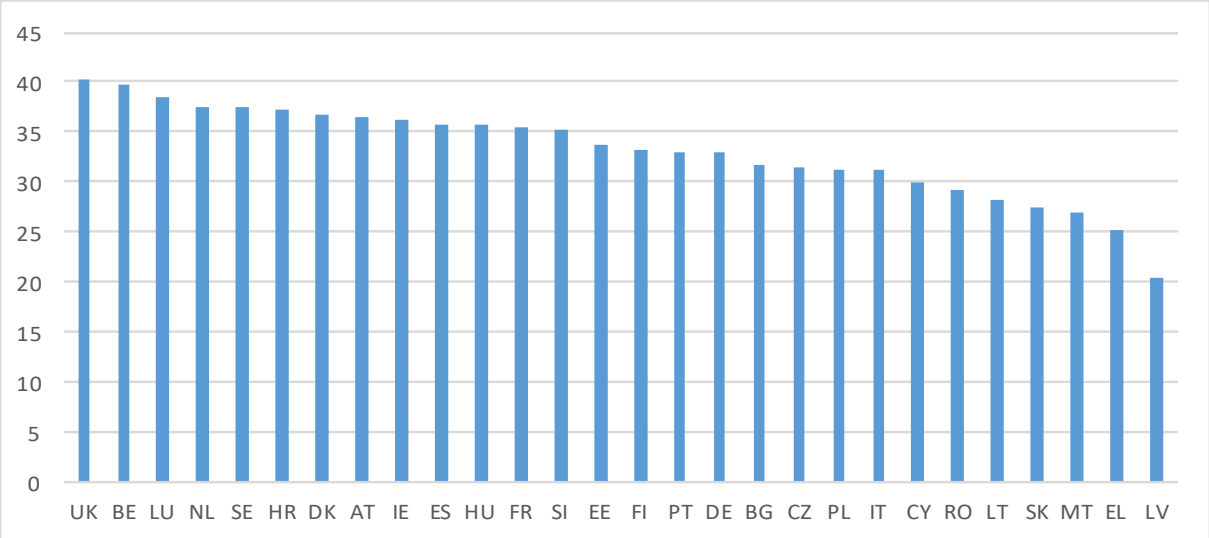
The indicator

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). This means that only publications with a DOI are included in the analysis. The two channels 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. Twitter has a much broader outreach function but it captures a lower engagement between the users and publications (Haustein, Bowman and Costas, 2016[9]; Robinson-Garcia et al., 2017)[10]. Wikipedia articles are written by digitally connected users, but since Wikipedia entries are consulted by the 'average' user (and thus not only researchers) it indicates a direct, wider benefit. In order to measure a real impact, it is necessary to calculate the share of OA publication sources compared to other sources.

Outcomes

Figure 51 indicates the shares of OA publications within the DOI population of publications covered by altmetric.com. With 40% of OA publications, the United Kingdom accounts for the highest share, followed closely by Belgium and Luxembourg. At the other end of the scale, Latvia has only 20% of its publications as OA, followed by Greece with 25%. Thus, across the EU-28, non-OA publications dominate with 60% to 80% of all publications.

Figure 51 Share of OA publications, 2012-2015



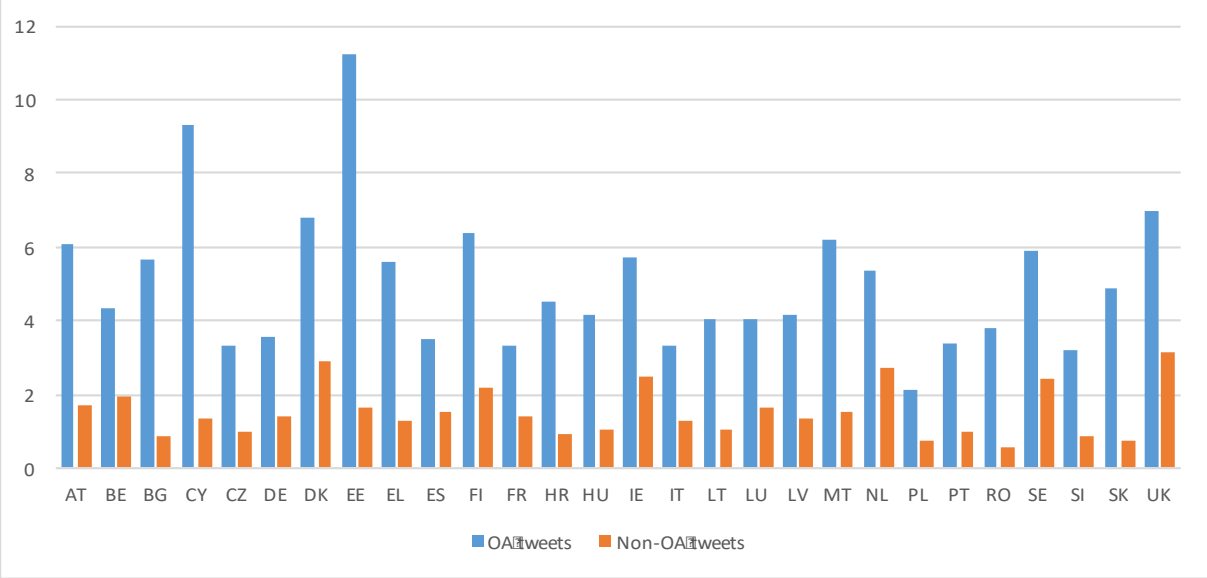
Source: CWTS, MoRRI, 2017.
Data: altmetric.com

Figure 52 shows clearly that OA publications are tweeted far more than non-OA ones. On average, each OA publication is tweeted 5 times while non-OA ones are tweeted 1.5 times. Estonian OA publications obtain the highest number with 11.2 tweets per publication while Polish ones receive the lowest number with 2.1 per publication.

The low shares of non-OA tweets in several eastern member states such as Romania, Poland, Bulgaria, Slovakia, Slovenia or Croatia (all below 1.0) (and also in comparison to their ratios of OA publication-based tweets) suggests that access to non-OA publications is by and large limited.

[9] See: https://arxiv.org/abs/1502.05701
[10] See: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0183551.

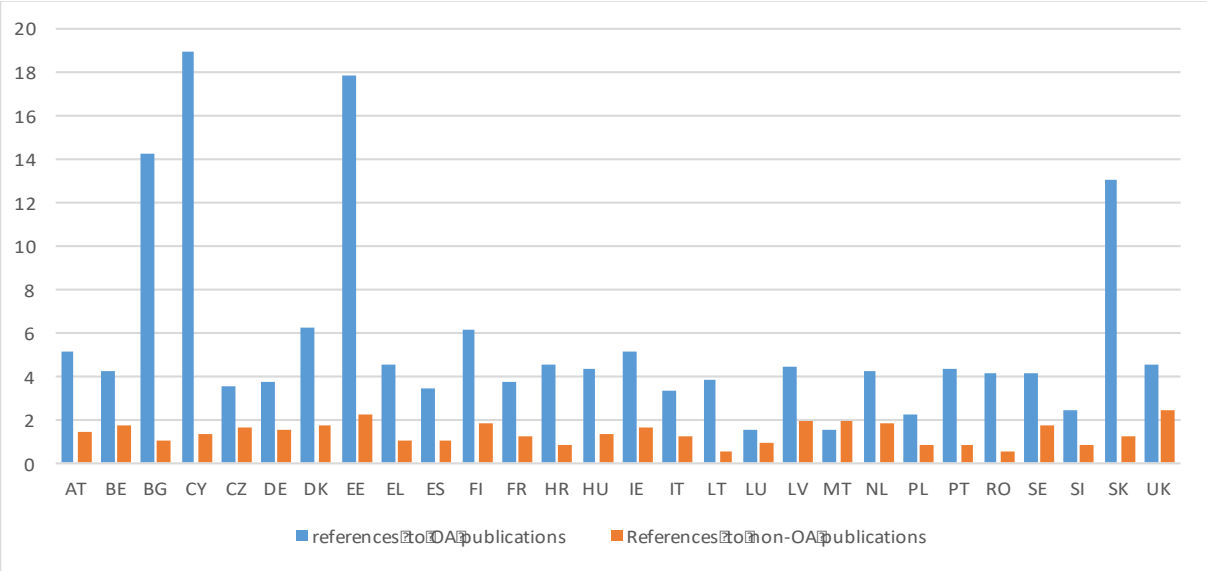
Figure 52 OA3.1 - Number of tweets per publication for OA and non-OA publications, 2012-2015



Source: CWTS, MoRRI, 2017.
Data: altmetric.com

An interesting indicator with a broader impact concerns the references in Wikipedia. These articles refer to a variety of sources, including scientific articles. The following figures indicate the shares of articles – OA as well as non-OA – as cited in Wikipedia entries.

Figure 53 OA3.2 - Share of OA and non-OA publications used in Wikipedia, 2012-2015



Source: CWTS, MoRRI, 2017.
Data: altmetric.com

If one assumes that these entries are not only written by researchers[11] but that information needs to be referenced, those authors without access to paid journal articles will quote from open access ones. In fact, as Figure 53 indicates, the open access articles tend to be cited much more often than the non-OA ones. Overall, 5.7% of OA articles and 1.4% of non-OA articles are cited in Wikipedia. The use though is very varied. An interesting difference can be found among the countries with the smallest outputs: for Luxembourg and Malta the share is around 1.5% and thus the lowest, Cyprus has the highest share with almost 19%. A high share can also be found in Estonia (18%), Bulgaria (14%) and Slovakia (13%), while Slovenia (2.4%) and Poland (2.2%) have amongst the lowest shares, together with the smallest countries mentioned above.

[11] There are about 30 million registered users and another 30 million individual internet provider (IP) users – thus, the probability is rather high that non-specialists are authoring and editing many entries (see: Wikipedia: Authors of Wikipedia).

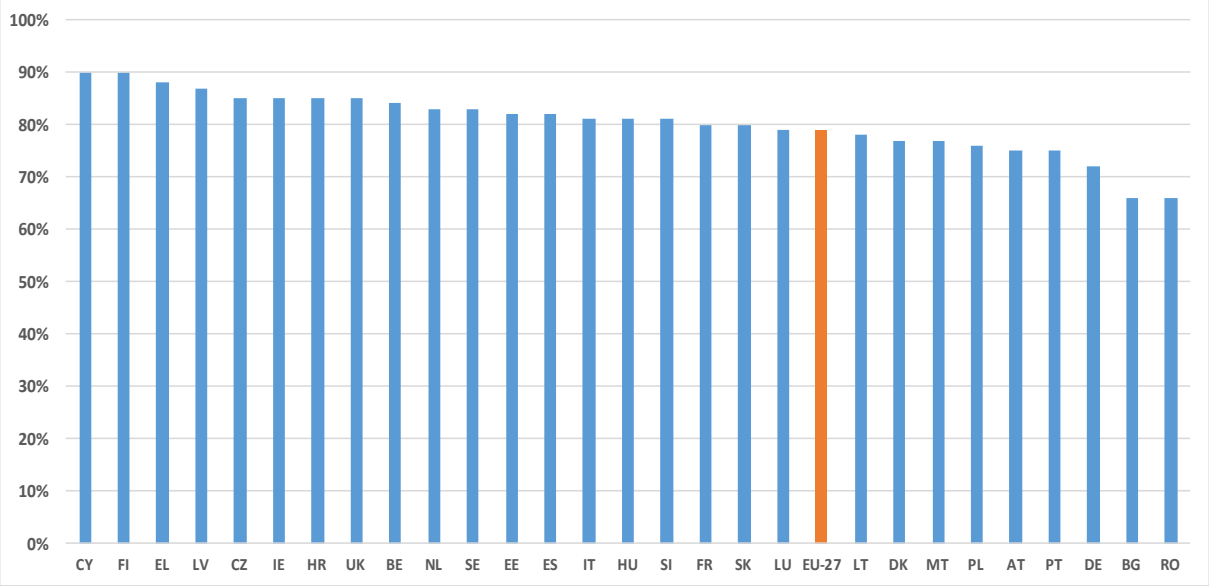
7.3 OA4 - Public perception of open access

The indicator

The indicator on the public perception of open access is constructed from a question in Eurobarometer 2013. It provides the share of respondents who think that publicly funded research should be made available. This indicator was collected only once, therefore its evolution cannot be provided.

Outcomes

Figure 54 OA4 - Public perception of open access, 2013



Source: Eurobarometer 401.

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 at more than 30%. The EU average is 79%. Nineteen EU member states are above the EU average, and 9 are below. There seems to be no clear pattern discernible in the sense that a mix of old and new, northern, southern, eastern and western member states, high and low gross expenditure on research and development (GERD) countries can be found on both sides of the average.

7.4 OA5 - Funder mandates

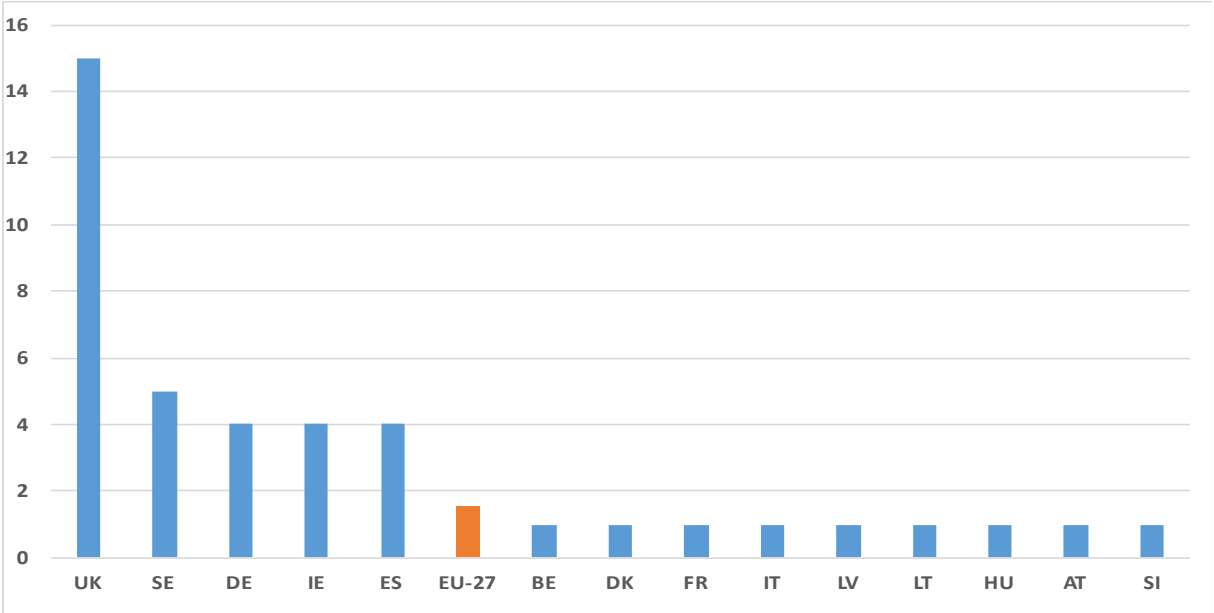
The indicator

This indicator is derived from an *ad hoc* survey by DG-RTD of the OpenAIRE network. It is used as background material to a staff Commission paper (SDW (2012)0222) on open access. It signals whether or not national funders are disposed to open access publishing. The absolute numbers, however, need to be considered in relation to national funding structures. While in some EU member states there may be one or two main research-funding agencies, in others the number can be much more substantial (such as in the United Kingdom with its many Research Councils).

The indicator has not been updated since 2011. However, it is likely that there have been changes given the significant increase of open science practices in recent years.

Outcomes

Figure 55 OA5 - Existing funding mandates for OA publishing, 2011



Source: EC 2012 (SWD(2012)0222).

An *ad hoc* survey of the OpenAIRE repository by DG-RTD checked if funding organisations required open access publishing of their sponsored research. While the survey uses absolute figures, interpretation of the absolute figures need to take into account national funding structures and therefore the number of funders[12].

According to the OpenAIRE data (for the EU-27[13]), there were no national funders in 13 MS requiring open access publications versus 14 who indicated that there were national funders requiring OA publishing. The United Kingdom is the country with the highest number of individual funding agencies that apply open access mandates (15), followed by Sweden (5), Germany, Ireland and Spain (4 each). These are also the countries above the EU average of 2.

[12] In a number of Member States, there are dedicated thematic Councils (e.g. United Kingdom, Denmark) which also act as funders, while in others there are one or two main funding agencies (e.g. Germany).
[13] Without Croatia

7.5 OA6 - Research-performing organisations' support structures for researchers as regards incentives and barriers for data sharing

The indicator

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:

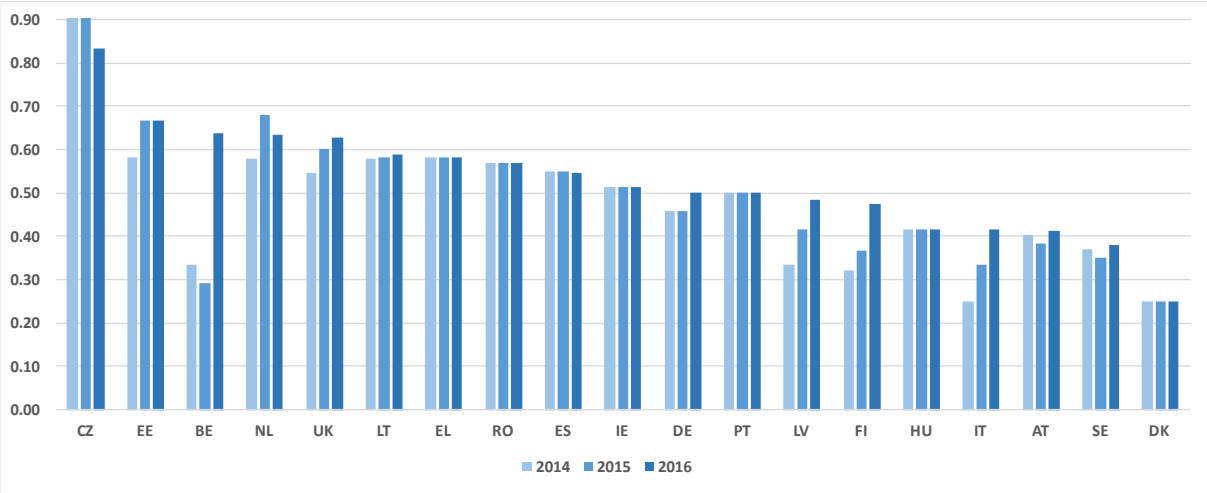
- Repositories are provided by your institution/by departments.

(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.

Outcomes

Figure 56 Higher education institutions' support structures for researchers as regards incentives and barriers for data sharing

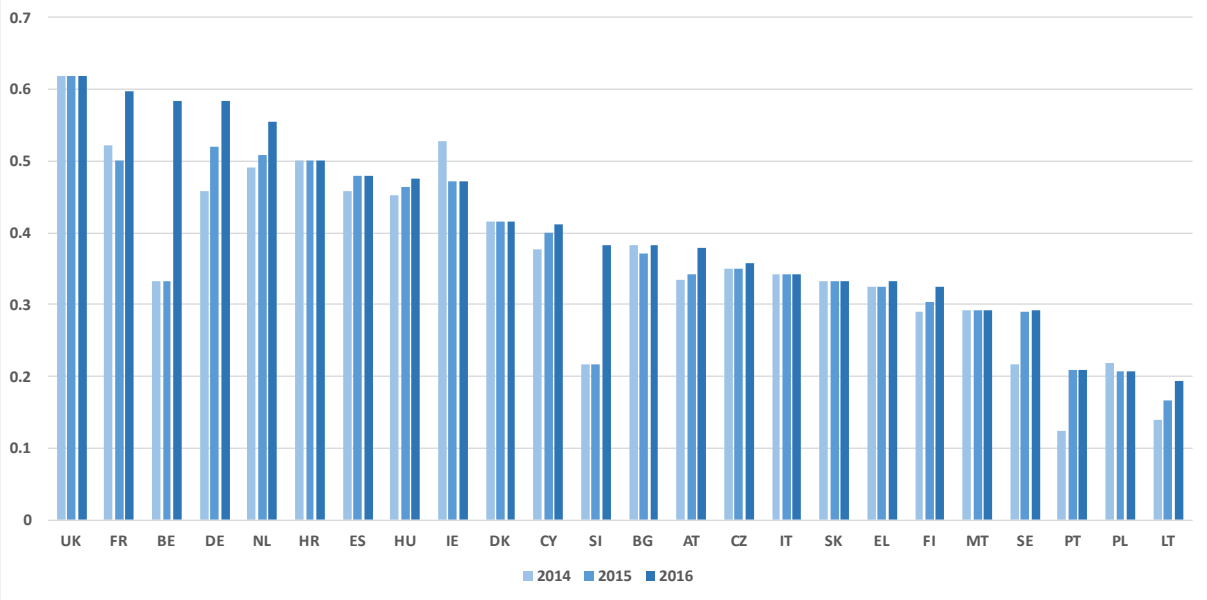


Source: HEI Survey, MoRRI, 2017.
Note: No data for BG, HR, CY, MT, SK, SI, PL, LU. Insufficient response for FR

In some EU member states support structures for data sharing appear to be developed. Given the lack of responses from several countries, one can however assume that these structures are not developed. The majority of the non-responding countries are also those with a rather low public perception of open access (see Figure 54).

There was no responding higher education institution offering all of the options. In 2016, a relatively high share of the options can be found in the Czech Republic, Estonia, Belgium, the Netherlands and the United Kingdom (all above 60), while the country with the lowest share of structures was Denmark with 0.25. Overall, the average was 0.53 in 2016. The situation is less advanced in public research organisations. The average for the EU was 0.41 in 2016. The level ranges from 20% to 60% – the lowest level to be found in Lithuania (0.19) and the highest in the United Kingdom (0.62).

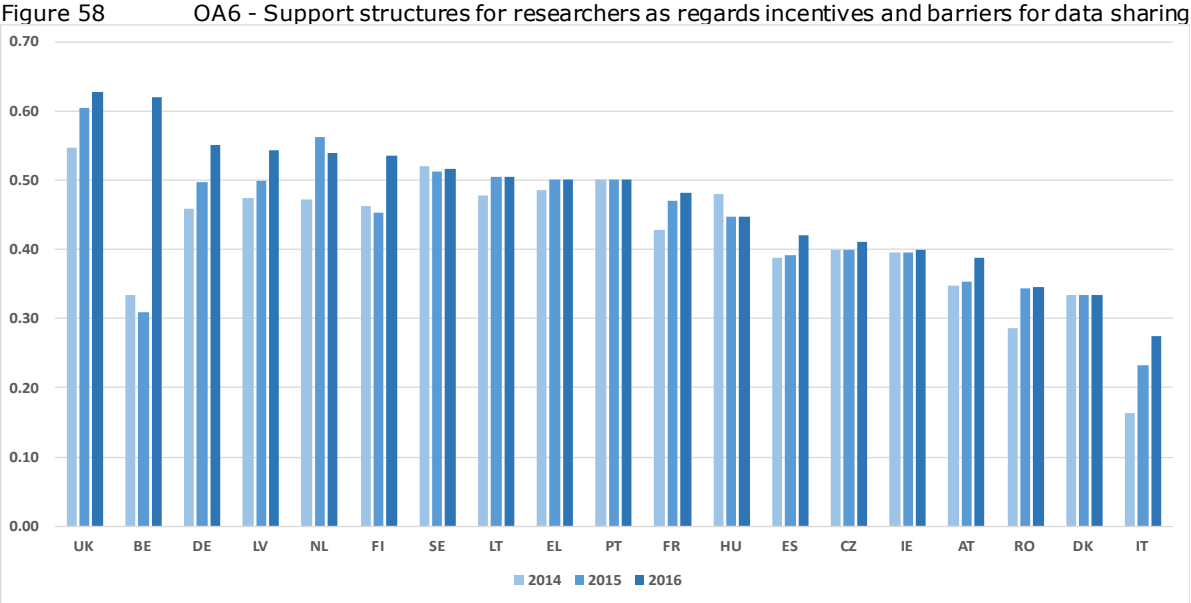
Figure 57 Public research organisations' support structures for researchers as regards incentives and barriers for data sharing



Source: PRO Survey, MoRRI, 2017.
Note: No data for LU; insufficient response for RO, LV.

With both results taken together, the overall picture can be seen in Figure 58: the average of the 19 countries included was 0.47 in 2016. The highest range was recorded for the United Kingdom with 0.63, and the lowest for Italy with 0.27. The differences between the types of research organisations and their achievements in terms of incentives and barriers thus explain the aggregated picture.

Figure 58 OA6 - Support structures for researchers as regards incentives and barriers for data sharing



Source: HEI, PRO Surveys, MoRRI, 2017.
Note: No data for LU.

Evolution

It is interesting to note that there are increases in a number of countries, which are not only due to higher response rates but also most likely due to real changes in support. Estonia, Belgium, the Netherlands, the United Kingdom, Germany, Latvia, Finland, Italy, Austria and Sweden indicated changes in their system from one year to another. Interestingly, there is not a constant change in all of the countries. Nevertheless, the absence of several member states and the rather low share of structures suggest that the concept of data sharing needs to be developed further.

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.

8 Ethics

MoRRI used the following definition: 'Ethics as a scientific discipline is concerned with normative rules for everybody. In the context of research and innovation, ethics is a common platform for deliberation and discussion of values in society that are based on perceptions of right and wrong, influenced by cultural norms and aiming at informing policy making'.

The following indicators are included:

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.

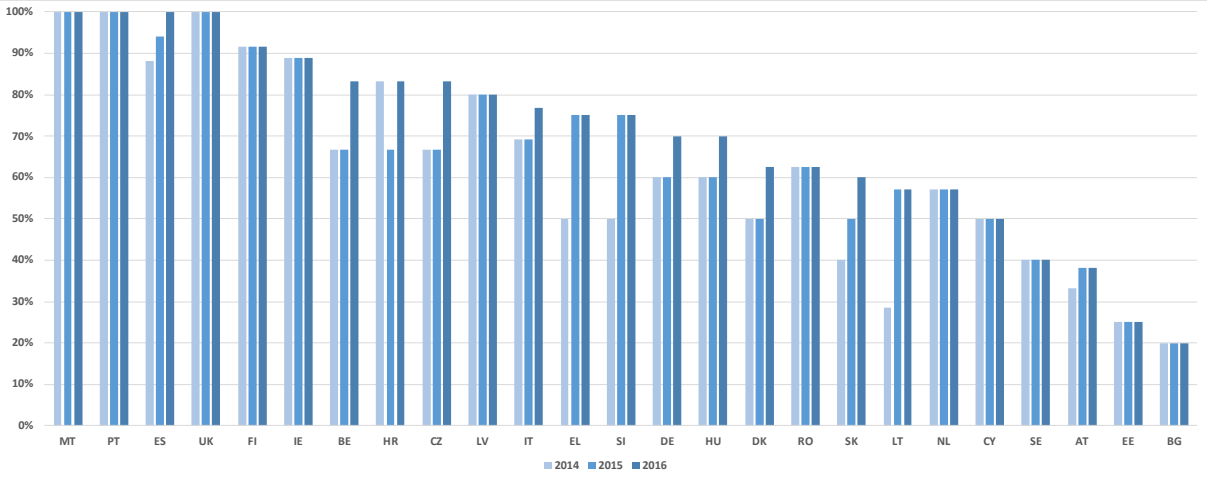
8.1 E1a - Ethics at the level of higher education institutions and public research organisations

The indicator

This indicator was derived from two questions in the surveys of higher education institutions and public research organisations (MoRRI, 2017), namely: 'Did your organisation have a research ethics committee?', and 'Did your institution have a research integrity office?' (operating during 2014, 2015 and 2016).

Outcomes

Figure 59 Share of higher education institutions having a research ethics committee



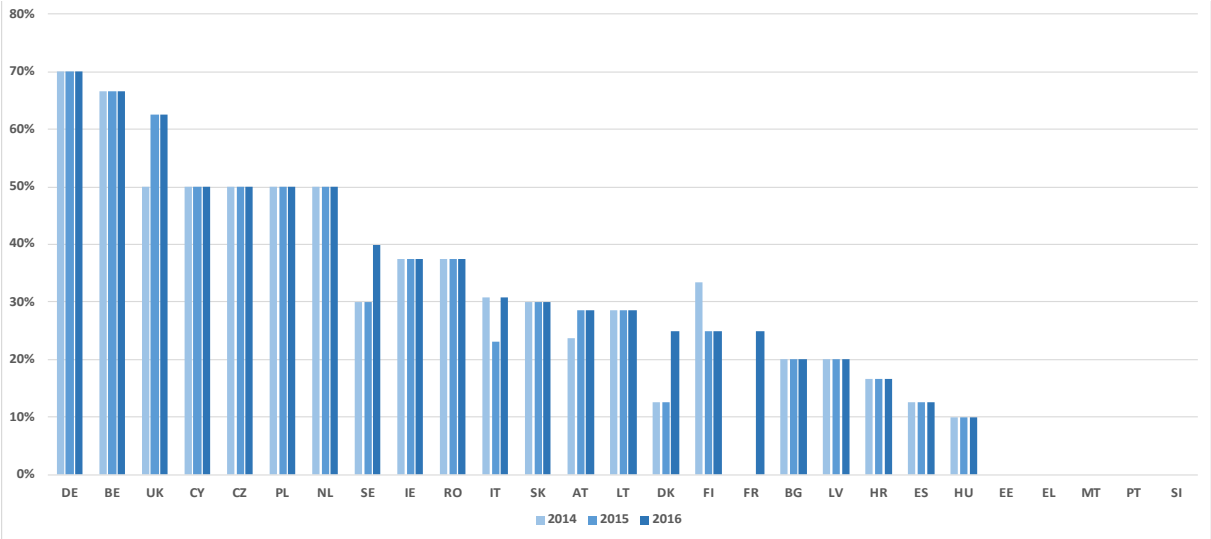
Source: HEI Survey, MoRRI, 2017.
Note: No data for LU. FR and PL's response rate too low.

Research ethics committees at higher education institutions are quite common in a number of member states, such as the United Kingdom, Malta and Portugal. In Spain, the reporting higher education institutions indicated a change between 2014 and 2016 in order to achieve a very high degree in 2016.

In another 17 member states, ethics committees are more often established than non-established (all countries above 0.50). Only Sweden, Austria, Estonia and Bulgaria are below the mean, suggesting that many higher education institutions do not have an ethics committee.

Research integrity offices are less common in the EU according to the results presented in Figure 60. While the majority of EU member states report this type of organisation, 5 MS (Estonia, Greece, Malta, Portugal, Slovenia) do not have them. This type of office seems to be more common in Germany, Belgium and the United Kingdom compared to other countries.

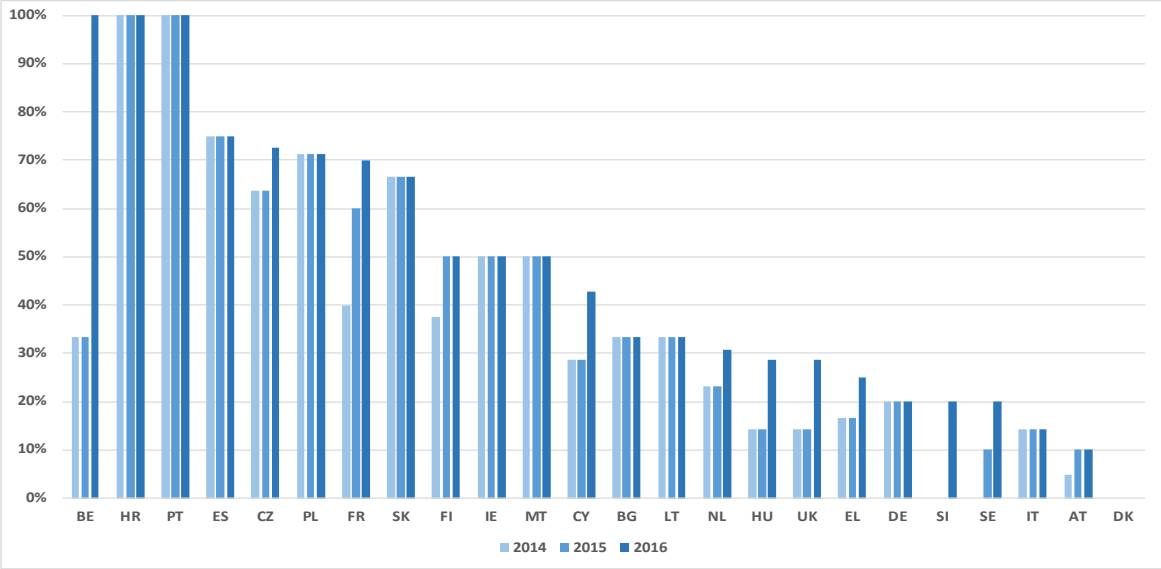
Figure 60 Share of higher education institutions having a research integrity office



Source: HEI Survey, MoRRI, 2017.
Note: No data for LU. FR and PL's response rate too low.

Research integrity offices are a rather new type of structure to deal with good scientific practice but they can also address ethical questions of research. The responses from some countries suggest that there is mainly one form (e.g. Malta, Portugal, Spain) where the ethics committee dominates and the research integrity office does not play a role. In other countries this distinction is not clear cut. There is one exception – Estonia – which has no research integrity offices and has a below mean index score for ethics committees.

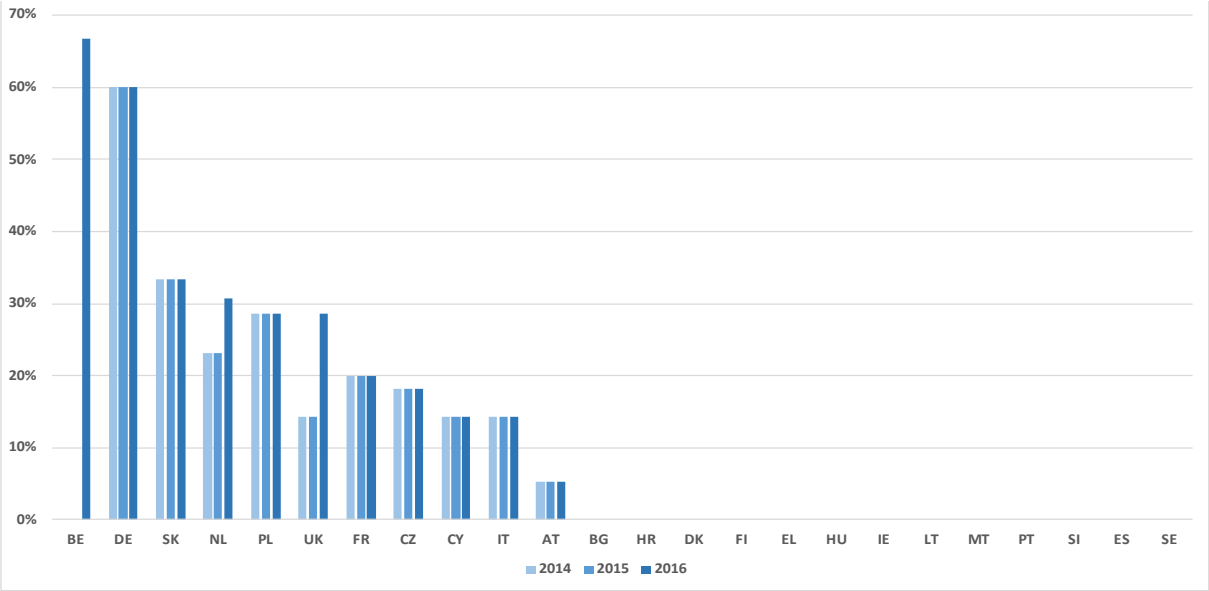
Figure 61 Share of public research organisations having a research ethics committee



Source: PRO Survey, MoRRI, 2017.
Note: No data for LU. LV and RO's response rate too low.

In 2016, the situation for public research organisations varied from that of higher education institutions by the number of countries being much lower where at least 50% of the organisations have a research ethics committee. Out of the 25 MS included in the survey, 21 indicate that at least 50% of higher education institutions have a research ethics committee in existence, but only 11 out of the 25 MS report the same for the research organisations. In terms of research integrity offices, the concept seems to be known to public research organisations in only 11 MS (see Figure 62).

Figure 62 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.

Evolution

Between 2014 and 2016, significant developments in terms of higher education institutions' research ethics committees can be seen in Lithuania, Greece, and from a higher level the Czech Republic, Belgium and Italy. However, they seem to be less often established at public research organisations. Between 2015 and 2016, developments were indicated for 12 member states, suggesting that research ethics committees are slowly increasing in public research organisations.

In terms of research integrity offices, the situation remained rather stable for the higher education institutions: only a few report changes between the years (United Kingdom, Sweden, Denmark, Finland and Italy), while for the remaining MS there were no changes between 2014 and 2016.

This structure remained unchanged for the majority of countries – only Belgium, the Netherlands and the United Kingdom reported any change. It is noteworthy that Belgium is the only member state to report this structure for the first time in 2016.

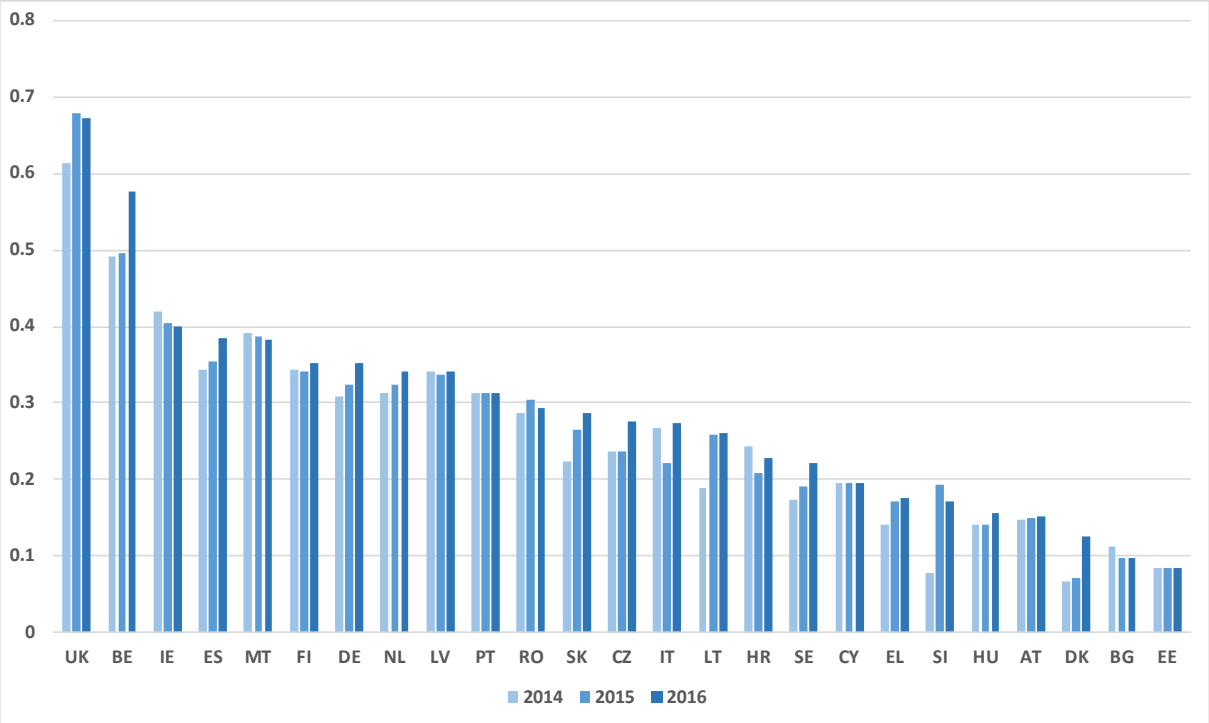
8.2 E1b - Ethics at the level of higher education institutions and public research organisations (composite indicator)

The indicator

This indicator is a complex composite that uses two starting questions in the surveys of higher education institutions and public research organisations (MoRRI, 2017), namely 'Do you have a research ethics committee? and 'Do you have a research integrity office?', and subsequent questions on the design, functions and impacts of these institutional arrangements, such as 'Have the opinions [of the research ethics committee] been binding or non-binding recommendations?', or 'Has the research integrity office been able to take independent initiative to investigate a case?'. This index indicator thus seeks to measure the strength of ethics bodies (research ethics committees or research integrity offices) in terms of their autonomy and decision making.

Outcomes

Figure 63 Composite index of research ethics committees/research integrity offices at higher education institutions

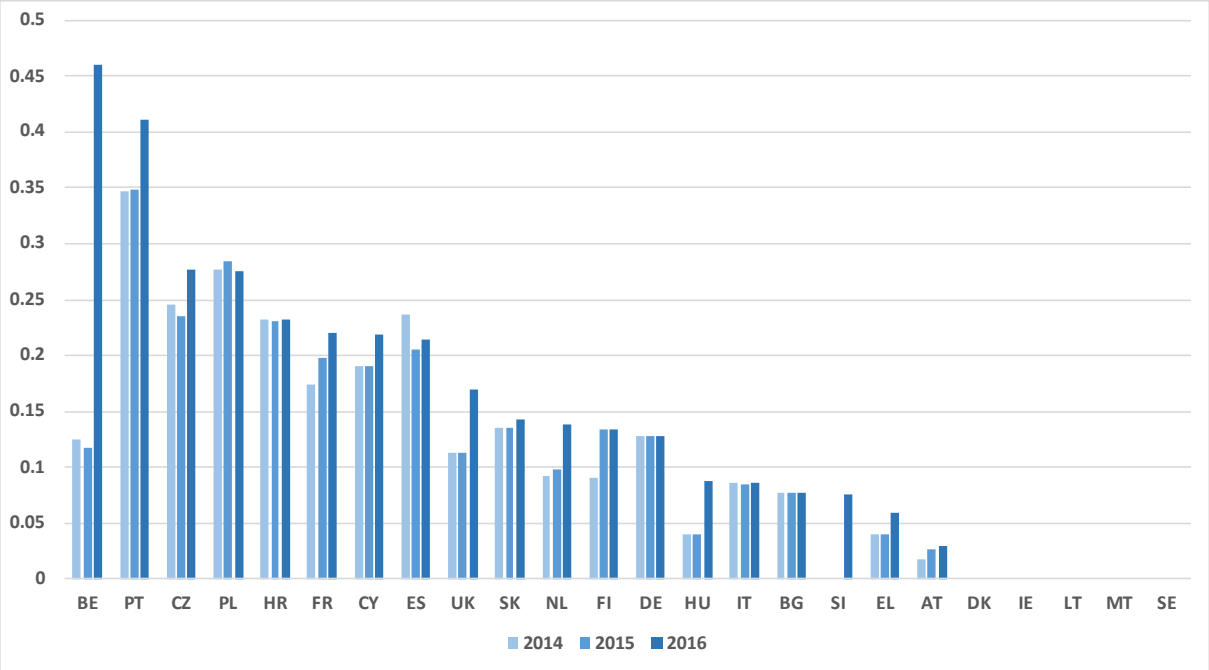


Source: HEI Survey, MoRRI 2017
Note: No data for LU. FR and PL's response rate too low.

The indicator indicates the spread between the member states concerning the strength of research ethics committees and/or research integrity offices exist at higher education institutions. The highest average score for higher education institutions, indicating that ethics bodies have strength behind their actions, is above 0.60 in the United Kingdom and drops down to below 0.10 in Estonia.

These structures are much less developed in research organisations. Besides Belgium, the scores vary between zero and 0.28 for those countries where public research organisations have research ethics committees and/or research integrity offices.

Figure 64 Composite index of research ethics committees/research integrity offices at public research organisations



Source: PRO Survey, MoRRI 2017
Note: No data for LU. LV and RO's response rate too low.

Evolution

Between 2014 and 2016, the evolution between higher education institutions and public research organisations seemed rather active. One can see, overall, more research ethics committees and/or research integrity offices to be in existence for both types. One of the reasons may be that the umbrella organisation All European Academies (ALLEA) published revised guidelines. One can assume that Belgium is not the only country where the national academies have published a similar code for the national level – which has then been adopted by a large number of other national higher education institutions.

Decreases from one year to the next can either suggest that these structures are less stable than one could assume, or that reorganisation and rebranding occurred. Given that the survey responses were asked for the 3 years, it seems unlikely that the differences occurred due to changes in survey respondents.

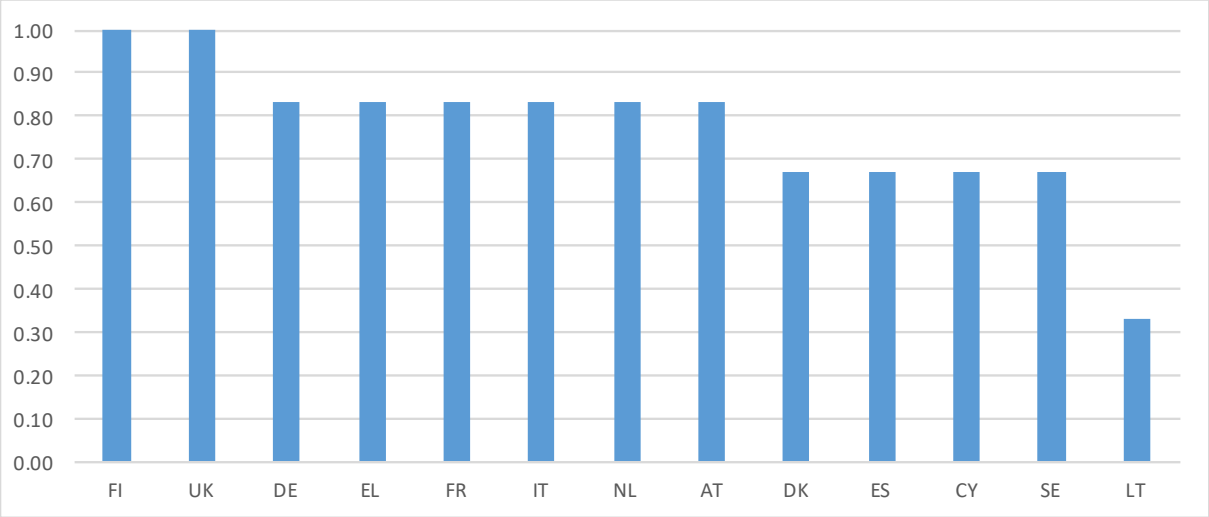
8.3 E2 - National ethics committees index

The indicator

This index captures features of national ethics committee's infrastructures in a country. It measures the existence, output, impact and quality of national ethics committees (NECs). The data source is qualitative and integrates research from the MASIS and EPOCH research projects. The data was collected just once.

Outcomes

Figure 65 E2 - National ethics committees' index, 2012



Source: EPOCH, 2012; calculation: Technopolis.

The variance between the 13 observed countries is obvious. The countries with the highest index are Finland and the United Kingdom (1.0 each), followed by another 6 MS at an index of 0.83. The only country with a rather low index is Lithuania with 0.33.

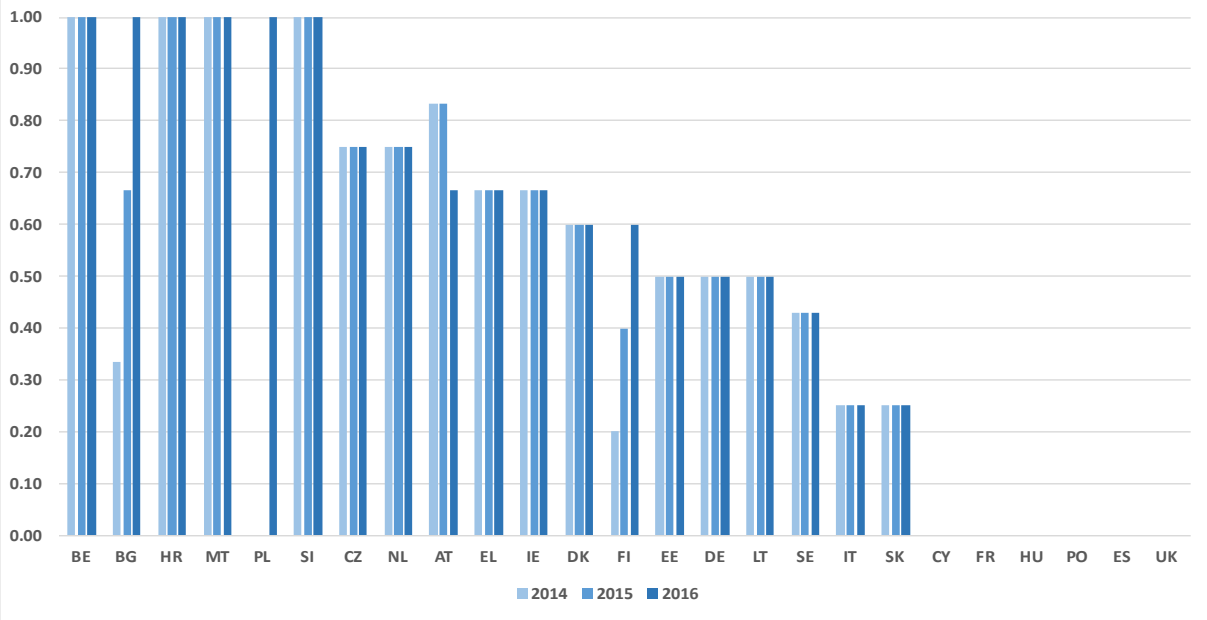
8.4 E3a - Research-funding organisations' index

The indicator

The indicator is based on the dedicated survey of the funding organisations (MoRRI, 2017) and its question 'Has your organisation integrated any type of ethics assessment/review in its funding decisions?'

Outcomes

Figure 66 E3a - Research-funding organisations' index



Source: RFO Survey, MoRRI, 2017.

The results suggest that ethics assessments by funding organisations are carried out in a number of member states (e.g. Belgium, Bulgaria, Croatia, Malta, Poland and Slovenia). There are, however, a number of MS where this is not common practice, such as in Cyprus, France, Hungary, Portugal, Spain and the United Kingdom.

One should bear in mind that member states maintain various systems: for example, in many member states issues such as dangerous pathogens or radioactive medical products in medical research are regulated and researchers may need prior approval from their own organisations before they apply for project funding from research funders. As such, the absence of a procedure at funding-organisation level does not mean that there is a complete lack of such a procedure because it could be provided at an earlier stage and/or by another competent organisation.

Evolution

In terms of developments, it is interesting to note that the funding organisations in only 4 countries, namely Bulgaria, Poland, Austria and Finland, indicate some changes. In all others, the situation in 2016 was the same as in 2014. Austria was the only MS with a decrease, suggesting that a funding organisation has changed its assessments.

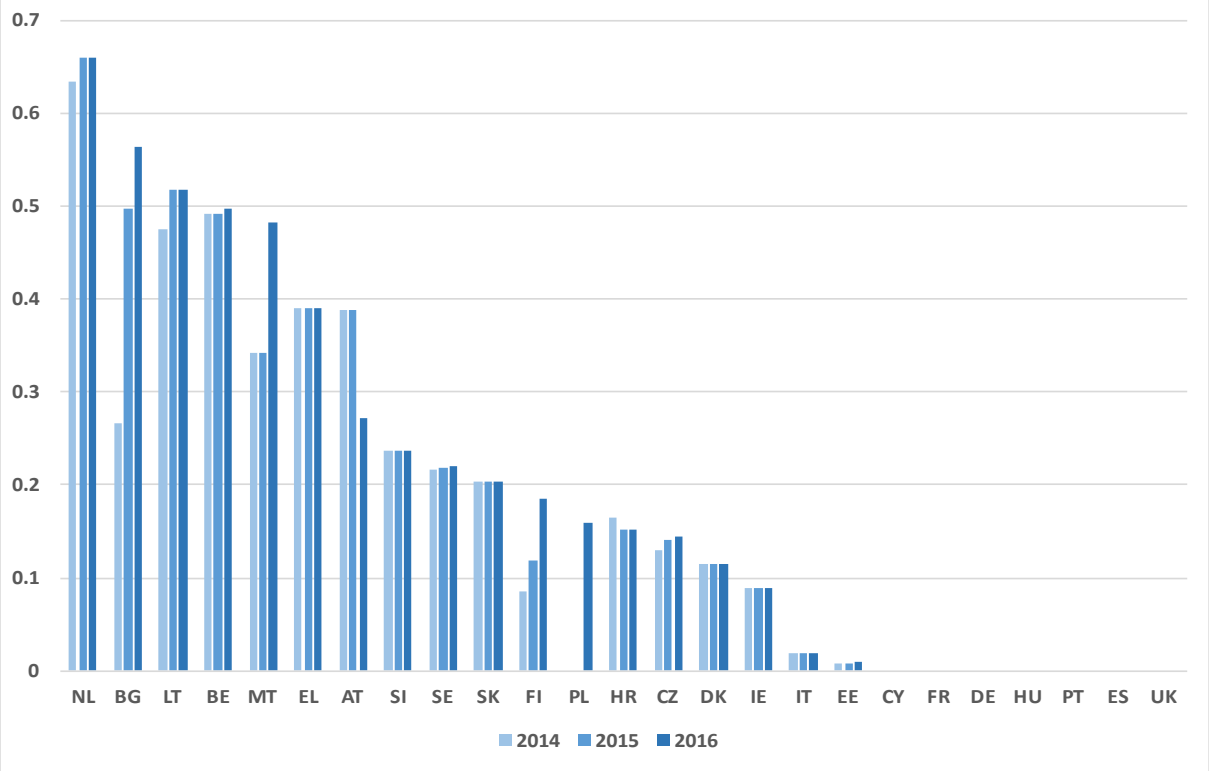
8.5 E3b - Research-funding organisations' index (composite indicator)

The indicator

This indicator is a complex composite that uses the starting questions in the survey of funding organisations (MoRRI, 2017), namely 'Has your organisation integrated any type of ethics assessment/review in its funding decisions?' and subsequent questions on the design and numbers of the projects concerned. It mirrors the indicator on 'Research-funding organisations' index'.

Outcomes

Figure 67 E3b - Composite index of research-funding organisations



Source: RFO Survey, MoRRI, 2017.

It is most likely that this composite indicator does not provide the most accurate picture about the situation in the member states.

Research-funding organisations in only 18 member states provided information. The outcome bears some resemblance to the previous indicator but while in the former a number of MS indicate 100% agreement with a single question, this agreement drops significantly – most likely due to a rather complex question and a high dropout rate (compare, for example, Croatia in both these indicators).

Evolution

Among the 18 member states that signalled relevant procedures, only 4 had no changes during the period 2014-2016, while changes seemed to have happened in all the others. The largest change can be found in Bulgaria, followed by Malta. Austria is the only country where some aspects seemed to have been abandoned between 2015 and 2016.

Ethics

Main observations

Ethics committees

- Research ethics' committees are widely spread - in many Member States they are common such as Spain, the UK, Malta, Portugal, Slovenia, Ireland and Finland.
- At least 50 % of the higher education institutions in EU Member States have a committee with the exception of Bulgaria, where they are not everywhere..

Research integrity

- Research integrity offices are less common in the EU.
- They are more common in Germany, Belgium and the UK and less so in Estonia, Greece, Malta, Portugal, or Slovenia.
- Research performing organisations are less likely to have a research integrity office compared to higher education institutions.

Funders

- Ethics assessments by funding organisations are done in a number of countries such as Belgium, Bulgaria, Croatia, Malta, Poland, or Slovenia.
- There are, however, a number of countries where this is not common practice such as in Cyprus, France, Hungary, Portugal, Spain and the UK.

9 Governance

The European Commission defines governance in the context of responsible research and innovation as '*Policy makers… have a responsibility to prevent harmful or unethical developments in research and innovation*'[14].

While this definition provides a high-level policy, we defined it as 'all processes of governing, whether undertaken by a government, market or network, whether over a family, tribe, formal or informal organisation or territory and whether through laws, norms, power or language'. For science and innovation, this means the provision and distribution of resources as well as the rules of how those resources are used (outputs).

The following indicators are included:

Number	Name of indicator	Note
GOV1	Use of science in policy making	Unchanged indicator based on MASIS (2012).
GOV2	RRI-related governance mechanisms within research-funding and performing organisations	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)	Data available for 2014, 2015, 2016. Composite index based on HEI, PRO and RFO surveys of MoRRI consortium, 2017.

[14] http://ec.europa.eu/research/science-society/document_library/pdf_06/responsible-research-and-innovation-leaflet_en.pdf.

9.1 GOV1 - Use of science in policy making

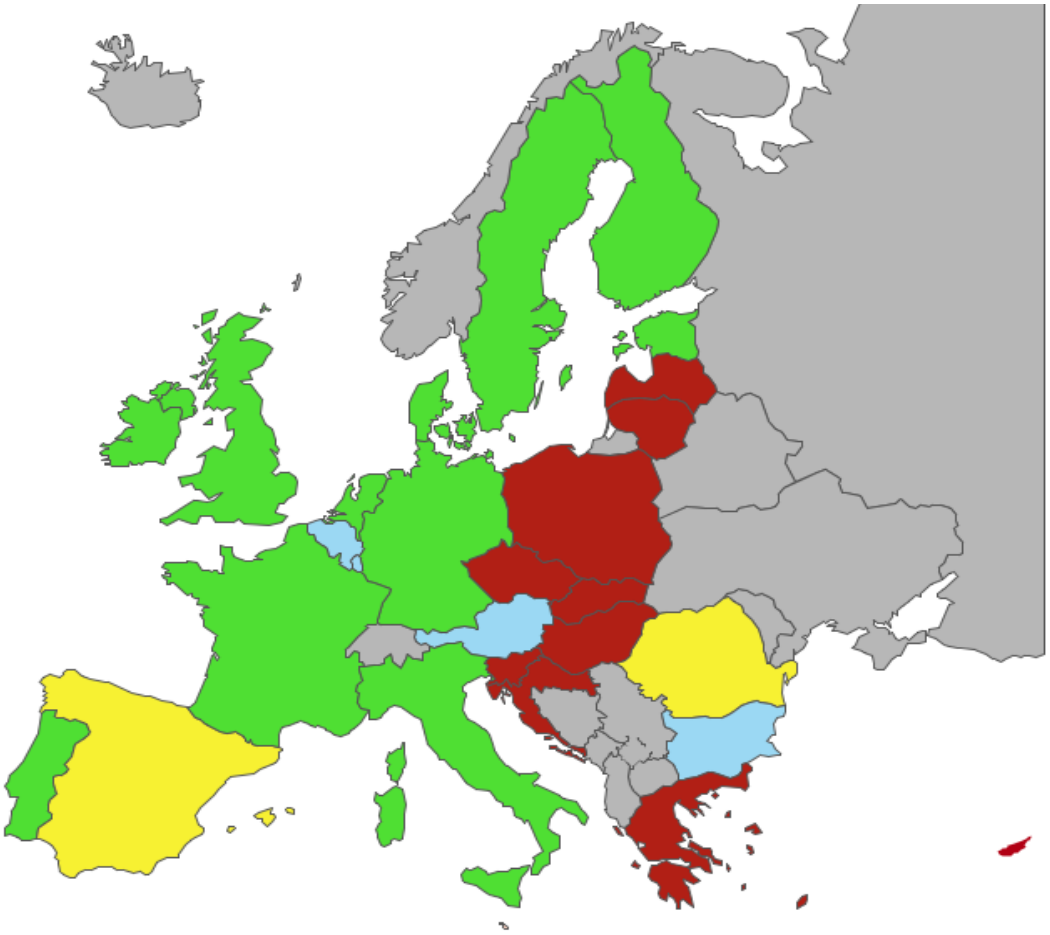
The indicator

The use of science in policy making shows the extent to which science-based knowledge and advice is used in policy-making processes. The indicator was built based on qualitative opinions of national experts in the course of the MASIS project (2012).

There are two dimensions relating to the use of science-based knowledge in decision-making. One dimension concerns the extent to which a formalised structure for feeding science-based knowledge into decision-making is in place, e.g. in terms of institutional sites dealing with these processes. The other dimension concerns the extent to which science-based knowledge and advice have a real impact on decisions. Based on these elements, 4 categories of countries were identified: highly formalised procedures and high saliency; less formalised, but with considerable influence; formalised procedures but low impact of science-based knowledge in policy making; and low degree of science-based knowledge in policy making.

Outcomes

Figure 68 Use of science in policy making, 2012



Source: MASIS report, 2012.
Key: Green: highly formalised/high impact; blue: less formalised/considerable impact; yellow: formalised/low impact; red: no formalisation/low impact.

Using this indicator, the EU member states can be broadly classified into 4 groups: 10 MS are highly formalised with a high impact on policy making – all of them are to be found within the group of the old EU-15 member states. The second largest group with 9 MS are neither characterised by formalisation nor by impact of science on policy making. Spain and Romania are 2 countries that are formalised but with a rather low impact, while it is noted that Belgium, Luxembourg, Austria and Bulgaria have a high impact despite being less formalised.

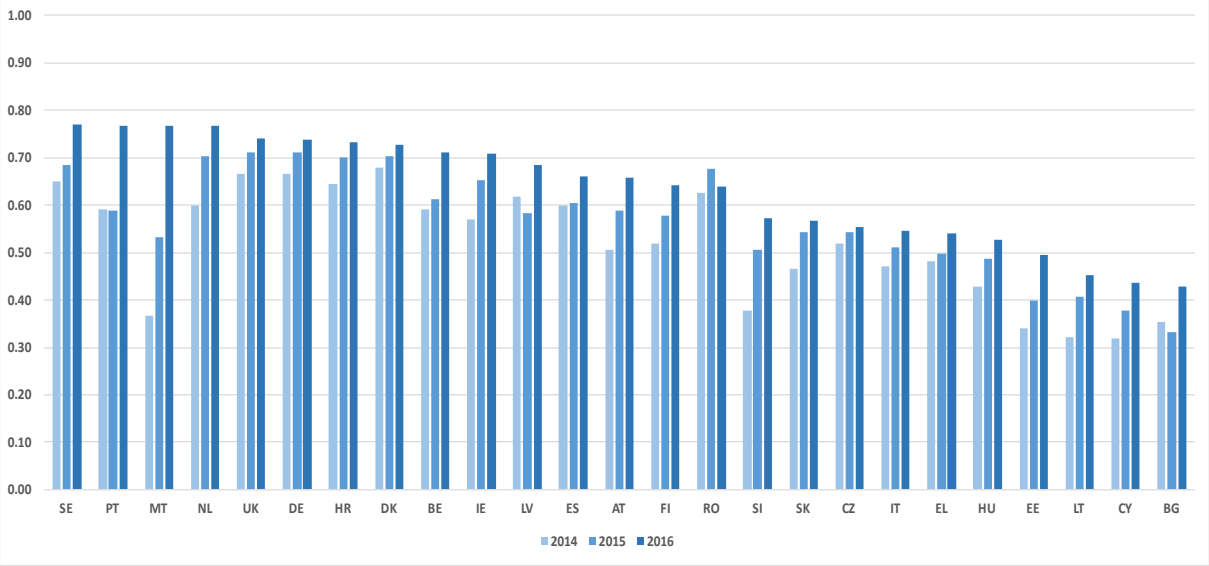
9.2 GOV2 - RRI-related governance mechanisms within research-funding and higher education institutions

The indicator

The following indicator aims to provide an insight into how far the RRI concept has reached the research system by addressing the following question to funding organisations and research-performing organisations: 'Has your organisation established processes for managing ethics/citizen engagement/open access and open science/gender equality/responsible research and innovation?' Respondents were asked to identify each of the dimensions for which established processes were implemented in the organisation that they represented. A maximum score is given to organisations that cover all 5 dimensions.

Outcomes

Figure 69 RRI-related governance mechanisms within research-funding and research-performing organisations



Source: HEI, PRO and RFO surveys, MoRRI, 2017.
Note: No data for LU. FR and PL's response rate too low.

In 2016, 10 member states reached above the 0.70 mark, indicating that at least 70% of the research-performing and funding organisations had RRI-related governance mechanisms in place. The 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.

Evolution

This indicator reflects an increase across all EU member states between 2014 and 2016. The dimensions seem to diffuse considerably in all MS. While in 2014, the EU-average share was 0.52, it increased to 0.57 in 2015 and 0.63 in 2016. 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.

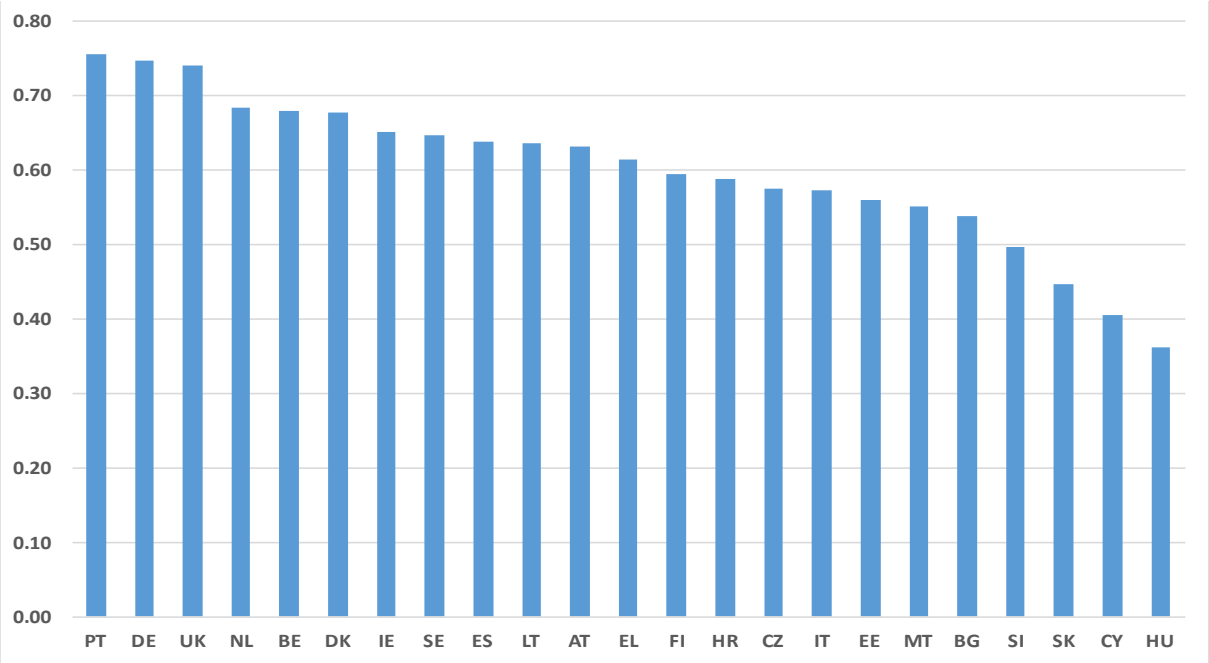
9.3 GOV3 - RRI-related governance mechanisms within research-funding and research-performing organisations – composite index

The indicator

This composite indicator is based on the question: 'Did your organisation actively encourage ethics/citizen engagement/open access and open science/gender equality/responsible research and innovation among researchers, employees or partner organisations during 2016, and are there changes compared to previous years?' Respondents were asked to indicate the current degree of encouragement and that of the past 2 years to enable a better understanding of the dynamics.

Outcomes

Figure 70 Composite index on RRI-related governance mechanisms, 2016



Source: HEI, PRO and RFO surveys, MoRRI, 2017.

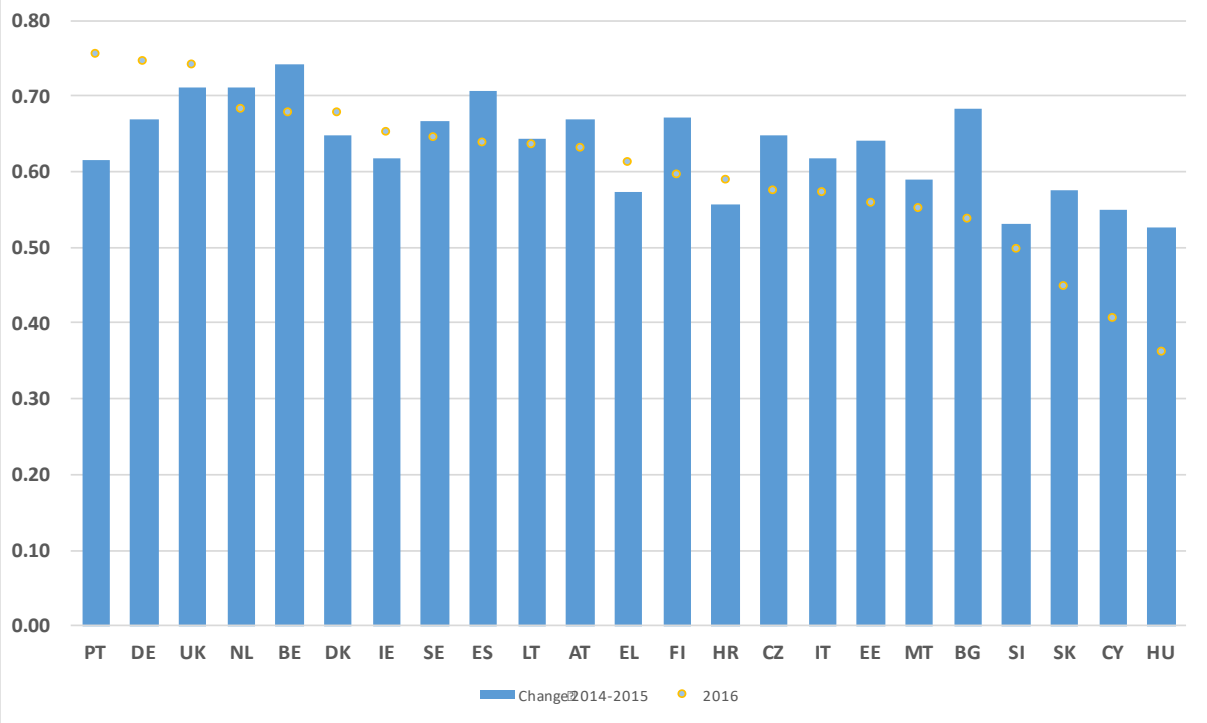
Several aspects should be noted. First, for 2016, one can see that only four 4 MS (Slovenia, Hungary, Slovakia and Cyprus) are lagging in terms of encouragement. All other MS are above the mean of 0.5. Portugal, Germany and the United Kingdom reach values above 0.70.

Evolution

In terms of the changes between 2014 and 2015, Figure 71 includes the relevant information. In order to compare it to the situation in 2016, the 2016 data have been included in the form of small dots. The order of MS also follows the 2016 order. This enables one to analyse if changes in 2014 and 2015 happened and potentially affected the situation in 2016. Portugal, for example, indicated changes at a level of 0.61 between 2014 and 2015. In 2016, however, it reached 0.76, thus suggesting 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.

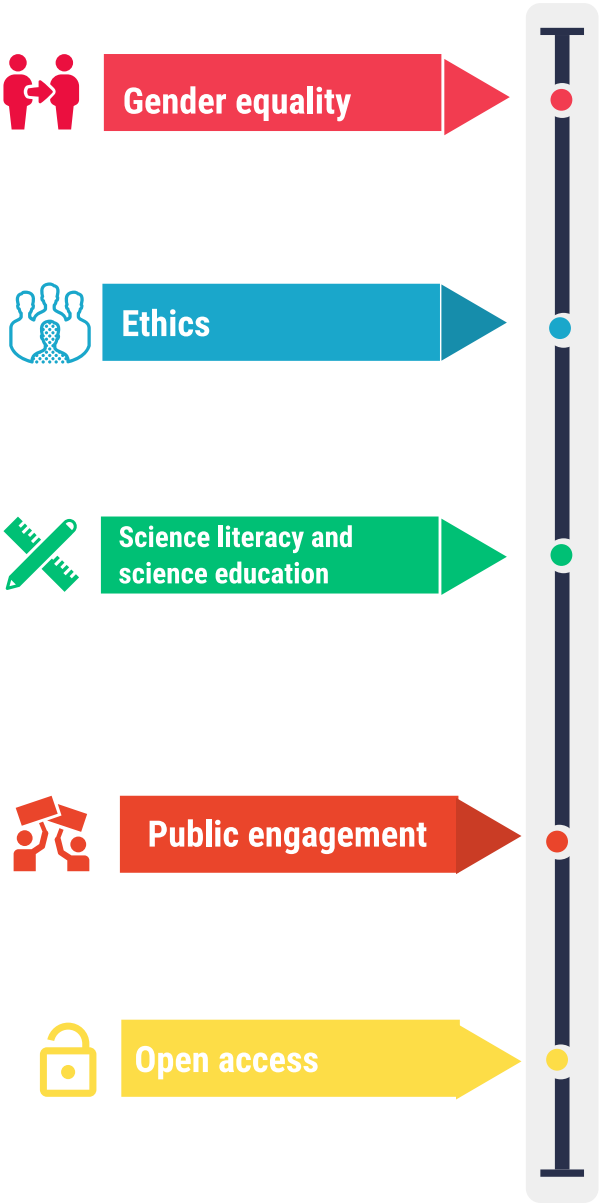
Figure 71 Composite index on RRI-related governance mechanism changes, 2014-2015



Source: HEI, PRO and RFO surveys, MoRRI, 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.

Appendix 1: RRI Dimensions in member states – A Scorecard approach

In this final section, we aimed to apply a scorecard approach to the used RRI indicators and identify thus relative strengths and weaknesses by indicator for each country (see the Tables below).

The scorecard methodology for assigning 'performance' scores for each indicator is rather straightforward by using the distribution of the countries' scores to assign a score being above, close to, or below average performance:

- Above-average performance is obtained when the indicator score is among the highest 33% of the observed scores for all countries;
- Close-to-average performance is obtained when the indicator score is among the middle 33% of the observed scores for all countries;
- Below-average performance is obtained when the indicator score is among the lowest 33% of the observed scores for all countries.

The performance is shown in traffic light format: above-average performance is indicated with a green dot, close-to-average performance with a yellow one, and below-average performance with a red dot. The methodology makes sure that there is an equal distribution of green, yellow and red dots for each indicator.

The scorecard shows the relative strengths and weaknesses for each country compared to the other countries. The user should bear in mind that the nature of the indicators differs – some indicators refer to 'hard' statistical data and other indicators are based on 'soft' opinion-based data. Moreover, data gaps lead rather often to 'blanks' which does not indicate that the country does not have anything relevant in the given indicator but rather that information was not available for all countries.

The scorecards are useful to identify individual dimensions where relative performance could be improved.

Figure 72 RRI scorecard - Gender Equality

Indicator	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
GE1: Share of RPOs with gender equality plans	🟢	🔴	🔴	🟡	🟢	🔴	🟢	🟡	🟢	🟢	🔴	🟡	🟡	🔴	🔴		🟡	🟡	🟡	🟢	🔴	🟡	🔴	🔴	🔴	🟢	🟢	🟢
GE2.1: Share of female researchers by sector - all sectors	🟡	🟢	🔴	🟡	🔴	🟢	🟡	🟡	🟡	🔴	🟢	🟡	🟡	🟢	🟢	🔴	🔴	🔴	🔴	🔴	🟡	🟢	🟢	🟡	🟢		🔴	
GE2.2: Share of female researchers - business enterprise sector	🟡	🟢	🔴	🟡	🔴	🟢	🟡	🟡	🟢	🔴	🟢	🟡	🟢	🟢	🟢	🔴	🔴	🟡	🔴	🔴	🔴	🟡	🟢	🟡	🔴		🟡	
GE2.3: Share of female researchers - government sector	🔴	🟢	🔴	🟡	🔴	🟢	🟡	🟡	🟡	🔴	🟢	🟡	🟢	🟢	🟡	🔴	🔴	🔴	🔴	🟡	🔴	🟢	🟢	🟢	🟢		🟡	🔴
GE2.4: Share of female researchers -higher education	🟡	🟢	🔴	🔴	🔴	🟢	🟡	🔴	🟡	🔴	🟢	🟡	🔴	🟢	🟢	🔴	🟡	🔴	🟡	🔴	🟡	🟢	🟢	🟡	🟢		🟡	
GE3: Share of RFOs promoting gender content in research	🟡	🟡	🔴	🟡	🔴	🟡	🟢	🟢	🟢	🔴	🔴	🟡	🔴		🔴		🔴	🟡	🟢	🟢	🔴	🟢		🔴	🟡	🟡	🟢	🟢
GE4.1: Dissimilarity index: Higher education sector	🟢	🔴	🟡	🟡	🟢	🟡	🟢	🔴	🔴		🟡	🔴	🔴	🟢	🟢	🟢	🟡	🟢	🔴	🟢	🟡	🔴	🔴	🟢	🔴	🟢	🟡	🔴
GE4.2: Dissimilarity index: Government sector	🔴	🔴	🟡	🟢	🟡	🟢	🟢	🟢	🔴		🔴	🔴	🟢	🟡	🟢	🔴	🟡	🔴	🟢	🟡	🟡	🔴	🔴	🟡	🔴	🟢	🟡	🟢
GE5: Share of RPOs with policies to promote gender in research content	🟢	🟡	🟡	🟡	🟢	🔴	🟢	🔴	🟢	🟢	🔴	🟡	🟢	🔴	🔴		🔴	🔴	🟡	🟢	🟡	🔴	🔴	🟡	🔴	🟡	🟢	🟢
GE6: Glass ceiling index	🟢	🔴	🟢	🟡	🔴	🟢	🔴	🔴	🟡	🟡	🔴	🟡	🟢	🟡	🟢	🟢	🔴	🔴	🟡	🟡	🟢	🟡	🟡	🟡	🟢	🔴	🟡	🟢
GE7.1: Gender wage gap - academic professions	🔴	🟢	🟢	🟡	🟢	🟢	🟡	🔴	🔴	🟢	🟡	🔴	🔴	🟢	🟡	🔴	🟢	🔴	🟡	🟢	🔴	🔴	🟡	🟡	🟢	🟡	🟡	🟡
GE7.2: Gender wage gap - technicians and associate professionals	🔴	🔴	🟢	🟡	🟢	🟢	🟡	🟢	🟡	🔴	🔴	🟡	🟡	🟢	🟢	🔴	🟢	🔴	🟢	🟡	🟢	🔴	🔴	🔴	🟡	🟡	🔴	🟡
GE8: Share of female heads of RPOs	🔴	🟢	🔴	🟡	🟡	🔴	🟢	🔴	🟡	🟡	🟢	🟡	🟢	🟢	🟢		🟡	🔴	🟢	🟡	🔴	🟢	🔴	🟢	🔴	🔴	🟢	🔴
GE9: Share of gender-balanced recruitment committees	🟡	🟢	🔴	🔴	🔴	🟢	🟡	🔴	🔴	🟡	🟢	🔴	🟢	🟢	🟡		🔴		🟡	🔴	🟢		🟡	🟢	🟢	🟡	🟡	🔴
GE10: Share of female authors and inventors	🔴	🟢	🟡	🔴	🔴	🟡	🟡	🔴	🟡	🔴	🟢	🟢	🔴	🟢	🟢	🔴	🟡	🔴	🔴	🔴	🟢	🟢	🟢	🟢	🟡	🟡	🟡	🟡

Figure 73 RRI scorecard - Science Literacy and Science Education

Indicator	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
SLSE1: Importance of societal aspects of science in science curricula for 15-16 year-old students	🔴	🔴	🟡	🟢		🟡	🔴	🔴	🟢	🟢	🟢	🔴	🟡	🟢	🟢	🔴	🟡	🟢	🔴	🔴	🟢	🟢	🔴	🟡	🟢	🟢	🟢	🟡
SLSE2: RRI related training at HEIs	🟢	🟡	🟢	🟢	🟡	🟢	🔴	🔴	🟡	🔴	🔴	🟡	🔴	🟡	🔴		🔴	🔴	🟢	🔴	🟢	🔴	🟢	🟢	🟢	🟡	🟢	🟢
SLSE3: Science communication Culture	🟢	🟡	🔴	🟢	🟢	🟡	🟡	🟡	🟢	🟢	🔴	🟢	🟡	🟡	🔴	🟡	🟡		🟢	🟡	🟡	🟢	🟡	🟡	🟡	🟢	🟢	🟢
SLSE4.1: Organisational memberships in ECSA	🟡	🟡	🟡	🟢	🟡	🟡	🟢	🟢	🟡	🟡	🟡	🟡	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟡	🟡	🟢	🟡	🟡	🟡	🟡	🟡	🟢
SLSE4.2: Citizen science publications	🟡	🔴	🟡	🟢	🔴	🟢	🟢	🔴	🟡	🔴	🟡	🟡	🔴	🟢	🔴	🔴	🔴	🟢	🟢	🟢	🔴	🟡	🟡	🔴	🟡	🟢	🟡	🟢

Figure 74 RRI scorecard - Public engagement

Indicator	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
PE1: Models of public involvement in S&T decision making	🟢	🔴	🔴	🟢	🟢	🟡	🔴	🟡	🔴	🟢	🟡	🟢	🔴	🟡	🟢	🔴	🔴		🟢	🟡	🟡	🟡	🔴	🟡	🟡	🟢	🟢	🟢
PE2: Policy-oriented engagement with science	🟢	🔴	🔴	🟢	🟢	🔴	🟡	🟡	🟡	🟡	🟡	🟢	🔴	🔴	🔴	🟢	🟡	🔴	🟢	🟢	🔴	🟢	🔴	🔴	🟡	🟡	🟢	🟡
PE3: Citizen preferences for active participation in S&T decision making	🟡	🟡	🔴	🟢	🟢	🟡	🟡	🟢	🟡	🟢	🟡	🔴	🟡	🔴	🔴	🟢	🔴	🟢	🔴	🟡	🔴	🟡	🔴	🔴	🔴	🟢	🟢	🟢
PE4: Active information search about controversial technologies	🔴	🟡	🔴	🟢	🟢	🟡	🔴	🟡	🔴	🟡	🟢	🟢	🔴	🟢	🟢	🟡	🔴	🔴	🟢	🟡	🔴	🔴	🟡	🟢	🟡	🟡	🟢	🔴
PE5: Public engagement performance mechanisms at the level of RPOs	🟢	🔴	🟢	🟢	🟡	🟢	🟡	🔴	🟡	🟢	🔴	🟡	🔴	🟡	🟡		🔴	🔴	🔴	🔴	🔴	🟢	🟢	🔴	🟢	🟡	🟡	🟢
PE7: Embedment of public engagement activities in the funding structure of key public research funding agencies	🟢	🟡	🔴	🟡	🟢	🟡	🟢	🔴	🟢	🟡	🔴	🟡	🔴		🔴		🔴	🔴	🟡	🟡	🔴	🟢		🔴	🟡	🟢	🟢	🟢
PE8: Public enaggement elements as evaluative criteria in research proposal evaluations	🟡	🟢	🟡	🟡	🟡	🟢	🔴	🔴	🟢	🟡	🔴	🟡	🔴		🔴		🔴	🟢	🟡	🟢	🔴	🟢		🔴	🟡	🟢	🟢	🔴
PE9: Research and innovation democratisation index	🟡	🔴	🔴	🟢	🟢	🟡	🔴	🟢	🔴	🔴	🔴	🔴	🟢	🟢	🟡	🟡	🟡	🔴	🟢	🔴	🔴	🟡	🟡	🟢	🟡	🟢	🟢	🟡
PE10: National infrastructure for involvement of citizens and societal actors in research and innovation	🟢	🟡	🔴	🟢	🟡	🟢	🟢	🔴	🔴	🔴	🟡	🔴	🟢	🟡	🟡	🟡	🟡	🟡	🟢	🟡	🔴	🔴	🔴	🟡	🟢	🟢	🟢	🟡

Figure 75 RRI scorecard - Ethics

Indicator	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
E1a: Ethics at the level of RPOs - Ethics committees	🟢	🔴	🟡	🟡	🟢	🔴	🔴	🟡	🔴	🟢	🔴	🟢	🟢	🟡	🔴		🟢	🟡	🟡	🔴	🟡	🔴	🟡	🟢	🟢	🔴	🔴	🟢
E1a: Ethics at the level of RPOs - Research Integrity offices	🟢	🔴	🟢	🟡	🟢	🔴	🟢	🔴	🔴	🟡	🔴	🟡	🟡	🟡	🟡		🔴	🔴	🟢	🟡	🟢	🔴	🟢	🔴	🟢	🔴	🟡	🟢
E1b: Ethics at the level of HEI (Composite)	🟢	🔴	🟡	🔴	🟢	🔴	🟢	🔴	🟢		🟡	🟡	🔴	🟡	🟡		🔴	🟢	🟢	🔴		🟡	🟡	🔴	🟡	🟢	🔴	🟢
E1b: Ethics at the level of PRO (Composite)	🟢	🔴	🟢	🔴	🟡		🔴	🔴	🟢	🟢	🟢	🟡	🟢		🔴		🟡	🔴	🟡	🔴	🟢	🟢		🔴	🟡	🟡	🔴	🟡
E2: National ethics committees index				🔴	🟢			🟢	🔴	🟢		🟢	🔴		🔴				🟢	🟢						🟢	🔴	🟢
E3a: Research funding organisations index	🟢	🟢	🟢	🟡	🟡	🟡	🟡	🟡	🔴	🔴	🟢	🔴	🔴		🟡		🔴	🟢	🟢	🟡	🟢			🟢	🔴	🟡	🔴	🔴
E3b: Research funding organisations index (Composite)	🟢	🟢	🟢	🟡	🔴	🟡	🟡	🟡	🔴	🔴	🟡	🔴	🔴		🟢		🔴	🟢	🟢	🟢	🟡	🔴		🔴	🟡	🟢	🟡	🔴

Figure 76 RRI scorecard - Open Access

Indicator	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
OA1.1: Share of Open Access publications	🟢	🟢	🟢	🔴	🔴	🔴	🟢	🟡	🟡	🔴	🟡	🟡	🟢	🟢	🟡	🟡	🟡	🟡	🟡	🟢	🟡	🟢	🟢	🔴	🔴	🔴	🟢	🔴
OA1.2: Citation scores for OA publications	🟡	🔴	🟡	🟢	🟢	🟡	🟡	🔴	🟡	🟢	🔴	🟡	🟢	🔴	🔴	🟡	🔴	🔴	🟢	🟢	🔴	🟡	🔴	🟡	🔴	🟢	🟢	🟢
OA4: Public perception of Open Access	🟢	🔴	🟢	🔴	🔴	🟡	🟢	🟢	🟡	🟡	🟢	🟡	🟢	🟢	🔴	🔴	🟡	🔴	🟡	🔴	🔴	🔴	🔴	🟡	🟡	🟢	🟡	🟢
OA5: Funder mandates	🟢	🟡	🟡	🟢	🟢	🟡	🟢	🟡	🟢	🟢		🟢	🟡	🟢	🟢	🟡	🟢	🟡	🟡	🟢	🟡	🟡	🟡	🟢	🟡	🟡	🟢	🟢
OA6: Research performing organisations' support structures for researchers as regards incentives and barriers for data sharing	🟢		🟢	🔴	🟡	🟢	🟡	🟡	🟡	🟡		🔴		🔴	🟢		🔴		🟢	🔴		🟡	🟡			🔴	🔴	🟢

Figure 77 RRI scorecard - Governance

Indicator	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
GOV1: Use of science in policy-making	🟡	🟡	🔴	🟢	🟢	🟢	🟢	🔴	🟡	🟢	🔴	🟢	🔴	🔴	🔴	🟡	🔴		🟢	🟡	🔴	🟢	🟡	🔴	🔴	🟢	🟢	🟢
GOV2: RRI-related governance mechanisms within research funding and performing organisations	🟡	🔴	🔴	🟢	🟢	🔴	🟡	🔴	🟡	🟢	🟢	🔴	🔴	🟡	🔴		🔴	🟢	🟢	🟡	🟡	🟢	🟡	🔴	🔴	🟡	🟢	🟢
GOV3: RRI-related governance mechanisms within research funding and performing organisations	🟢	🔴	🟡	🟢	🟢	🔴	🟢	🟡	🟡	🔴	🟡	🔴	🔴		🟡		🔴	🔴	🟢	🟡	🟡	🟢		🔴	🔴	🟡	🟢	🟢

Appendix 2: Indicator fiches

Appendix 2 provides a detailed description of each of the final RRI indicators of the report in a tailored indicator fiche. The purpose of describing each indicator in a more synthetic and schematic way is to provide clear, specified, transparent and homogenous indicator descriptions that will help to ensure the best possible starting point for future replicability of the indicators. The fiches are divided into three blocks of information:

- Indicator Characteristics: It provides the main general information on the indicator. This is inspired from the indicator fiches of the report "Metrics and indicators of Responsible Research and Innovation" (D3.2).
- Data collection specifications: Provides detailed information on the process from collecting the data to building the indicator.
- Assessment of RRI indicators: Using a colour-code system (Green, Yellow, Red) it provides to each of the indicator an assessment on the basis of three criteria.
  - Availability of data: It gives an indication on the data's availability in terms of country coverage.
  - Statistical Robustness: When opportune, a series of statistical tests (validation procedure) were conducted to assess the indicators robustness. A detailed description of the nature and purpose of the tests is given below.
  - Feasibility/Replicability: It provides an interpretation on the degree of replicability of the indicator. Regarding the complexity to obtain the data and to construct the indicator.

Short note on the validation procedure

In order to investigate the properties of the MoRRI indicators, a validation procedure was developed and implemented for the indicators. The first step concerns the general quality of the survey questions on which the indicators are based. Very high item non-response suggests that questions were very difficult to understand or answer, thus raising questions about the data reliability. In such cases, indicators were suggested for removal.

Additional tests were applied that sought to examine the following questions:

- Is the indicator internally consistent? This issue is only relevant for composite indicators. While we expect each subpart of a composite indicator to measure different aspects, they should all relate the same theme and thus be positively correlated. A simple statistic of internal consistency is Cronbach's Alpha. A simple rule is that a value greater than 0.7 suggests internal consistency. Slightly lower values (0.55-0.70) were flagged but not considered problematic. Much lower values were considered to be problematic an indication that alternative specifications should be considered provided.
- For composite indicators with values of alpha less than 0.70, alternative specifications were considered. These alternatives were used to examine the robustness of the indicators, i.e. do slight changes to the indicator specifications result in changes in country rankings? As a simple test, we calculate the number of countries that change five or more spots in rankings when alternatives are used. If a large number of countries change greatly then the indicator is not considered robust.
- An additional issue is the extent to which country differences can be considered to be substantial. For survey data, this depends to a large degree on the variance in within country responses compared to the variance between countries. Knowledge of this can be important for interpretation of differences in country rankings. We calculate and report a simple measure, intra-class correlations (defined as the share of total variance that is between-country as opposed to within-country). Low values for intra-class correlations indicate that variance within country is high compared to between countries, which suggests that small differences in values between countries are likely not statistically significant.

These validation checks have primarily been conducted on indicators based on primary data, though, where possible, they were also conducted on secondary data. In some cases, for simple indicators where there was no obvious alternative, specification to measure the same conceptual indicator, no validation tests were conducted. In order to ease presentation, the validation results are also colour-coded.

- Green is given for simple and conceptually sound indicators where now equivalent alternative is available or for composite indicators with high internal consistency (alpha greater than 0.7).

- Yellow is given for cases where internal consistency is slightly below desired levels and where intra-class correlation is low. For these cases, our assessment is that the quality of these indicators is acceptable for presentation and use, but perhaps can be further improved in future data collection.
- Red is given to cases that were found to be problematic and where the indicator was either revised or dropped.

The following table presents an overview of the results obtained of this exercise for each indicator.

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			
PE1		*no validation conducted*	
PE2			
PE3			
PE4			
PE5			
PE6 (DROPPED)		-	
PE7			
PE8			
PE9			
PE10			
OA1			
OA2 (DROPPED)		-	
OA3			
OA4			
OA5		*no validation conducted*	
OA6			
E1a			
E1b			
E2		*no validation conducted*	
E3a			
E3b			
GOV1		*no validation conducted*	
GOV2			
GOV3			

1. GENDER EQUALITY

Information item	GE1
Indicator characteristics	
Name of indicator	**Share of RPOs (HEI and PRO) with gender equality plans**
Primary/secondary data	Primary data (from survey)
Description	GE1 measures institutional engagement in gender equality work. The existence of a gender equality plan (GEP) indicates institutionalised activities for gender equality. A GEP is a consistent set of provisions and actions aimed at ensuring gender equality.
Qual / Quant	Quantitative
Source of data	HEI survey (conducted in 2016) PRO survey (conducted in 2017)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RPOs / Countries
Coverage	Sample of the HEI and PRO population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°19 of HEI and PRO surveys, namely: "Does your organisation have a gender equality plan?" *See Appendix 3 (survey questionnaires)*
Indicator building	Country scores are the average of the individual scores of each organisation. The score is given by: Yes = 1pt No / Not Applicable = 0 pt **Don't Know = not considered* Country scores range from 0 to 1
Assessment of RRI indicators	
Availability of data	HEI survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg. PRO survey: Data collected for all EU-28 countries, with diverging response rates. No responses for Estonia and Luxembourg *See Appendix 4 and 5 with specific response rates*
Statistical robustness	Simple, straightforward indicator, no obvious alternatives. Indicator of gender equality plans may not fully function as indicator of efforts in general to promote GE in HEIs (large variation in country results). Intraclass: 0.47 (indicates high share of variation is between country)
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

Information item	GE2
Indicator characteristics	
Name of indicator	**Share of female researchers by sector**
Primary/secondary data	Indicator is based on secondary (already existing) data
Description	Share of female researchers by sector is a base calculation of the gender distribution of researchers currently in the labour force. The indicator is available for each of the higher education, government and business sectors at the national level. The availability of sector specific data will allow for an appreciation of changes in women's participation in research in these various sectors. This enables the monitoring of expanding and declining opportunity for women.
Qual / Quant	Quantitative
Source of data	Eurostat: Statistics on research and development (rd_p_femres)
Time-series	Most countries biennial – but data availability differs according to countries
Unit of measure	Metric – share of female researchers
Unit of analysis	Countries
Coverage	EU-28 member states
Data collection specifications	
Data collection	Data extracted from Eurostat "Statistics on research and development (rd_p_femres)". Data presented in full-time equivalent (FTE) form.
Indicator building	-
Assessment of RRI indicators	
Availability of data	Very good availability. Data missing for Finland and the UK
Statistical robustness	*Indicator from She Figures (no validation conducted).*
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	-

Information item	GE3
Indicator characteristics	
Name of indicator	**Share of RFOs promoting gender content in research**
Primary/secondary data	Primary data (from survey)
Description	The share of RFOs promoting gender content in research measures the extent to which RFOs take actions to ensure the integration of the gender dimension in research content. This indicator illustrates the integration of gender as part of research design and the research process. It entails sex and gender analysis being integrating into basic and applied research proposals and/or assessments when allocating research and development funding.
Qual / Quant	Quantitative
Source of data	RFO survey (conducted in 2016)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RFOs / Countries
Coverage	Sample of the RFO population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°19 of RFO survey, namely: "When allocating research and innovation funding in years 2014, 2015 and 2016, did your organisation include the gender dimension in research content?" *See Appendix 3 (survey questionnaires)*
Indicator building	Country scores are the average of the individual scores of each organisation. The score is given by: Yes, standard criterion = 1 Yes, specific criterion = 0.5 No/ Not App = 0 **Don't Know = not considered* Country scores range from 0 to 1
Assessment of RRI indicators	
Availability of data	RFO survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg and Latvia. *See Appendix 4 and 5 with specific response rates*
Statistical robustness	Possible alternative: binary indicator (yes==1, no=0). No country changes 5 or more spots in ranking for this alternative. Intraclass: 0.42 (indicates high share of variation is between country)
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

Information item	GE4
Indicator characteristics	
Name of indicator	**Dissimilarity index**
Primary/secondary data	Secondary (already existing) data
Description	The Dissimilarity Index provides a theoretical measurement of the percentage of women and men who would have to move to another field of science to ensure a gender balanced distribution across fields. It measures the distance from balanced gender distribution across fields for horizontal segregation in research.
Qual / Quant	Quantitative
Source of data	SHE FIGURES
Time-series	Every 3 years (at least up to now)
Unit of measure	Metric – share of men and women for the distance of balanced gender distribution across fields (interval)
Unit of analysis	Countries
Coverage	EU-27
Data collection specifications	
Data collection	Based on EUROSTAT data (rd_p_perssci), seven fields are used as basis for this computed indicator.
Indicator building	Details are not provided in the methodology of the SHE Figures
Assessment of RRI indicators	
Availability of data	Very good availability. Data missing for France
Statistical robustness	*Secondary data, no validation conducted.*
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	

Information item	GE5
Indicator characteristics	
Name of indicator	**Share of RPOs (HEI and PRO) with policies to promote gender in research content**
Primary/secondary data	Primary data (from survey)
Description	GE5 investigates the extent RPOs take actions to ensure the integration of the gender dimension in research content. This indicator focuses on the integration of the gender dimension in research programmes and projects.
Qual / Quant	Quantitative
Source of data	HEI survey (conducted in 2016) PRO survey (conducted in 2017)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RPOs / Countries
Coverage	Sample of the HEI and PRO population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°20 of HEI and PRO surveys, namely: "Does your organisation have implemented processes to promote the integration of a gender dimension in research and innovation content of projects and studies, for example information and qualification tools or concrete rewards and incentives?" *See Appendix 3 (survey questionnaires)*
Indicator building	Country scores are the average of the individual scores of each organisation. The score is given by: Yes = 1pt No / Not Applicable = 0 pt **Don't Know = not considered* Country scores range from 0 to 1
Assessment of RRI indicators	
Availability of data	HEI survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg. PRO survey: Data collected for all EU-28 countries, with diverging response rates. No responses for Estonia and Luxembourg *See Appendix 4 and 5 with specific response rates*
Statistical robustness	*Simple straightforward indicator, no obvious alternative specifications. No validation conducted.*
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years. it complements the newly developed indicator for the SHE Figures 2015 on "Proportion of a country's scientific publications integrating a gender dimension in their research content".

Information item	GE6
Indicator characteristics	
Name of indicator	**Glass ceiling index**
Primary/secondary data	Secondary data
Description	The Glass Ceiling Index measures women's chances of reaching the highest academic ranks relative to men's chances. It illustrates the difficulties women have to reach the highest organisational levels within RPOs. The proportion of women at academic levels A, B and C can be compared with the proportion of men at these levels. The share of women in Grade A as a comparison to the share of women in academia overall can be compared with the results for men. These data cover the higher education sector at the national level.
Qual / Quant	Quantitative
Source of data	SHE FIGURES
Time-series	Every 3 years (at least up to now)
Unit of measure	Metric – share of women in grade A in relation to share of women in academia (interval)
Unit of analysis	Countries
Coverage	EU-28
Data collection specifications	
Data collection	Data extracted from SHE FIGURES
Indicator building	-
Assessment of RRI indicators	
Availability of data	Very good availability.
Statistical robustness	*Secondary data, no validation conducted.*
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	

Information item	GE7
Indicator characteristics	
Name of indicator	**Gender wage gap**
Primary/secondary data	Secondary data
Description	The gender wage gap indicator measures gender variations with respect to annual and hourly earnings, and is used as a proxy for gender equality in the academic as well as the non-academic research sector.
Qual / Quant	Quantitative
Source of data	Eurostat ISCO-08 code 2 and 3 – Academic Profession, Technicians and Associate Professionals
Time-series	Yes
Unit of measure	Metric – difference in gross annual earnings between women and men in relation to male gross annual earnings (interval)
Unit of analysis	Countries
Coverage	EU-28
Data collection specifications	
Data collection	Data extracted from Eurostat. Data presented for "Academic Professions" and for "Technicians and associate professions". The Gender wage gap is given by the average hourly remuneration.
Indicator building	-
Assessment of RRI indicators	
Availability of data	Very good availability.
Statistical robustness	*Secondary data, no validation conducted.*
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	-

Information item	GE8
Indicator characteristics	
Name of indicator	**Share of female heads of RPOs (HEI and PRO)**
Primary/secondary data	Primary data (from survey)
Description	The share of female heads of research performing organisations captures the share of those headed by women. It can be interpreted as an indicator of gender balance in decision making and, therefore, the structural setting for gender equality
Qual / Quant	Quantitative
Source of data	HEI survey (conducted in 2016) PRO survey (conducted in 2017)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RPOs / Countries
Coverage	Sample of the HEI and PRO population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°22 of HEI and PRO surveys, namely: "Please specify the gender of the person who was/is head of your organisation in 2014, 2015 and 2016 (Head of organisation: highest decision-making official in the organisation (e.g. rector or equivalent in the academy, president or equivalent in non-academic research organisations))" *See Appendix 3 (survey questionnaires)*
Indicator building	Country scores are the average of the individual scores of each organisation. The score is given by: Male=0 Female=1 Country scores range from 0 to 1
Assessment of RRI indicators	
Availability of data	HEI survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg. PRO survey: Data collected for all EU-28 countries, with diverging response rates. No responses for Estonia and Luxembourg *See Appendix 4 and 5 with specific response rates*
Statistical robustness	*Simple straightforward indicator, no obvious alternative specifications. No validation conducted.*
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years. Alternative data collection could also be tested using web scraping techniques

Information item	GE9
Indicator characteristics	
Name of indicator	**Share of gender-balanced recruitment committees at RPOs (HEI and PRO)**
Primary/secondary data	Primary data (from survey)
Description	This indicator monitors female participation in decision making. The indicator captures the share of recruitment committees for internationally recognised researchers which are gender balanced. It can be interpreted as an indicator of the gender balance of the decision-making process.
Qual / Quant	Quantitative
Source of data	HEI survey (conducted in 2016) PRO survey (conducted in 2017)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RPOs / Countries
Coverage	Sample of the HEI and PRO population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°23 and 24 of HEI and PRO surveys, namely: Q°23: "How many recruitment committees for leading researcher positions did your organisation set up in 2014, 2015 and 2016 for the recruitment of researchers? Q°24: "In how many recruitment committees for leading researcher positions the share of female members was equal or higher than 40% of the total committee members? *See Appendix 3 (survey questionnaires)*
Indicator building	The indicator is calculated as the share from "the number of recruitment committees where the share of female was equal or higher than 40% of the total committee members" (Question 24) divided by the "Total number of recruitment committees for leading researchers set up by the organisation" (Question 23) Country scores are the average of the individual scores of each organisation. Country scores range from 0 to 1
Assessment of RRI indicators	
Availability of data	HEI survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg. PRO survey: Data collected for all EU-28 countries, with diverging response rates. No responses for Estonia and Luxembourg *See Appendix 4 and 5 with specific response rates*
Statistical robustness	*Simple straightforward indicator, no obvious alternative specifications. No validation conducted.*
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

Information item	GE10
Indicator characteristics	
Name of indicator	**Share of female inventors and authors**
Primary/secondary data	Indicator is based on register data (Databases), but own compilation and analysis is necessary.
Description	Number and share of female inventors and authors illuminates developments in women's representation across fields and sectors over time, on the basis of bibliometric data and patent counts. It captures both the number and share of female authors on scientific publications by scientific discipline, and the number and share of female inventors on patents by sector of activity.
Qual / Quant	Quantitative
Source of data	Scopus (for authors) PATSTAT (for patents)
Time-series	Yes
Unit of measure	Metric – share of female inventors and authors (interval)
Unit of analysis	Inventors in patent applications and authors of publications
Coverage	EU-28
Data collection specifications	
Data collection	*Data about publications (articles, letters, notes and reviews) and authors are extracted from Scopus (years 2005-16), data about transnational patents applications and inventors are extracted from PATSTAT (years 2005-15). Gender information is added by applying a gender identification method based on forenames.*
Indicator building	The indicator uses fractional counting of the publications and patents. By this, each publication/patent is weighted according to the relative share of a country and a gender. The share of publications/patents with a female author/inventor is computed in relation to the number of all publications/patents of a country.
Assessment of RRI indicators	
Availability of data	Very good availability.
Statistical robustness	*Secondary data, no validation conducted.*
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	Patents for the year 2016 not available. Publication follows after expiry of 18 months period from the date of filing or the earliest priority date.

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-old students**
Primary/secondary data	Primary data (from desk research)
Description	SLSE1 looks at controversial science topics and their coverage in the curricula of 15 to 18-year-old students. 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
Qual / Quant	Qualitative
Source of data	Desk research and interviews, conducted by network of country correspondents
Time-series	No
Unit of measure	Index (0 to 1)
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 is made in cooperation with the project team)
Coverage	EU-28
Data collection specifications	
Data collection	A qualitative assessment has been 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", intergenerational 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 reasons for your assessment.
Indicator building	The indicator is built following qualitative assessment based on the responses to the addressed questions. 1 point is given to each response where the answer is "Yes" (for questions 1 to 2c), and an additional point is given if the answer to question 3 is "These aspects are covered substantially". The country scores range from 0 to 5.
Assessment of RRI indicators	
Availability of data	Good availability. More difficult to collect in countries where the educational structure is decentralised (e.g. Belgium, United Kingdom, Germany). Data not collected for Germany
Statistical robustness	*No validation conducted*
Feasibility / Replicability	It requires the mobilisation of a network of country correspondents to conduct the desk research at country level. Not possible to conduct centrally.
Comments/caveats	

Information item	SLSE2
Indicator characteristics	
Name of indicator	**RRI-related training at HEIs**
Primary/secondary data	Primary data (from survey)
Description	SLSE2 provides information to what extent RRI-related aspects such as ethical, economic, environmental, legal and social aspects (EEELSA) are part of the education of young researchers.
Qual / Quant	Quantitative
Source of data	HEI survey (conducted in 2016)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	HEIs / Countries
Coverage	Sample of the HEI population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°25 of HEI survey, namely: "Did PhD students' trainings include RRI-related aspects (such as ethical, economic, environmental, legal and social aspects) in 2014, 2015 and 2016?" *See Appendix 3 (survey questionnaires)*
Indicator building	Country scores are the average of the individual scores of each organisation. The score is given by: Yes (mandatory) = 1pt Yes (voluntary) = 0.5pt No/ Not App = 0pt **Don't Know = not considered* Country scores range from 0 to 1
Assessment of RRI indicators	
Availability of data	HEI survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg. *See Appendix 4 and 5 with specific response rates*
Statistical robustness	Possible alternative: binary indicator (yes==1, no=0). Five countries change 5 or more spots in ranking for this alternative.
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years. The indicator could be slightly revised by putting 'philosophy of science' course at the centre of analysis instead of EEELSA.

Information item	SLSE3
Indicator characteristics	
Name of indicator	**Science Communication Culture**
Primary/secondary data	Secondary
Description	This composite indicator summarizes the overall national science communication culture. It was originally developed for the MASIS project. It builds on six parameters that collectively form a framework for describing the science communication culture of a specific country. These include • the degree of institutionalisation (e.g. the presence of popular science magazines, regularity of science section in newspapers, dedicated science communication in television etc.), • political attention to the field, • the scale and diversity of actor involvement, • traditions for popularisation within academia, • public interest in science and technology, • and finally, the training and organisational characteristics of science journalism in the country.
Qual / Quant	Qualitative
Source of data	Data from the MASIS project, specifically the publication Mejlgaard et al (2012), Locating science in society across Europe: Clusters and conferences, Science and Public Policy 39, pp. 741-750
Time-series	No.
Unit of measure	Ordinal
Unit of analysis	Countries
Coverage	EU-28
Data collection specifications	
Data collection	Data collection is based on country reports produced by a network of national experts, following a common guideline and template.
Indicator building	Categorisations based on qualitative assessment of data according to the six parameters listed above.
Assessment of RRI indicators	
Availability of data	Good availability of data
Statistical robustness	*Secondary data, no validation conducted*
Feasibility / Replicability	The indicator is feasible as a one-off source. In order to recollect data across countries, a setup similar to the MASIS project would be required. This involves national experts conducting desk research and interviews in their respective countries. The guidelines from the MASIS project could be adopted.
Comments/caveats	

Information item	SLSE4
Indicator characteristics	
Name of indicator	**Citizen science activities in RPOs**
Primary/secondary data	Primary
Description	SLSE4 captures if research performing organisations are engaged in citizen science in projects or through scientific publications about it. Since the indicator basis concerns rather small numbers, the indicator is presented in absolute numbers for the two aspects, namely: 1. Number of member organisations in the European Citizen Science Association (ECSA), and 2. The number of scientific publications concerning 'citizen science'.
Qual / Quant	Quantitative
Source of data	ECSA, annual reports Bibliometric data: Scopus
Time-series	2015, 2016. Updates depending on ECSA annual overview
Unit of measure	Absolut figures
Unit of analysis	Countries
Coverage	EU-28
Data collection specifications	
Data collection	1. From ECSA annual report, we collected the number of members by country in the ECSA (2015 and 2016) 2. Using Scopus, we collected the number of "citizen science" publications per country 2015 and 2016
Indicator building	The indicator consists of two components: a. The number of members by country in the ECSA b. The number of "citizen science" publications per country
Assessment of RRI indicators	
Availability of data	Good availability for publications. ECSA annual membership breakdown can be obtained.
Statistical robustness	*No validation conducted. However, membership-based data tends to have several biases such as host country bias, organisational bias, etc. Statistical robustness questionable since in many countries only one or two members.*
Feasibility / Replicability	Requires access to the ECSA reports and contact with the association to double check data. Overall the feasibility is good.
Comments/caveats	Membership-based data is biased and thus the data basis for the indicator suggests a limited level of relevant information on the subject matter.

3. PUBLIC ENGAGEMENT

Information item	PE1
Indicator characteristics	
Name of indicator	**Models of public involvement in S&T decision making**
Primary/secondary data	Secondary
Description	Models of public involvement in S&T decision making is a two-dimensional indicator. On one dimension is the degree of formalisation of structures and mechanisms, at the national level, for the involvement of citizens in decisions about science and technology. On the second dimension is the degree to which citizens are involved in making decisions. The two dimensions are considered to reflect the degree of overall democratisation of science and technology decision-making. On the basis of these two dimensions, countries are grouped into a four-category typology.
Qual / Quant	Qualitative
Source of data	Indicator presented in Mejlgaard et al (2012): 'Locating Science in Society across Europe – Clusters and Consequences', in *Science and Public Policy* 39(6): 741-50, p. 746, table 3.
Time-series	No.
Unit of measure	Nominal
Unit of analysis	Countries
Coverage	Coverage includes the EU-28 except Malta
Data collection specifications	
Data collection	Data collection is based on country reports produced by a network of national experts, following a common guideline and template.
Indicator building	Categorisations based on qualitative assessment of data according to the dimensions listed above.
Assessment of RRI indicators	
Availability of data	Existing data cover very well across Europe
Statistical robustness	*No validation conducted*
Feasibility / Replicability	The indicator is feasible as a one-off source. In order to recollect data across countries, a setup similar to the MASIS project would be required. This involves national experts conducting desk research and interviews in their respective countries. The guidelines from the MASIS project could be adopted.
Comments/caveats	Typology with two dimensions; hence numeric value of indicator has little meaning. Breaking PE1 up into two separate indicators would allow measurement of each individual dimension.

Information item	PE2
Indicator characteristics	
Name of indicator	**Policy-oriented engagement with science**
Primary/secondary data	Secondary
Description	Policy-oriented engagement with science is an individual-level indicator of the reported actual engagement of citizens. It combines three items from the 2010 Eurobarometer on 'Europeans, science and technology': 1) Do you attend public meetings or debates about science and technology? 2) Do you sign petitions or join street demonstrations on matters of nuclear power, biotechnology or the environment? 3) Do you participate in the activities of a non-governmental organisation dealing with science and technology related issues?
Qual / Quant	Quantitative
Source of data	Eurobarometer 340, wave 73.1 from 2010
Time-series	Only 2 out of the three items applied are time series (data available for 2005), while the third is not.
Unit of measure	Numerical value (average score on index)
Unit of analysis	The basic data unit is individuals, but the indicator is an aggregated measure at country level
Coverage	EU28
Data collection specifications	
Data collection	Data extracted from Eurobarometer
Indicator building	The indicator is calculated as a mean national score aggregated from a representative sample of citizens by country.
Assessment of RRI indicators	
Availability of data	Existing data cover very well across Europe
Statistical robustness	Possible alternative: binary indicator (yes==1, no=0). One country changes 5 or more spots in ranking for this alternative. Cronbach's alpha: 0.58 (close to desired level). Intraclass: 0.02 (very low, indicating that most variation is within country).
Feasibility / Replicability	The indicator is feasible for application. However, continued future data collection would be expensive, unless aligned with the Eurobarometer series work
Comments/caveats	

Information item	PE3
Indicator characteristics	
Name of indicator	**Citizen preferences for active participation in S&T decision making**
Primary/secondary data	Secondary
Description	This indicator is derived from the special Eurobarometer on RRI, which reads: 'What is the level of involvement citizens should have when it comes to decisions made about science and technology?' with the following response categories: 1. citizens do not need to be involved or informed; 2. citizens should only be informed; 3. citizens should be consulted and their opinions should be considered; 4. citizens should participate and have an active role; 5. citizens' opinions should be binding; and 6. don't know. The indicator reports the share of citizens at the national level expressing a preference for active participation.
Qual / Quant	Quantitative
Source of data	Data are from special Eurobarometer 401
Time-series	No
Unit of measure	Numerical value (share of citizens in a country opting for active participation)
Unit of analysis	The basic data unit is individuals, but the indicator is an aggregated measure at country level
Coverage	EU28
Data collection specifications	
Data collection	Data extracted from Eurobarometer
Indicator building	The indicator is calculated as a mean national score aggregated from a representative sample of citizens by country.
Assessment of RRI indicators	
Availability of data	Existing data cover very well across Europe
Statistical robustness	*Simple straightforward indicator, no obvious alternative specifications. No validation conducted.*
Feasibility / Replicability	The indicator is feasible for application. However, continued future data collection would be expensive, unless aligned with the Eurobarometer series work
Comments/caveats	

Information item	PE4
Indicator characteristics	
Name of indicator	**Active information search about controversial technology**
Primary/secondary data	Secondary
Description	This indicator is built as a composite measure based on three individual items from the 2010 Eurobarometer on biotechnology. It divides respondents into three categories depending on their responses to background items concerning GM food. The three categories of responses are: 1. "have heard of and talked about and/or searched for information"; 2. "have heard of but not talked about or searched for information"; and 3. "have not heard about". The indicator is calculated as the share of respondents that have heard of and have talked about and/or searched for information on GM foods.
Qual / Quant	Quantitative
Source of data	Eurobarometer 341, wave 73.1 from 2010.
Time-series	No
Unit of measure	Numerical value (share of citizens who have heard and talked and/or searched for information)
Unit of analysis	The basic data unit is individuals, but the indicator is an aggregated measure at country level
Coverage	EU28
Data collection specifications	
Data collection	Data extracted from Eurobarometer
Indicator building	The indicator is calculated as a mean national score aggregated from a representative sample of citizens by country.
Assessment of RRI indicators	
Availability of data	Existing data cover very well across Europe
Statistical robustness	*Simple straightforward indicator, no obvious alternative specifications. No validation conducted.*
Feasibility / Replicability	The indicator is feasible for application. However, continued future data collection would be expensive, unless aligned with the Eurobarometer series work
Comments/caveats	

Information item	PE5
Indicator characteristics	
Name of indicator	**Public engagement performance mechanisms at the level of research institutions (HEI and PRO)**
Primary/secondary data	Primary data (from survey)
Description	The indicator is based on data collection at the level of universities and public research agencies, which are aggregated to the national level. The indicator reports the level of public engagement mechanisms implemented within universities and research institutions at the country level.
Qual / Quant	Quantitative
Source of data	HEI survey (conducted in 2016) PRO survey (conducted in 2017)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RPOs / Countries
Coverage	Sample of the HEI and PRO population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°26 and 27 of HEI (respectively Q°25 and Q°26 of PRO survey), namely: Q°26 (HEI)/Q°25 (PRO): "Which of the following mechanisms does your institution apply in order to interact with citizens and societal stakeholders? Please consider whether there are changes in the practices of your institution over the years by providing answers for 2014, 2015, and 2016 (check those that apply)?" Q°27 (HEI)/Q°26 (PRO): "Which of the following statements come closest to the situation at your research institution? Please consider whether the priorities changed over the years by providing answers for 2014, 2015, and 2016?" *See Appendix 3 (survey questionnaires)* **Originally, the indicator also included Q°28 (HEI)/Q°27 (PRO), but this question was dropped as a result of the Validation test - see below*
Indicator building	The indicator is a composite made of: a) The country score from the response to Q°26 (1pt per option ticked). Scores ranging from 0 to 14 have been normalised from 0 to 1. b) The country score from the response to Q°27 (1pt per option ticked). Scores ranging from 0 to 2. Individual composite scores (sum of a and b) have been normalised from 0 to 1. Country scores are the average of the individual scores of each organisation.
Assessment of RRI indicators	
Availability of data	HEI survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg. PRO survey: Data collected for all EU-28 countries, with diverging response rates. No responses for Estonia and Luxembourg *See Appendix 4 and 5 with specific response rates*
Statistical robustness	Results of validation test for original version of indicator: Possible alternative: reduce Q26 to three levels (bottom 33% = 1; middle 33%=2; top 33%=3) and Q28 to binary indicator. 15 countries change 5 or more spots in ranking for this alternative. Cronbach's alpha = 0.17 (very low). Intraclass=0.06 (very low, indicating that most variation is within country). ***NOTE: Based on this test, the indicator was revised (description of current version listed above in "Indicator building"). Current version performs well on all measures of robustness.*** Results of validation test for current version of indicator: Possible alternative: remove Q28. 2 countries change 5 or more spots in ranking for this alternative. Cronbach's alpha = 0.84 (satisfactory). Intraclass=0.03 (very low, indicating that most variation is within country)
Feasibility / Replicability	Composite indicator. Complexity level is moderate.
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

Information item	PE6 (DROPPED)
Indicator characteristics	
Name of indicator	**Dedicated resources for Public Engagement**
Primary/secondary data	Primary data (from survey)
Description	The indicator is based on data collection at the level of universities and public research agencies, which will be aggregated to the national level. The indicator reports the national average budget share reserved for Public Engagement activities within universities and research institutions at the country level.
Qual / Quant	Quantitative
Source of data	HEI survey (conducted in 2016) PRO survey (conducted in 2017)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RPOs / Countries
Coverage	Sample of the HEI and PRO population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°5 and 29 of HEI and PRO surveys, namely: Q°5: "Please indicate the overall budget of your institution in Euro (€) for the years 2014, 2015, 2016 In case your financial year is spread within two years, please report as follows: 2014/2015 under 2014; 2015/2016 under 2015; 2016/2017 under 2016". Q°29: "Please indicate the institutional budget in Euros for the years 2014, 2015 and 2016 reserved for activities relating to public engagement and outreach programmes such as "open university days", "science festivals", "conferences/lectures aimed at the general public", etc. *See Appendix 3 (survey questionnaires)*
Indicator building	The indicator is calculated as the share from "the institutional budget in Euros for activities relating to public engagement" (Question 29) divided by the "Overall budget of the institution" (Question 5) Country scores are the average of the individual scores of each organisation. Country scores range from 0 to 1
Assessment of RRI indicators	
Availability of data	Overall response rate to the specific questions extremely low or answers provided inconsistent. RPOs may not have a clear track of the institutional budget reserved for activities relating to public engagement and outreach programmes. There was not enough data to build a robust indicator.
Statistical robustness	-
Feasibility / Replicability	Indicator is resource demanding, it requires the effort of country correspondents to collect data from RPOs and follow-up by phone to make sure the data provided is consistent and reliable.
Comments/caveats	Most organisations skipped Q°29. When answers where provided, we found there were inconsistent in many cases - a misunderstanding of the question could be the cause - sometimes the budget given in Q29 is higher than the overall HEI budget, which cannot be the case.

Information item	PE7
Indicator characteristics	
Name of indicator	**Embedment of public engagement activities in the funding structure of key public research funding agencies**
Primary/secondary data	Primary data (from survey)
Description	The indicator describes whether a country's largest and most prominent research funding agencies (typically research councils) allocate competitive funding to activities (mechanisms, programs, projects) where public engagement elements explicitly are targeted. These could, e.g., be specific research activities on public engagement, programmes supporting outreach activities, etc.
Qual / Quant	Quantitative
Source of data	RFO survey (conducted in 2016)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RFOs / Countries
Coverage	Sample of the RFO population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°21 and n°23 of RFO survey, namely: Q°21: "Some research funding organisations contribute to Public Engagement through their funding schemes. Please indicate, if any of the following activities have been supported by targeted funding schemes in your organisation (Please tick all relevant boxes)" Q°23: "Please indicate the extent to which your funding agency has engaged with citizens and societal actors when developing its funding strategies" *See Appendix 3 (survey questionnaires)*
Indicator building	The indicator is a composite made of: a. The country score from the response to Q°21 (1pt per option ticked; No = 0). Scores ranging from 0 to 3 have been normalised from 0 to 1. b. The country score from the response to Q°23 (Likert scale). Scores ranging from 1 to 5 have been normalised from 0 to 1. The final indicator is an average between the scores a. and b. Country scores range from 0 to 1
Assessment of RRI indicators	
Availability of data	RFO survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg and Latvia. *See Appendix 4 and 5 with specific response rates*
Statistical robustness	Possible alternative: reduce Q23 to binary indicator. One country changes 5 spots or more in ranking for this alternative. Cronbach's alpha=0.55 (close to desired level). Intraclass=0.12 (very low, indicating that most variation is within country).
Feasibility / Replicability	Composite indicator. Complexity is minor.
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

Information item	PE8
Indicator characteristics	
Name of indicator	**Public engagement elements as evaluative criteria in research proposal evaluations**
Primary/secondary data	Primary data (from survey)
Description	The indicator describes whether a country's largest and most prominent research funding agencies (typically research councils) take public engagement elements into account for the evaluation of research and innovation projects.
Qual / Quant	Quantitative
Source of data	RFO survey (conducted in 2016)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RFOs / Countries
Coverage	Sample of the RFO population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°24 of RFO survey, namely: "Please indicate the extent to which Public Engagement has been a criterion for the appraisal of research applications" *See Appendix 3 (survey questionnaires)*
Indicator building	Country scores are the average of the individual scores of each organisation. Responses were given in a Likert scale (1 to 5). Country scores have been normalised in a range from 0 to 1
Assessment of RRI indicators	
Availability of data	RFO survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg and Latvia. *See Appendix 4 and 5 with specific response rates*
Statistical robustness	Straightforward indicator with no suitable alternative. Reduction to binary indicator would result in large decline in country variation.
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

Information item	PE9
Indicator characteristics	
Name of indicator	**Research & Innovation democratisation index**
Primary/secondary data	Primary data (from survey)
Description	This indicator is based on opinions from public stakeholders on the degree of engagement of citizens and societal actors in research and innovation processes. This composite indicator is based on two questions in a dedicated Science in Society (SiS) survey (MoRRI 2017), which asked for the present situation as well as opinions on changes during the previous two years. To all these questions, respondents were asked to what extent they agree and whether or not the situation has improved/worsened/remained unchanged. The second question asked about awareness of legal frameworks in a given country, requiring citizens and CSO participation in S&T decision making.
Qual / Quant	Quantitative
Source of data	Science in Society (SiS) survey (MoRRI 2016)
Time-series	No. Survey conducted once, for year 2016
Unit of measure	Index (0 to 1)
Unit of analysis	The basic unit is organisations, specifically different stakeholder organisations, but the information is aggregated to the national level
Coverage	Sample of the Science in Society stakeholders' population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°5 and 6 of SiS survey, namely: Q°5: "Based on your experience and knowledge of the current situation in your country, please indicate the extent to which you agree with the following statements" Q°6: "Are you aware of legal frameworks in your country which require participation of citizens and civil society organisations in science and technology decision making?" *See Appendix 3 (survey questionnaires)*
Indicator building	The indicator is a composite made of: a. The country score from the response to Q°5 (Likert scale). Scores ranging from 1 to 5 have been normalised from 0 to 1. b. The country score from the response to Q°6 (Yes=1pt; No=0pt). Scores ranging from 0 to 1 The final indicator is an average between the scores a. and b. Country scores range from 0 to 1
Assessment of RRI indicators	
Availability of data	SiS survey: Data collected for all EU-28 countries with overall high response rates. *See Appendix 4 and 5 with specific response rates*
Statistical robustness	Cronbach's alpha=0.74 (indicating that set of questions function well as composite indicator). Intraclass=0.04 (very low, indicating that most variation is within country).
Feasibility / Replicability	Composite indicator. Complexity is moderate.
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

Information item	PE10
Indicator characteristics	
Name of indicator	**Research & Innovation democratisation index**
Primary/secondary data	Primary data (from survey)
Description	The indicator is based on a stakeholder survey among organisations centrally located in the broader 'science in society' field. The indicator is a composite measure based on a limited number of survey questions all tapping into the organisational landscape – or infrastructure – for involving citizens and societal actors in research and innovation. The indicator summarizes the degree of development of the national infrastructure for involvement of citizens and societal actors in research and innovation.
Qual / Quant	Quantitative
Source of data	Science in Society (SiS) survey (MoRRI 2016)
Time-series	No. Survey conducted once, for year 2016
Unit of measure	Index (0 to 1)
Unit of analysis	The basic unit is organisations, specifically different stakeholder organisations, but the information is aggregated to the national level
Coverage	Sample of the Science in Society stakeholders' population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°8 of SiS survey, namely: "Based on your experience and knowledge of the current situation in your country, please indicate the extent to which you agree with the following statements" *See Appendix 3 (survey questionnaires)*
Indicator building	Country scores are the average of the individual scores of each organisation. Responses were given in a Likert scale (1 to 5). Country scores have been normalised in a range from 0 to 1
Assessment of RRI indicators	
Availability of data	SiS survey: Data collected for all EU-28 countries with high response rates. *See Appendix 4 and 5 with specific response rates*
Statistical robustness	*Simple straightforward indicator, no obvious alternative specifications. No validation conducted.*
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

4. OPEN ACCESS

Information item	OA1
Indicator characteristics	
Name of indicator	**Open Access literature**
Primary/secondary data	Primary
Description	The indicator will calculate the number and share of publications that have some 'free' online accessibility (both in Gold and Green OA).
Qual / Quant	Quantitative
Source of data	Web of Science. Mendeley. Open Access databases (based on Crossref, DAOJ and ROAD).
Time-series	Yes
Unit of measure	Raw counts and shares
Unit of analysis	Countries, regions, disciplines, institutions and authors.
Coverage	All countries, disciplines, institutions, authors with publications in the Web of Science.
Data collection specifications	
Data collection	WoS database
Indicator building	
Assessment of RRI indicators	
Availability of data	Very good availability
Statistical robustness	The WoS database is commonly available containing millions of publications. Even the smaller European countries have more than ~500 publications on a yearly basis, making calculations robust. For OA publishing this WoS database is the source where evidence for OA is indicated. This means that OA publishing is always related to all published papers, which is a sound method.
Feasibility / Replicability	The method is fully replicable. However, the sources that are used to find evidence for open access are delayed in their updating of the newer publications. This means that when the years 2015-2016 are analysed again in the next years, the shares will probably be higher. And if new sources are added to find evidence of open access, the shares may get higher.
Comments/caveats	The share of open access publishing is a reasonable indicator as long as we are still in the transition towards full open access. This is a situation that will at some point be the dominant (business) model. As this is a transition period, the increase in OA publishing does not necessarily reflect policy responsiveness, or MS policies, but a system change.

Information item	OA2 (DROPPED)
Indicator characteristics	
Name of indicator	**Data publications and citations per country**
Primary/secondary data	Primary
Description	The open data indicator is based on the metadata offered by DataCite. DataCite is an international consortium of public research institutions, funding bodies and publishers worldwide whose mission is to promote open research data accessibility and tracking. For the latter, DataCite advocates for the use of Digital Object Identifiers (DOI)
Qual / Quant	Quantitative
Source of data	The Data Citation Index (DCI) on the Web of Science.
Time-series	Yes
Unit of measure	Raw counts and possible some relative measures at the country level.
Unit of analysis	Countries
Coverage	All European countries
Data collection specifications	
Data collection	-
Indicator building	-
Assessment of RRI indicators	
Availability of data	Data has been obtained from DataCite, a consortium providing DOIs to datasets recorded in data centres from all over the world. See "*comments/caveats*"
Statistical robustness	-
Feasibility / Replicability	A thorough recent study (https://www.sciencedirect.com/science/article/pii/S1751157717300834) has shown the important data and conceptual limitations regarding DataCite as a source for reliable Open Data indicators. Although, the source is considered the most promising, more research and development is needed in order to be able to provide reliable indicators on open data production. Considering this situation, we refrain from providing indicators based on this source beyond those reported in the link mentioned above.
Comments/caveats	Indicator OA2, which aimed to analyse open data practice by assessing the number of data sets in repositories proved to be an invalid indicator for the time being. Open data practices differ across science fields (in some fields it is common, whereas in others it is almost absent); standardisation of curation and findability are still under development; and cultural perceptions about data and access to data are not common. This was shown in the report: Open data; a researcher perspective (2017). More practically, the DataCite, which is currently the most reliable source to analyse repositories across the world, shows that the distribution of repositories is uneven. However, whether this reflects an actual situation or an analytical bias is unclear right now. Any conclusion from such data would be unsound.

Information item	OA3
Indicator characteristics	
Name of indicator	**Social media outreach/take up of Open Access Literature**
Primary/secondary data	Primary
Description	OA3 informs how OA European publications are being disseminated across social media tools.
Qual / Quant	Quantitative
Source of data	The indicator is built on data retrieved from the Web of Science (OA publications) and altmetric.com (twitter and Wikipedia references)
Time-series	From 2012 onwards
Unit of measure	Raw counts, shares and ratios.
Unit of analysis	Countries
Coverage	All countries (aggregated based on institutions/author affiliations) with OA publications in the Web of Science and with a DOI are included in the altmetric.com database.
Data collection specifications	
Data collection	Data collection is linked to the use of two private databases with the WoS database and Altmetric.com.
Indicator building	Identification of OA and non-OA publications per country and year through the WoS database. Matching of altmetric.com database which contains a WoS subset, namely all the publications with a DOI. Altmetric.com provides statistical data of these publications in terms of twitter and Wikipedia use. Two indicators were included: (1) The average number of tweets for OA and non-OA publications mentioned through twitter per country; (2) The share of OA and non-OA publications cited in Wikipedia, per country
Assessment of RRI indicators	
Availability of data	Very good availability
Statistical robustness	For OA publishing the WoS database is the source where evidence for OA is indicated. This means that OA publishing is always related to all published papers, which is a sound method. OA publishing coupled to twitter and Wikipedia is fully automated, based on robust methods.
Feasibility / Replicability	Data collection has been based on publications from the Web of Science containing a DOI. DOIs have been matched with Altmetric.com and tweets and Wikipedia mentions have been extracted from this source. This makes the methodology easily replicable and totally feasible.
Comments/caveats	Given the difficulties of open data (see OA2), this indicator took only publications into account. For the time being, it is suggested to limit it to open access publications only.

Information item	OA4
Indicator characteristics	
Name of indicator	**Public perception of Open Access - PPOA**
Primary/secondary data	Secondary
Description	The indicator on public perception of Open Access is constructed form a question in the Eurobarometer 2013. It provides the share of people who think that publicly funded research should be made available.
Qual / Quant	Quantitative
Source of data	Indicator presented at European Commission. Special Eurobarometer 401 on Responsible Research and Innovation (RRI), Science and Technology p. 147-151.
Time-series	No
Unit of measure	Ordinal
Unit of analysis	EU, national, gender, age, level of education, interest in science
Coverage	EU-28
Data collection specifications	
Data collection	Data extracted from Eurobarometer
Indicator building	The indicator is calculated as a mean national score aggregated from a representative sample of citizens by country.
Assessment of RRI indicators	
Availability of data	Existing data cover very well across Europe
Statistical robustness	*Simple straightforward indicator, no obvious alternative specifications. No validation conducted.*
Feasibility / Replicability	The indicator is feasible for application. However, continued future data collection would be expensive, unless aligned with the Eurobarometer series work
Comments/caveats	

Information item	OA5
Indicator characteristics	
Name of indicator	**Funder Mandates**
Primary/secondary data	Secondary
Description	The indicator presents if and how many funder mandates for open access publishing there are in the EU member states. Funder/institutional mandates relate to the policy and practice of funding institutions giving research grants or of academic institutions to request the research output to be made openly accessible.
Qual / Quant	Quantitative
Source of data	The indicator is presented in the Commission Staff Working Document: Impact Assessment Accompanying the document Commission Recommendation on access to and preservation of scientific information in the digital age {C(2012} 4890 final} {SWD(2012) 221 final} based on openaire.eu., available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SWD:2012:0222:FIN:EN:PDF, p. 88.
Time-series	No
Unit of measure	Nominal
Unit of analysis	National
Coverage	EU-27
Data collection specifications	
Data collection	Data collected in the mentioned source
Indicator building	-
Assessment of RRI indicators	
Availability of data	Good coverage of EU27
Statistical robustness	*Secondary source, no validation conducted*
Feasibility / Replicability	Medium/Low feasibility. Data is not accessible through the public website of OpenAire.
Comments/caveats	Alternative data collection could be foreseen using the funding acknowledgements in scientific publications.

Information item	OA6
Indicator characteristics	
Name of indicator	**RPO (HEI and PRO) support structures for researchers as regards incentives and barriers for data sharing**
Primary/secondary data	Primary
Description	OA6 captures practices and perceptions of the incentives and barriers for and against data sharing in RPOs.
Qual / Quant	Quantitative
Source of data	HEI survey (conducted in 2016) PRO survey (conducted in 2017)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RPOs / Countries
Coverage	Sample of the HEI and PRO population of each EU-28 member state
Data collection specifications	
Data collection	Indicator built from Question n°51, 52 and 53 of HEI survey (Q°49, 50 and 51 of PRO survey), namely: Q°51: "Which of the following policies apply in your institution?" Q°52: "Which of the following open data sharing practices apply in your institution?" Q°53: "Which of the following support (in kind and in funding) options with regard to open access publishing and data sharing apply?" *See Appendix 3 (survey questionnaires)*
Indicator building	The indicator is a composite made of: a. The country score from the response to Q°51 (1pt per policy applied). Scores ranging from 0 to 2 have been normalised from 0 to 1. b. The country score from the response to Q°52 (1pt per practice applied). Scores ranging from 0 to 2 have been normalised from 0 to 1. c. The country score from the response to Q°53 (1pt per support option applied). Scores ranging from 0 to 4 have been normalised from 0 to 1. The final indicator is an average between the scores a, b and c. Country scores range from 0 to 1
Assessment of RRI indicators	
Availability of data	HEI survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg. PRO survey: Data collected for all EU-28 countries, with diverging response rates. No responses for Estonia and Luxembourg *See Appendix 4 and 5 with specific response rates*
Statistical robustness	Cronbach's alpha=0.78 (satisfactory). Intraclass=0.13 (very low, indicating that most variation is within country).
Feasibility / Replicability	Composite indicator. Complexity is moderate
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

5. ETHICS

Information item	E1a
Indicator characteristics	
Name of indicator	**Ethics at the level of Universities and Public Research Organisations**
Primary/secondary data	Primary
Description	This indicator was derived from two questions in the survey of higher education institutions (MoRRI 2016) and Public Research Organisation (MoRRI 2017), namely: « Did your organisation have a Research Ethics Committee? » and « Did your institution have a Research Integrity Office? » (operating during 2014, 2015, 2016)
Qual / Quant	Quantitative
Source of data	HEI survey (conducted in 2016) PRO survey (conducted in 2017)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RPOs / Countries
Coverage	Sample of the HEI and PRO population of each EU-28 member state
Data collection specifications	
Data collection	Indicator derived from two questions of the HEI survey (Q°30 and Q°39) and the PRO survey (Q°29 and Q°38), namely: Q°30 (HEI)/Q°29 (PRO): "Did your organisation have a Research Ethics Committee?" Q°39 (HEI)/Q°38 (PRO): "Did your institution have a Research Integrity Office?" *See Appendix 3 (survey questionnaires)*
Indicator building	Country scores are the average of the individual scores of each organisation derived from answers to Q°30 (HEI) - the share of RPOs having an Ethics Committee - and to Q°39 (HEI) - the share of RPOs having a Research Integrity Office. The score is given by: Yes=1pt No=0pt Country scores range from 0 to 1
Assessment of RRI indicators	
Availability of data	HEI survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg. PRO survey: Data collected for all EU-28 countries, with diverging response rates. No responses for Estonia and Luxembourg *See Appendix 4 and 5 with specific response rates*
Statistical robustness	*Straightforward indicator. No validation conducted*
Feasibility / Replicability	High degree of replicability
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years. Alternative data collection could also be tested using web scraping techniques.

Information item	E1b
Indicator characteristics	
Name of indicator	**Ethics at the level of Universities and Public Research Organisations (Composite indicator)**
Primary/secondary data	Primary
Description	This indicator is a complex composite which uses two starting questions in the survey of higher education organisations (MoRRI2017), namely "Do you have an ethics committee/Do you have a research integrity office"?, and subsequent questions on the design, functions and impacts of these institutional arrangements such as "Have the opinions [of the Ethics committee] been binding or non-binding recommendations", or "Has the Research Integrity Office been able to take independently initiative to investigate a case?"
Qual / Quant	Quantitative
Source of data	HEI survey (conducted in 2016) PRO survey (conducted in 2017)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RPOs / Countries
Coverage	Sample of the HEI and PRO population of each EU-28 member state
Data collection specifications	
Data collection	Composite indicator derived from the questions of the HEI survey and the PRO survey, namely: HEI survey: Q30 to Q49 (Block A) PRO survey: Q29 to Q48 (Block B) *See Appendix 3 (survey questionnaires)*
Indicator building	E1.2 is the ethics index. The composites made from block A and block B questions are the average of all sub-questions scores in the respective blocks. The responses to the sub-questions have been given a score from 0 to 1. The Ethics index is the composite of the score of block A and Block B questions Country scores range from 0 to 1. **RPOs that responded "Yes" to Q30 and/or Q39 but then did not provide at least 50% of responses to the sub-questions are excluded from the score calculation of E1.2.*
Assessment of RRI indicators	
Availability of data	HEI survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg. PRO survey: Data collected for all EU-28 countries, with diverging response rates. No responses for Estonia and Luxembourg *See Appendix 4 and 5 with specific response rates*
Statistical robustness	Possible alternative: exclude Q31 on number cases per year. One country changes 5 spots or more in ranking for this alternative. Cronbach's alpha=0.66 (close to desired level). Intraclass=0.27 (moderate level).
Feasibility / Replicability	Composite indicator. Complex indicator.
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years. Alternative data collection could also be tested using web scraping techniques.

Information item	E2
Indicator characteristics	
Name of indicator	**National Ethics Committees Index (NEC index)**
Primary/secondary data	Secondary data
Description	The index captures qualities of national ethics committee infrastructure in a country. The index measures existence, output, impact and quality of NECs. It looks at the output in terms of opinions but also in terms of contributing to public debate, policy making. It particularly looks at the role of the public of NECs by measuring the publication of work results, the organisation of public events, classification of existing public involvement mechanisms, involvement of target groups and the existence and quality of websites.
Qual / Quant	Qualitative
Source of data	EPOCH (https://epochconference2012.wordpress.com/about)
Time-series	No
Unit of measure	Index (0 to 1)
Unit of analysis	National level. In most cases one NEC per country.
Coverage	Finland, United Kingdom, Germany, Greece, France, Italy, the Netherlands, Austria, Denmark, Spain, Cyprus, Sweden, Lithuania.
Data collection specifications	
Data collection	Data collected from source (Qualitative)
Indicator building	Index (from 0 to 1) constructed on the basis of set of qualitative criteria of the NEC. Final country score is the average score of all criteria: - Publication of work results: "Always"=1; "Sometimes"=0 - Organisation of public events: "Yes"=1; "No"=0 - Existence of specific public participation mechanisms: "Yes"=1; "No"=0 - Involvement of target groups: "Yes"=1; "No"=0 - Existence of websites: "Yes"=1; "No"=0 - Existence of well-organized websites providing information: "Yes"=1; "No"=0
Assessment of RRI indicators	
Availability of data	There are NEC in most countries, however, poor coverage of NEC specificities per country in order to build the final indicator.
Statistical robustness	*No validation conducted*
Feasibility / Replicability	Composite indicator. Level of complexity is moderate. Indicator can be replicated via a survey, with support of network of country correspondents. The effort required of the correspondents is limited and the survey can be centrally administered without large costs.
Comments/caveats	Alternative data collection for some sub questions could also be tested using web scraping techniques.

Information item	E3a
Indicator characteristics	
Name of indicator	**Research Funding Organisations Index**
Primary/secondary data	Primary
Description	The indicator is based on the dedicated survey of the funding organisations (MoRRI 2016) on "Has your organisation integrated any type of ethics assessment/review in its funding decisions?"
Qual / Quant	Quantitative
Source of data	RFO survey (conducted in 2016)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RFOs / Countries
Coverage	Sample of the RFO population of each EU-28 member state
Data collection specifications	
Data collection	Indicator derived from Q°25 of the RFO survey, namely: "Has your organisation integrated any type of ethics assessment/review in its funding decisions?" *See Appendix 3 (survey questionnaires)*
Indicator building	Country scores are the average of the individual scores of each organisation derived from answers to Q°25 (RFO). The score is given by: Yes=1pt No=0pt Country scores range from 0 to 1
Assessment of RRI indicators	
Availability of data	RFO survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg and Latvia. *See Appendix 4 and 5 with specific response rates*
Statistical robustness	*Straightforward indicator. No validation conducted*
Feasibility / Replicability	Simple indicator with high degree of replicability
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

Information item	E3b
Indicator characteristics	
Name of indicator	**Research Funding Organisations Index (Composite indicator)**
Primary/secondary data	Primary
Description	This indicator is a complex composite which uses the starting questions in the survey of funding organisations (MoRRI 2016), namely "Has your organisation integrated any type of ethics assessment/review in its funding decisions?" and subsequent questions on the design and numbers of projects concerned. It mirrors the indicator on "Research funding organisations index".
Qual / Quant	Quantitative
Source of data	RFO survey (conducted in 2016)
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	RFOs / Countries
Coverage	Sample of the RFO population of each EU-28 member state
Data collection specifications	
Data collection	Composite indicator derived from the questions of the RFO survey, namely: Q°25 to Q°36 *See Appendix 3 (survey questionnaires)*
Indicator building	E3.2 is the RFO ethics index. The responses to the sub-questions have been given a score between 0 to 1. The composite is the average of all sub-questions scores. **RFOs that responded "Yes" to Q25 but then did not provide at least 50% of responses to the sub-questions are excluded from the score calculation.*
Assessment of RRI indicators	
Availability of data	RFO survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg and Latvia. *See Appendix 4 and 5 with specific response rates*
Statistical robustness	Possible alternative: exclude Q41 on number cases per year. One country changes 5 spots or more in ranking for this alternative. Cronbach's alpha=0.60 (close to desired level). Intraclass=0.08 (very low, indicating that most variation is within country).
Feasibility / Replicability	Complex indicator. The indicator is resource demanding. Requires considerable effort from country correspondents to collect the necessary responses to the survey questions.
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

6. GOVERNANCE

Information item	GOV1
Indicator characteristics	
Name of indicator	**Use of science in Policy making**
Primary/secondary data	Secondary
Description	The indicator was built based on qualitative opinions by national experts in the course of the MASIS project (2012). Two dimensions relating to the use of science-based knowledge in decision making. One dimension concerns the extent to which a formalised structure for feeding science-based knowledge into decision making is in place, e.g. in terms of institutional sites dealing with these processes. The other dimension concerns the extent to which science-based knowledge and advice have a real impact on decisions. Based on these elements, four categories of countries are identified: highly formalized procedures and high saliency; less formalized, but with considerable influence; formalized procedures but low impact of science based knowledge in policy making; and low degree of science-based knowledge in policy making.
Qual / Quant	Qualitative
Source of data	Data from the MASIS project, specifically the publication Mejlgaard et al (2012), Locating science in society across Europe: Clusters and conferences, Science and Public Policy 39, pp. 741-750
Time-series	No.
Unit of measure	Ordinal
Unit of analysis	Countries
Coverage	EU-28 member state (except Malta)
Data collection specifications	
Data collection	Data collection is based on country reports produced by a network of national experts, following a common guideline and template.
Indicator building	Categorisations based on qualitative assessment of data according to the dimensions listed above.
Assessment of RRI indicators	
Availability of data	Existing data cover very well across Europe
Statistical robustness	*No validation conducted*
Feasibility / Replicability	The indicator is feasible as a one-off source. In order to recollect data across countries, a setup similar to the MASIS project would be required. This involves national experts conducting desk research and interviews in their respective countries. The guidelines from the MASIS project could be adopted.
Comments/caveats	A complementary approach was tested using bibliometric techniques. See Haunschild/Bornmann 2017

Information item	GOV2
Indicator characteristics	
Name of indicator	**RRI-related governance mechanisms within research funding and research performing organisations**
Primary/secondary data	Primary
Description	This indicator determines whether RRI is seen as a priority issue for organisations and is supported by a formalised governance structure. The data for this indicator is be gathered through HEI, PRO and RFO surveys and presented at the aggregated national level as the share of organisations having a formalised governance structure
Qual / Quant	Quantitative
Source of data	Data collected through HEI, PRO and RFO surveys
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	Countries (basic units RPOs and RFOs)
Coverage	EU-28
Data collection specifications	
Data collection	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 *See Appendix 3 (survey questionnaires)*
Indicator building	GOV2 is a composite indicator build following 2 main steps: 1) A country score for each survey (RFO, HEI and PRO) is calculated as the average of the individual scores of each organisation to Q°7. A point is given to each of the response categories ticked. Results have been normalised and go from 0 to 1. 2) The average of the country scores of each survey (RFO, HEI and PRO) is calculated. The result is the composite indicator GOV2
Assessment of RRI indicators	
Availability of data	HEI survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg. PRO survey: Data collected for all EU-28 countries, with diverging response rates. No responses for Estonia and Luxembourg RFO survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg and Latvia. *See Appendix 4 and 5 with specific response rates*
Statistical robustness	HEI: Cronbach's alpha=0.82 (satisfactory). Intraclass=0.03 (very low, indicating that most variation is within country). RFO: Cronbach's alpha=0.69 (satisfactory). Intraclass=0.16 (very low, indicating that most variation is within country).
Feasibility / Replicability	Composite indicator. Complexity is moderate
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

Information item	GOV3
Indicator characteristics	
Name of indicator	**RRI-related governance mechanisms within research funding and performing organisations – composite index**
Primary/secondary data	Primary
Description	This indicator determines whether RRI is seen as a priority issue for organisations and is supported by a formalised governance structure. The data for this indicator is be gathered through HEI, PRO and RFO surveys and presented at the aggregated national level as the share of organisations having a formalised governance structure
Qual / Quant	Quantitative
Source of data	Data collected through HEI, PRO and RFO surveys
Time-series	No. Survey conducted once, for years 2014, 2015 and 2016
Unit of measure	Index (0 to 1)
Unit of analysis	Countries (basic units RPOs and RFOs)
Coverage	EU-28
Data collection specifications	
Data collection	Data collected from survey, Q°13 of the HEI, PRO and RFO surveys, namely: "Did your organisation actively encourage the following among researchers, employees or partner organisations during 2016 —Are there changes compared to previous years?" Response categories: Ethics; Citizen Engagement; Open Access; Gender Equality; Responsible R&I *See Appendix 3 (survey questionnaires)*
Indicator building	GOV3 is a composite indicator build following 2 main steps: 1) A country score for each survey (RFO, HEI and PRO) is calculated as the average of the individual scores of each organisation to Q°13. Within each response category, the following scores are applied: "Very much"=2pt; "Somewhat"=1pt; "Not at all"=0pt. Results have been normalised and go from 0 to 1. 2) The average of the country scores of each survey (RFO, HEI and PRO) is calculated. The result is the composite indicator GOV3
Assessment of RRI indicators	
Availability of data	HEI survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg. PRO survey: Data collected for all EU-28 countries, with diverging response rates. No responses for Estonia and Luxembourg RFO survey: Data collected for all EU-28 countries with diverging response rates. No responses for Luxembourg and Latvia. *See Appendix 4 and 5 with specific response rates*
Statistical robustness	HEI: Cronbach's alpha=0.74 (satisfactory). Intraclass=0.12 (very low, indicating that most variation is within country). RFO: Cronbach's alpha=0.73 (satisfactory). Intraclass=0.23 (moderate level).
Feasibility / Replicability	Complex indicator
Comments/caveats	To avoid survey fatigue and allow to better capture institutional changes over time, it is recommended to replicate this indicator with a frequency of minimum 3 years.

Appendix 3: Questionnaires

Science in Society Survey

* **1. Country**

Austria
Belgium
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Ireland
Italy
Latvia
Lithuania
Luxembourg
Malta
The Netherlands
Poland
Portugal
Romania
Slovakia
Slovenia
Spain
Sweden
United Kingdom

* **2. Name of your organisation**

3. Your role in the organisation

4. Your name

5. Based on your experience and knowledge of the current situation in your country, please indicate the extent to which you agree with the following statements:

						Looking back over the last 2 years, would you say that the situation has:		
	1 Strongly disagree	2 Tend to disagree	3 Neither agree or disagree	4 Tend to agree	5 Strongly agree	Changed to the worse	Remained the same	Changed to the better
Citizens and civil society organisations are informed about developments in research and innovation	☐	☐	☐	☐	☐	☐	☐	☐
Citizens and civil society organisations are consulted when political decisions about research and innovation are being made	☐	☐	☐	☐	☐	☐	☐	☐
The opinions and advice of citizens and civil society organisations have a significant impact on political decisions about research and innovation	☐	☐	☐	☐	☐	☐	☐	☐
The values and expectations of citizens and civil society organisations play an important role in setting the agenda for research and innovation	☐	☐	☐	☐	☐	☐	☐	☐
My own organisation has been able to influence decisions about research and innovation in my country	☐	☐	☐	☐	☐	☐	☐	☐

6. Are you aware of legal frameworks in your country which require participation of citizens and civil society organisations in science and technology decision making?

Yes

No

7. If yes, please provide a brief description of the legal framework

8. Based on your experience and knowledge of the current situation in your country, please indicate the extent to which you agree with the following statements:

						Looking back over the last 2 years, would you say that the situation has:		
	Strongly disagree	Tend to disagree	Neither agree nor disagree	Tend to agree	Strongly agree	Changed to the worse	Remained the same	Changed to the better
Citizens and civil society organisations have easy access to decision makers in the area of research and innovation policy	☐	☐	☐	☐	☐	☐	☐	☐
Citizens and civil society organisations are often represented in advisory bodies related to research and innovation policy	☐	☐	☐	☐	☐	☐	☐	☐
In my country, there are multiple channels for interaction between science and broader society	☐	☐	☐	☐	☐	☐	☐	☐
My own organisation plays an important role in mediating between science and broader society in my country	☐	☐	☐	☐	☐	☐	☐	☐

Survey for Research Funding Organisations

1. Country

Austria
Belgium
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Ireland
Italy
Latvia
Lithuania
Luxembourg
Malta
The Netherlands
Poland
Portugal
Romania
Slovakia
Slovenia
Spain
Sweden
United Kingdom

2. Name of your organisation

3. Your role/position in the organisation

4. Your name

5. Is it within the scope of your organisation to fund research and innovation?

It is among our main activities

It is not a core activity, but we regularly do so

Occasionally

Never

6. What has been the size of the budget for research and innovation funding of your organisation for the period 2014-2016 (in €)?

In case your financial year is spread within two years, please report as follows: 2014/2015 under 2014; 2015/2016 under 2015; 2016/2017 under 2016.

2014	
2015	
2016 (estimation)	

7. Based on your experience and knowledge, has your organisation established processes for managing the following aspects in 2014, 2015, 2016? Please tick all that apply

	Ethics in research and innovation	Citizen engagement and participation of societal actors	Open access and open science	Gender equality in research and innovation	Responsible research and innovation
2014	❑	❑	❑	❑	❑
2015	❑	❑	❑	❑	❑
2016	❑	❑	❑	❑	❑

For each area you have ticked, please briefly describe the processes in place

8. Ethics in research and innovation	
9. Citizen engagement and participation of societal actors	
10. Open access and open science	
11. Gender equality in research and innovation	
12. Responsible research and innovation	

13. Did your organisation actively encourage the following among researchers, employees or partner organisations during 2016 —Are there changes compared to previous years?

				Looking back over the last 2 years (2014-2015), would you say that in 2016 your organisation promotes these areas		
	Very much	Somewhat	Not at all	1 More actively	2 About the same	3 Less actively
Ethics in research and innovation	☐	☐	☐	☐	☐	☐
Citizen engagement and participation of societal actors	☐	☐	☐	☐	☐	☐
Open access and open science	☐	☐	☐	☐	☐	☐
Gender equality in research and innovation	☐	☐	☐	☐	☐	☐
Responsible research and innovation	☐	☐	☐	☐	☐	☐

For each area you have ticked, please briefly describe the processes in place

14. Ethics in research and innovation	
15. Citizen engagement and participation of societal actors	
16. Open access and open science	
17. Gender equality in research and innovation	
18. Responsible research and innovation	

In the following sections we are going to ask you to provide more information on some of the aspects of RRI mentioned above.

19. When allocating research and innovation funding in years 2014, 2015 and 2016, did your organisation include the gender dimension in research content?

	Yes, it was a standard criterion in all programmes	Yes, it was a standard criterion in specific types of programmes	No	Don't know
2014	☐	☐	☐	☐
2015	☐	☐	☐	☐
2016	☐	☐	☐	☐

20. Citizen Science refers to the general public engagement in scientific research activities when citizens actively contribute to science either with their intellectual effort or surrounding knowledge or with their tools and resources. Please indicate the approximate budget of your organisation for Citizen Science projects/activities (in €)?

In case your financial year is spread within two years, please report as follows: 2014/2015 under 2014; 2015/2016 under 2015; 2016/2017 under 2016

2014	
2015	
2016	

The following questions are about 'Public Engagement', which describes the interaction between research institutions and citizens or societal stakeholders.

21. Some research funding organisations contribute to Public Engagement through their funding schemes. Please indicate, if any of the following activities have been supported by targeted funding schemes in your organisation (Please tick all relevant boxes)

	Projects / activities which are primarily about disseminating research to citizens or societal stakeholders	Research projects which involve citizens or societal stakeholders in research activities	Research projects on Public Engagement (where the contents of the research is about Public Engagement)	No such activities are funded through targeted schemes
2014	❑	❑	❑	☐
2015	❑	❑	❑	☐
2016	❑	❑	❑	☐

22. Please indicate the approximate budget size for targeted Public Engagement projects/ activities.

In case your financial year is spread within two years, please report as follows: 2014/2015 under 2014; 2015/2016 under 2015; 2016/2017 under 2016

2014	
2015	
2016 (estimation)	

23. Please indicate the extent to which your funding agency has engaged with citizens and societal actors when developing its funding strategies :

	To a very large extent	To a large extend	To some extent	To a small extent	To a very small or no extent
2014	☐	☐	☐	☐	☐
2015	☐	☐	☐	☐	☐
2016	☐	☐	☐	☐	☐

24. Please indicate the extent to which Public Engagement has been a criterion for the appraisal of research applications

	To a very large extent	To a large extend	To some extent	To a small extent	To a very small or no extent
2014	☐	☐	☐	☐	☐
2015	☐	☐	☐	☐	☐
2016	☐	☐	☐	☐	☐

* **25. Has your organisation integrated any type of ethics assessment/review in its funding decisions? Please tick 'Yes' for those years assessment processes were in place, even if no assessment has been performed.**

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

26. What is the scope of ethics review in your organisation? What criteria does ethics assessment cover in your organisation?

27. Has your organisation monitored ethical aspects in funding applications within all science disciplines targeted by your organisation?

	All disciplines	Most disciplines	Some disciplines
2014	☐	☐	☐
2015	☐	☐	☐
2016	☐	☐	☐

28. How strong has been the influence of the processes you installed in your organisation to check projects for their ethical acceptability on the shaping of research and innovation priorities?

	No influence (1)	(2)	(3)	(4)	Significant influence (5)
2014	☐	☐	☐	☐	☐
2015	☐	☐	☐	☐	☐
2016	☐	☐	☐	☐	☐

29. Has your organisation involved in any way different societal actors / stakeholders to assess the ethical acceptability of research that you fund?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

30. If you have involved stakeholders in checking ethical issues on the research you fund, how strong has been their influence on your funding decisions? Influence could include change in the appraisal score of proposals, changes in the objectives or the design of research etc.

	No influence (1)	(2)	(3)	(4)	Significant influence (5)
2014	☐	☐	☐	☐	☐
2015	☐	☐	☐	☐	☐
2016	☐	☐	☐	☐	☐

31. Has your organisation involved in any way different stakeholders in assessing the societal relevance (research aiming at answering questions society asks or solving problems it faces) of the research you fund?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

32. If you have involved stakeholders in checking the societal relevance (research aiming at answering questions society asks or solving problems it faces) of the research you fund, how strong has been their influence on the research funding decisions of your organisation? Influence could include change in the appraisal score of proposals, changes in the objectives or the design of research etc.

	No influence (1)	(2)	(3)	(4)	Significant influence (5)
2014	☐	☐	☐	☐	☐
2015	☐	☐	☐	☐	☐
2016	☐	☐	☐	☐	☐

33. Some research projects in the technical science, natural sciences and health science include social sciences and humanities to address the societal and/or ethical impact of their research. How often in recent years did research projects that your organisationd funde integrate social sciences and humanities to address the societal and/or ethical impact of research in technical science, natural science or health science?

	Always	Often	Occasionally	Rarely	Never
2014	☐	☐	☐	☐	☐
2015	☐	☐	☐	☐	☐
2016	☐	☐	☐	☐	☐

34. Some research projects involve stakeholders and/or citizens in their research design to address the societal and/or ethical impact of a research project. How often did research projects that your organisation funded include the involvement the stakeholders and/or citizens?

	Always	Often	Occasionally	Rarely	Never
2014	☐	☐	☐	☐	☐
2015	☐	☐	☐	☐	☐
2016	☐	☐	☐	☐	☐

35. If you think about the total of projects your organisation has funded in 2014, 2015 and 2016. How many of them went through an ethics review process? Please provide an estimation of the share (%)?

2014 [ ]

2015 [ ]

2016 (estimation) [ ]

36. What is the share of research proposals for which ethics review has required substantive changes in grant application or second ethics assessment? Please provide an estimation of the share (%)?

2014 [ ]

2015 [ ]

2016 (estimation) [ ]

Survey on RRI for Higher Education Institutions

* **1. Country**

Austria
Belgium
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Ireland
Italy
Latvia
Lithuania
Luxembourg
Malta
The Netherlands
Poland
Portugal
Romania
Slovakia
Slovenia
Spain
Sweden
United Kingdom

* **2. Name of your organisation**

3. Your role in the organisation

4. Your name

5. Please indicate the overall budget of your institution in Euro (€) for the years 2014, 2015, 2016 In case your financial year is spread within two years, please report as follows: 2014/2015 under 2014; 2015/2016 under 2015; 2016/2017 under 2016.

2014 ☐

2015 ☐

2016 ☐

6. What is the number of your research staff (in all categories and type of contracts)? Years 2014, 2015 and 2016

2014 ☐

2015 ☐

2016 ☐

7. Based on your experience and knowledge, has your organisation established processes for managing the following aspects in 2014, 2015, 2016? Please tick all that apply

	Ethics in research and innovation	Citizen engagement and participation of societal actors	Open access and open science	Gender equality in research and innovation	Responsible research and innovation
2014	❑	❑	❑	❑	❑
2015	❑	❑	❑	❑	❑
2016	❑	❑	❑	❑	❑

For each area you have ticked, please briefly describe the processes in place

8. Ethics in research and innovation	
9. Citizen engagement and participation of societal actors	

10. Open access and open science	
11. Gender equality in research and innovation	
12. Responsible research and innovation	

* **13. Did your organisation actively encourage the following among researchers, employees or partner organisations during 2016 —Are there changes compared to previous years?**

				Looking back over the last 2 years (2014-2015), would you say that in 2016 your organisation promotes these areas		
	Very much	Somewhat	Not at all	1 More actively	2 About the same	3 Less actively
Ethics in research and innovation	☐	☐	☐	☐	☐	☐
Citizen engagement and participation of societal actors	☐	☐	☐	☐	☐	☐
Open access and open science	☐	☐	☐	☐	☐	☐
Gender equality in research and innovation	☐	☐	☐	☐	☐	☐
Responsible research and innovation	☐	☐	☐	☐	☐	☐

For each area you have ticked "Very much" or "Somewhat", please briefly describe the processes in place

14. Ethics in research and innovation	
15. Citizen engagement and participation of societal actors	
16. Open access and open science	
17. Gender equality in research and innovation	
18. Responsible research and innovation	

In the following sections we are going to ask you to provide more information on some of the aforementioned aspects of RRI.

19. Does your organisation have a gender equality plan? - A gender equality plan is a consistent set of provisions and actions aimed at ensuring gender equality.

	Yes	No	Not known	Not applicable
2014	☐	☐	☐	☐
2015	☐	☐	☐	☐
2016	☐	☐	☐	☐

20. Does your organisation have implemented processes to promote the integration of a gender dimension in research and innovation content of projects and studies, for example information and qualification tools or concrete rewards and incentives?

	Yes	No	Not known	Not applicable
2014	☐	☐	☐	☐
2015	☐	☐	☐	☐
2016	☐	☐	☐	☐

21. Previously you indicated that your organisation has implemented processes to promote the integration of a gender dimension in research and innovation content of projects and studies. Could you please briefly describe the processes in place?

22. Please specify the gender of the person who was/is head of your organisation in 2014, 2015 and 2016 (Head of organisation: highest decision-making official in the organisation (e.g. rector or equivalent in the academy, president or equivalent in non-academic research organisations))

	Male	Female
2014	☐	☐
2015	☐	☐
2016	☐	☐

23. How many recruitment committees for leading researcher positions did your organisation set up in 2014, 2015 and 2016 for the recruitment of researchers?

2014	
2015	
2016 (estimation)	

24. In how many recruitment committees for leading researcher positions the share of female members was equal or higher than 40% of the total committee members?

2014	
2015	
2016 (estimation)	

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

	Yes, training in these aspects is mandatory	Yes, but training in these aspects is voluntary	No	Don't know	Not applicable
2014	☐	☐	☐	☐	☐
2015	☐	☐	☐	☐	☐
2016	☐	☐	☐	☐	☐

The following questions are about 'Public Engagement', which is a notion that captures the interaction between your research institution and citizens or societal stakeholders.

26. Which of the following mechanisms does your institution apply in order to interact with citizens and societal stakeholders? Please consider whether there are changes in the practices of your institution over the years by providing answers for 2014, 2015, and 2016 (check those that apply)

	2014	2015	2016
Research projects in partnership with non-academic organisations	☐	☐	☐
Collaboration with NGO's and local government bodies	☐	☐	☐
Participation in EU projects/networks about Public Engagement	☐	☐	☐
Community representatives in boards or committees	☐	☐	☐
Specific activities involving schools children visiting the institution	☐	☐	☐
Meetings / conferences addressed primarily to the public	☐	☐	☐
Implementation of specific action plans targeting Public Engagement at your institution	☐	☐	☐
Salary incentives for public outreach activities	☐	☐	☐
Awards for science communication	☐	☐	☐
Availability of a press and/or Public Relations office	☐	☐	☐
Public Engagement as a criterion for promotion	☐	☐	☐
Public availability of information regarding completed and ongoing research activities	☐	☐	☐
Publications addressed primarily to the public	☐	☐	☐

Organisation of outreach incentives such as 'open days' 'university festivals' etc.	☐	☐	☐

27. Which of the following statements come closest to the situation at your research institution? Please consider whether the priorities changed over the years by providing answers for 2014, 2015, and 2016

	Public Engagement has high strategic priority at our research institution	Public Engagement has moderate strategic priority at our research institution	Public Engagement is not a strategic priority at our research institution
2014	☐	☐	☐
2015	☐	☐	☐
2016	☐	☐	☐

28. Which of the following statements come closest to the situation at your institution? Please also consider whether there are changes in the situation at your institution over the years by providing answers for 2014, 2015, and 2016 (check those that apply, check only one per year)

	Public Engagement activities are mainly initiated by the management level at our research institution	Public Engagement activities are mainly initiated by individuals or groups of researchers at our research institution
2014	☐	☐
2015	☐	☐
2016	☐	☐

29. Please indicate the institutional budget in Euros for the years 2014, 2015 and 2016 reserved for activities relating to public engagement and outreach programmes such as "open university days", "science festivals", "conferences/lectures aimed at the general public" etc.

2014	
2015	
2016 (estimation)	

* **30. Did your organisation have a Research Ethics Commitee operating during 2014, 2015, 2016?**

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

31. How many cases per year have been decided by the Research Ethics Committee?

2014 [ ]

2015 [ ]

2016 [ ]

32. Has the Research Ethics Committee been able to take independently initiative to investigate a proposal?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

33. Have the applications to Research Ethics Committee been obligatory or voluntary?

	Obligatory	Voluntary	Depending on the content of the application, it can be obligatory or voluntary
2014	☐	☐	☐
2015	☐	☐	☐
2016	☐	☐	☐

34. Have the applications to Research Ethics Committee covered all disciplines or have they been restricted to certain research areas?

	All	Most	Some
2014	☐	☐	☐
2015	☐	☐	☐
2016	☐	☐	☐

35. What have the evaluation criteria covered in 2014, 2015 and 2016?

	Legal requirements for research on human subjects	Legal requirements for research on animals	Additional considerations of research ethics	Societal impact of research
2014	❑	❑	❑	❑
2015	❑	❑	❑	❑
2016	❑	❑	❑	❑

36. Have amendments to the proposals been requested based on the opinions of the Research Ethics Committee?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

37. Has the research ethics committee rejected research proposals entirely?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

38. Have the opinions of the Research Ethics Committee been binding or non-binding recommendations?

	Binding	Non-binding
2014	☐	☐
2015	☐	☐
2016	☐	☐

* **39. Did your institution have a Research Integrity Office operating during 2014, 2015, 2016?**

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

40. Has the Research Integrity Office been an ad-hoc committee or a permanent board?

	Permanent	Ad-hoc
2014	☐	☐
2015	☐	☐
2016	☐	☐

41. How many cases per year have been decided by the Research Integrity Office?

2014 ☐

2015 ☐

2016 ☐

42. Has the Research Integrity Office been able to take independently initiative to investigate a case?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

43. Have the complains to the Research Integrity Office been covering all disciplines or have they been restricted to certain research areas?

	All	Most	Some
2014	☐	☐	☐
2015	☐	☐	☐
2016	☐	☐	☐

44. What has the Research Integrity Office covered?

	Plagiarism	Fabrication fraud authorship and intellectual property and citation/acknowledgement practices	Scientific neutrality	Conflicts of interest in peer review	Scientific advice
2014	❑	❑	❑	❑	❑
2015	❑	❑	❑	❑	❑
2016	❑	❑	❑	❑	❑

45. Have the opinions been published in anonymised form after investigation?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

46. Have the opinions of the Research Integrity Office been binding or non-binding recommendations?

	Binding	Non-binding
2014	☐	☐
2015	☐	☐
2016	☐	☐

47. Has the Research Integrity Office taken actions to raise awareness for the issue of research integrity?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

48. Has the Research Integrity Office issued recommendations for researchers, policy makers and stakeholder?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

49. Has the Research Integrity Office provided training to researchers on research integrity?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

51. Which of the following policies apply in your institution

	2014	2015	2016
Your institution has explicit open data management regulations	☐	☐	☐
Your institution has explicit institutional Gold or green Open access publishing regulations	☐	☐	☐
Your institution choses to follow funder or field specific incentives for open data and publication sharing	☐	☐	☐

52. Which of the following open data sharing practices apply in your institution?

	2014	2015	2016
Repositories are provided by your institution	☐	☐	☐
Repositories are provided by departments	☐	☐	☐

53. Which of the following support (in kind and in funding) options with regard to open access publishing and data sharing apply?

	2014	2015	2016
The Library of your institution takes care of open access publishing	☐	☐	☐
Your institution provides IT support for FAIR data practices	☐	☐	☐
Your institution has specific budget for Open Access publishing	☐	☐	☐
Your institution has specific budget for the implementation of Open Data sharing	☐	☐	☐
Your institution provides support for on line communication (e.g. project websites) on publication and data sharing practices	☐	☐	☐
Your institution provides training in research data sharing e.g. about curation, metadata	☐	☐	☐

Survey on RRI for Public Research Organisations

* **1. Country**

Austria
Belgium
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Ireland
Italy
Latvia
Lithuania
Luxembourg
Malta
The Netherlands
Poland
Portugal
Romania
Slovakia
Slovenia
Spain
Sweden
United Kingdom

* **2. Name of your organisation**

3. Your role in the organisation

4. Your name

5. Please indicate the overall budget of your institution in Euro (€) for the years 2014, 2015, 2016 In case your financial year is spread within two years, please report as follows: 2014/2015 under 2014; 2015/2016 under 2015; 2016/2017 under 2016.

2014	
2015	
2016	

6. What is the number of your research staff (in all categories and type of contracts)? Years 2014, 2015 and 2016

2014	
2015	
2016	

* **7. Based on your experience and knowledge, has your organisation established processes for managing the following aspects in 2014, 2015, 2016? Please tick all that apply**

	Ethics in research and innovation	Citizen engagement and participation of societal actors	Open access and open science	Gender equality in research and innovation	Responsible research and innovation	N/A
2014	❑	❑	❑	❑	❑	❑
2015	❑	❑	❑	❑	❑	❑
2016	❑	❑	❑	❑	❑	❑

8. OPTIONAL: Previously you indicated that processes for managing ethics in research and innovation have been in place during the period 2014-2016. Could you please briefly describe them?

9. OPTIONAL: Previously you indicated that processes for managing citizen engagement and participation of societal actors have been in place during the period 2014-2016. Could you please briefly describe them?

10. OPTIONAL: Previously you indicated that processes for managing open access and open science have been in place during the period 2014-2016. Could you please briefly describe them?

11. OPTIONAL: Previously you indicated that processes for managing gender equality in research and innovation have been in place during the period 2014-2016. Could you please briefly describe them?

12. OPTIONAL: Previously you indicated that processes for managing responsible research and innovation have been in place during the period 2014-2016. Could you please briefly describe them?

* **13. Did your organisation actively encourage the following among researchers, employees or partner organisations during 2016 —Are there changes compared to previous years?**

				Looking back over the last 2 years (2014-2015), would you say that in 2016 your organisation promotes these areas		
	Very much	Somewhat	Not at all	1 More actively	2 About the same	3 Less actively
Ethics in research and innovation	☐	☐	☐	☐	☐	☐
Citizen engagement and participation of societal actors	☐	☐	☐	☐	☐	☐
Open access and open science	☐	☐	☐	☐	☐	☐
Gender equality in research and innovation	☐	☐	☐	☐	☐	☐
Responsible research and innovation	☐	☐	☐	☐	☐	☐

14. OPTIONAL: Previously you indicated that your organisation actively promotes ethics in research and innovation among researchers, employees, or partner organisations. Could you please briefly describe the processes in place?

15. OPTIONAL: Previously you indicated that your organisation actively promotes citizen engagement and participation of societal actors among researchers, employees, or partner organisations. Could you please briefly describe the processes in place?

16. OPTIONAL: Previously you indicated that your organisation actively promotes open access and open science among researchers, employees, or partner organisations. Could you please briefly describe the processes in place?

17. OPTIONAL: Previously you indicated that your organisation actively promotes gender equality in research and innovation among researchers, employees, or partner organisations. Could you please briefly describe the processes in place?

18. OPTIONAL: Previously you indicated that your organisation actively promotes responsible research and innovation among researchers, employees, or partner organisations. Could you please briefly describe the processes in place?

In the following sections we are going to ask you to provide more information on some of the aforementioned aspects of RRI.

19. Does your organisation have a gender equality plan? - A gender equality plan is a consistent set of provisions and actions aimed at ensuring gender equality.

	Yes	No	Not known	Not applicable
2014	☐	☐	☐	☐
2015	☐	☐	☐	☐
2016	☐	☐	☐	☐

20. Does your organisation have implemented processes to promote the integration of a gender dimension in research and innovation content of projects and studies, for example information and qualification tools or concrete rewards and incentives?

	Yes	No	Not known	Not applicable
2014	☐	☐	☐	☐
2015	☐	☐	☐	☐
2016	☐	☐	☐	☐

21. OPTIONAL: Previously you indicated that your organisation has implemented processes to promote the integration of a gender dimension in research and innovation content of projects and studies. Could you please briefly describe the processes in place?

22. Please specify the gender of the person who was/is head of your organisation in 2014, 2015 and 2016 (Head of organisation: highest decision-making official in the organisation (e.g. president or equivalent in non-academic research organisations))

	Male	Female
2014	☐	☐
2015	☐	☐
2016	☐	☐

23. How many recruitment committees for leading researcher positions did your organisation set up in 2014, 2015 and 2016 for the recruitment of researchers?

2014	
2015	
2016	

24. In how many recruitment committees for leading researcher positions the share of female members was equal or higher than 40% of the total committee members?

2014	
2015	
2016	

The following questions are about 'Public Engagement', which is a notion that captures the interaction between your research institution and citizens or societal stakeholders.

25. Which of the following mechanisms does your institution apply in order to interact with citizens and societal stakeholders? Please tick all that apply.

	2014	2015	2016
Research projects in partnership with non-academic organisations	❑	❑	❑
Collaboration with NGO's and local government bodies	❑	❑	❑
Participation in EU projects/networks about Public Engagement	❑	❑	❑
Community representatives in boards or committees	❑	❑	❑
Specific activities involving schools children visiting the institution	❑	❑	❑
Meetings / conferences addressed primarily to the public	❑	❑	❑
Implementation of specific action plans targeting Public Engagement at your institution	❑	❑	❑
Salary incentives for public outreach activities	❑	❑	❑
Awards for science communication	❑	❑	❑
Availability of a press and/or Public Relations office	❑	❑	❑
Public Engagement as a criterion for promotion	❑	❑	❑
Public availability of information regarding completed and ongoing research activities	❑	❑	❑
Publications addressed primarily to the public	❑	❑	❑
Organisation of outreach incentives such as 'open days' 'university	❑	❑	❑

festivals' etc.			

26. Which of the following statements come closest to the situation at your research institution? Please consider whether the priorities changed over the years by providing answers for 2014, 2015, and 2016

	Public Engagement has high strategic priority at our research institution	Public Engagement has moderate strategic priority at our research institution	Public Engagement is not a strategic priority at our research institution
2014	☐	☐	☐
2015	☐	☐	☐
2016	☐	☐	☐

27. Which of the following statements come closest to the situation at your institution? Please also consider whether there are changes in the situation at your institution over the years by providing answers for 2014, 2015, and 2016 (check those that apply, check only one per year)

	Public Engagement activities are mainly initiated by the management level at our research institution	Public Engagement activities are mainly initiated by individuals or groups of researchers at our research institution
2014	☐	☐
2015	☐	☐
2016	☐	☐

28. Please indicate the institutional budget in Euros for the years 2014, 2015 and 2016 reserved for activities relating to public engagement and outreach programmes such as "open days", "science festivals", "conferences/lectures aimed at the general public" etc.

2014	
2015	
2016	

* **29. Did your organisation have a Research Ethics Commitee operating during 2014, 2015, 2016?**

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

30. How many cases per year have been decided by the Research Ethics Committee?

2014	
2015	
2016	

31. Has the Research Ethics Committee been able to take independently initiative to investigate a proposal?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

32. Have the applications to Research Ethics Committee been obligatory or voluntary?

	Obligatory	Voluntary	Depending on the content of the application, it can be obligatory or voluntary
2014	☐	☐	☐
2015	☐	☐	☐
2016	☐	☐	☐

33. Have the applications to Research Ethics Committee covered all disciplines or have they been restricted to certain research areas?

	All	Most	Some
2014	☐	☐	☐
2015	☐	☐	☐
2016	☐	☐	☐

34. What have the evaluation criteria covered in 2014, 2015 and 2016?

	Legal requirements for research on human subjects	Legal requirements for research on animals	Additional considerations of research ethics	Societal impact of research
2014	❑	❑	❑	❑
2015	❑	❑	❑	❑
2016	❑	❑	❑	❑

35. Have amendments to the proposals been requested based on the opinions of the Research Ethics Committee?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

36. Has the research ethics committee rejected research proposals entirely?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

37. Have the opinions of the Research Ethics Committee been binding or non-binding recommendations?

	Binding	Non-binding
2014	☐	☐
2015	☐	☐
2016	☐	☐

* **38. Did your institution have a Research Integrity Office operating during 2014, 2015, 2016?**

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

39. Has the Research Integrity Office been an ad-hoc committee or a permanent board?

	Permanent	Ad-hoc
2014	☐	☐
2015	☐	☐
2016	☐	☐

40. How many cases per year have been decided by the Research Integrity Office?

2014	
2015	
2016	

41. Has the Research Integrity Office been able to take independently initiative to investigate a case?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

42. Have the complains to the Research Integrity Office been covering all disciplines or have they been restricted to certain research areas?

	All	Most	Some
2014	☐	☐	☐
2015	☐	☐	☐
2016	☐	☐	☐

43. What has the Research Integrity Office covered?

	Plagiarism	Fabrication fraud authorship and intellectual property and citation/acknowledgement practices	Scientific neutrality	Conflicts of interest in peer review	Scientific advice
2014	❑	❑	❑	❑	❑
2015	❑	❑	❑	❑	❑
2016	❑	❑	❑	❑	❑

44. Have the opinions been published in anonymised form after investigation?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

45. Have the opinions of the Research Integrity Office been binding or non-binding recommendations?

	Binding	Non-binding
2014	☐	☐
2015	☐	☐
2016	☐	☐

46. Has the Research Integrity Office taken actions to raise awareness for the issue of research integrity?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

47. Has the Research Integrity Office issued recommendations for researchers, policy makers and stakeholder?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

48. Has the Research Integrity Office provided training to researchers on research integrity?

	Yes	No
2014	☐	☐
2015	☐	☐
2016	☐	☐

49. Which of the following policies apply in your institution?

	Your institution has explicit open data management regulations	Your institution has explicit institutional Gold or green Open access publishing regulations	Your institution choses to follow funder or field specific incentives for open data and publication sharing	N/A
2014	❑	❑	❑	☐
2015	❑	❑	❑	☐
2016	❑	❑	❑	☐

50. Which of the following open data sharing practices apply in your institution?

	Repositories are provided by your institution	Repositories are provided by departments	N/A
2014	❑	❑	☐
2015	❑	❑	☐
2016	❑	❑	☐

51. Which of the following support (in kind and in funding) options with regard to open access publishing and data sharing apply?

	The Library of your institution takes care of open access publishing	Your institution provides IT support for FAIR data practices	Your institution has specific budget for Open Access publishing	Your institution has specific budget for the implementation of Open Data sharing	Your institution provides support for on line communication (e.g. project websites) on publication and data sharing practices	Your institution provides training in research data sharing e.g. about curation, metadata	N/A
2014	❑	❑	❑	❑	❑	❑	☐
2015	❑	❑	❑	❑	❑	❑	☐
2016	❑	❑	❑	❑	❑	❑	☐

52. Here you can provide additional information for clarifying your answers in previous questions

Appendix 4: Response rates by survey

Table 1 Science in Society survey - response rates

Country	Contacts	Responses	Rate
Austria	28	24	86%
Belgium	21	7	33%
Bulgaria	28	10	36%
Croatia	36	21	58%
Cyprus	21	11	52%
Czech Republic	47	26	55%
Denmark	33	17	52%
Estonia	21	14	67%
Finland	31	10	32%
France	42	11	26%
Germany	67	20	30%
Greece	15	8	53%
Hungary	29	17	59%
Ireland	6	2	33%
Italy	14	9	64%
Latvia	22	6	27%
Lithuania	33	18	55%
Luxembourg	7	1	14%
Malta	8	8	100%
Netherlands	26	16	62%
Poland	13	4	31%
Portugal	20	14	70%
Romania	17	6	35%
Slovakia	9	9	100%
Slovenia	19	10	53%
Spain	32	11	34%
Sweden	19	9	47%
United Kingdom	22	7	32%
TOTAL	686	326	**48%**

Table 2 Research Funding Organisations survey - Response rate

Country	Contacts	Responses	Rate	Incl. Partial	Rate
Austria	11	5	45%	8	73%
Belgium	10	4	40%	5	50%
Bulgaria	3	3	100%	3	100%
Croatia	7	2	29%	4	57%
Cyprus	2	1	50%	1	50%
Czech Republic	10	4	40%	6	60%
Denmark	15	10	67%	15	100%
Estonia	4	4	100%	4	100%
Finland	8	5	63%	5	63%
France	23	2	9%	4	17%
Germany	12	2	17%	2	17%
Greece	5	3	60%	5	100%
Hungary	1	1	100%	1	100%
Ireland	11	4	36%	6	55%
Italy	22	3	14%	6	27%
Latvia	3	0	0%	0	0%
Lithuania	10	3	30%	4	40%
Luxembourg	1	0	0%	0	0%
Malta	3	3	100%	3	100%
Netherlands	9	4	44%	8	89%
Poland	3	1	33%	1	33%
Portugal	4	1	25%	1	25%
Romania	6	0	0%	0	0%
Slovakia	4	4	100%	4	100%
Slovenia	3	2	67%	2	67%
Spain	29	4	14%	7	24%
Sweden	18	7	39%	11	61%
United Kingdom	38	1	3%	6	16%
TOTAL	275	83	**30%**	122	**44%**

*Column "Incl. Partial" provides the total response rate including "fully completed questionnaires" and "partially completed questionnaires"

Table 3 Higher Education Institutions survey - Response rate

Country	Contacts	Responses	Rate	Incl. Partial*	Rate
Austria	72	19	26%	32	44%
Belgium	42	5	12%	7	17%
Bulgaria	52	5	10%	5	10%
Croatia	49	6	12%	7	14%
Cyprus	8	2	25%	2	25%
Czech Republic	70	6	9%	6	9%
Denmark	16	8	50%	8	50%
Estonia	24	4	17%	4	17%
Finland	41	11	27%	12	29%
France	104	4	4%	6	6%
Germany	112	8	7%	12	11%
Greece	34	4	12%	4	12%
Hungary	64	10	16%	12	19%
Ireland	52	6	12%	10	19%
Italy	120	17	14%	20	17%
Latvia	29	5	17%	5	17%
Lithuania	40	7	18%	8	20%
Luxembourg	1	0	0%	0	0%
Malta	1	1	100%	1	100%
Netherlands	60	14	23%	16	27%
Poland	90	2	2%	2	2%
Portugal	83	2	2%	5	6%
Romania	49	8	16%	11	22%
Slovakia	34	10	29%	10	29%
Slovenia	17	4	24%	5	29%
Spain	75	14	19%	18	24%
Sweden	33	10	30%	12	36%
United Kingdom	107	16	15%	19	18%
TOTAL	1479	208	14%	259	18%

*Column "Incl. Partial" provides the total response rate including "fully completed questionnaires" and "partially completed questionnaires"

Table 4 Public Research Organisations survey - Response rate

Country	Contacts	Responses	Rate	Incl. Partial*	Rate
Austria	336**	18	5%	24	7%
Belgium	31	3	10%	6	19%
Bulgaria	140	6	4%	8	6%
Croatia	26	6	23%	6	23%
Cyprus	8	7	88%	7	88%
Czech Republic	32	11	34%	14	44%
Denmark	9	1	11%	1	11%
Estonia	11	0	0%	1	9%
Finland	24	8	33%	8	33%
France	48	10	21%	10	21%
Germany	102	6	6%	6	6%
Greece	25	10	40%	13	52%
Hungary	89	7	8%	11	12%
Ireland	25	3	12%	7	28%
Italy	20	7	35%	9	45%
Latvia	19	6	32%	6	32%
Lithuania	10	3	30%	3	30%
Luxembourg	6	0	0%	2	33%
Malta	2	2	100%	2	100%
Netherlands	47	12	26%	16	34%
Poland	183	7	4%	7	4%
Portugal	21	2	10%	2	10%
Romania	28	2	7%	4	14%
Slovakia	7	2	29%	3	43%
Slovenia	55	5	9%	7	13%
Spain	49	4	8%	6	12%
Sweden	47	10	21%	11	23%
United Kingdom	86	7	8%	8	9%
TOTAL	1486	165	11%	208	14%

*Column "Incl. Partial" provides the total response rate including "fully completed questionnaires" and "partially completed questionnaires"

** Austria was kept since the 19 responses received represent the main Austrian research organisations. The very high number of initial contacts corresponds to a lower number of organisations.

Appendix 5: Response rate per survey question

Below, we present tables with the total number of responses registered per survey questions that was then used in order to build a specific indicator

GE1: HEI survey (Q°19)			
Country	Q19_2014	Q19_2015	Q19_2016
AT	16	16	17
BE	5	5	5
BG	4	4	4
HR	6	6	6
CY	1	1	1
CZ	6	6	6
DK	8	8	8
EE	4	4	4
FI	12	12	12
FR	3	3	4
DE	9	9	9
EL	3	3	3
HU	8	8	8
IE	4	4	5
IT	11	12	13
LV	1	1	1
LT	6	6	6
MT	1	1	1
PL	2	2	2
PT	2	2	2
RO	8	8	8
SK	8	8	8
SI	4	4	4
ES	14	15	16
SE	11	11	11
NL	11	12	12
UK	15	16	16

GE1: PRO survey (Q°19)			
Country	Q19_2014	Q19_2015	Q19_2016
AT	22	22	22
BE	2	2	2
BG	5	5	5
HR	6	6	6
CY	6	6	6
CZ	10	10	10
DK	1	1	1
FI	8	8	8
FR	8	8	7
DE	5	5	5
EL	12	12	12
HU	7	7	7
IE	5	5	5
IT	6	6	5
LV	5	5	5
LT	3	3	3
MT	2	2	2
PL	6	6	7
PT	2	2	2
RO	2	2	2
SK	3	3	3
SI	5	5	5
ES	4	4	4
SE	10	10	10
NL	13	13	13
UK	7	8	7

GE3: RFO survey (Q°19)			
Country	Q19_2014	Q19_2015	Q19_2016
AT	6	6	6
BE	3	3	3
BG	2	2	2
HR	2	2	2
CY	1	1	1
CZ	4	4	4
DK	11	11	11
EE	4	4	4
FI	4	5	5
FR	2	2	2
DE	2	2	2
EL	2	3	3
HU	1	1	1
IE	4	4	4
IT	5	5	5
LT	4	4	4
MT	3	3	3
PL	1	1	1
PT	1	1	1
SK	4	4	4
SI	2	2	2
ES	3	3	3
SE	9	9	9
NL	4	4	4
UK	2	2	2

GE5: HEI survey (Q°20)			
Country	Q20_2014	Q20_2015	Q20_2016
AT	17	17	17
BE	5	5	5
BG	4	4	4
HR	6	6	6
CY	1	1	1
CZ	6	6	6
DK	7	7	7
EE	4	4	4
FI	12	12	12
FR	3	4	4
DE	8	8	8
EL	2	2	2
HU	5	5	5
IE	7	7	7
IT	13	13	13
LV	1	1	2
LT	6	6	6
MT	1	1	1
PL	2	2	2
PT	1	1	1
RO	8	8	8
SK	7	7	7
SI	4	4	4
ES	14	14	15
SE	10	10	10
NL	14	14	14
UK	12	13	13

GE5: PRO survey (Q°20)			
Country	Q20_2014	Q20_2015	Q20_2016
AT	21	21	21
BE	3	3	3
BG	5	5	5
HR	6	6	6
CY	5	6	6
CZ	9	9	9
DK	1	1	1
FI	8	8	8
FR	7	8	8
DE	4	4	4
EL	12	12	12
HU	7	7	7
IE	4	4	4
IT	7	7	7
LV	5	5	5
LT	3	3	3
MT	2	2	2
PL	6	6	7
PT	2	2	2
RO	2	2	2
SK	3	3	3
SI	5	5	5
ES	5	5	5
SE	9	9	9
NL	12	12	12
UK	7	8	8

GE8: HEI survey (Q°22)			
Country	Q22_2014	Q22_2015	Q22_2016
AT	20	20	20
BE	5	5	5
BG	5	5	5
HR	7	7	7
CY	2	2	2
CZ	6	6	6
DK	8	8	8
EE	4	4	4
FI	12	12	12
FR	4	4	4
DE	9	9	9
EL	4	4	4
HU	9	9	9
IE	8	8	8
IT	13	13	13
LV	5	5	5
LT	8	8	8
MT	1	1	1
PL	2	2	2
PT	2	2	2
RO	8	8	8
SK	8	8	8
SI	5	5	5
ES	16	16	16
SE	11	11	11
NL	14	14	14
UK	18	18	18

GE8: PRO survey (Q°22)			
Country	Q22_2014	Q22_2015	Q22_2016
AT	22	22	22
BE	3	3	3
BG	6	6	6
HR	6	6	6
CY	7	7	7
CZ	11	11	11
DK	1	1	1
FI	7	8	8
FR	10	10	10
DE	5	5	5
EL	12	12	12
HU	8	8	8
IE	4	4	4
IT	8	8	8
LV	6	6	6
LT	3	3	3
MT	2	2	2
PL	7	7	7
PT	2	2	2
RO	2	2	2
SK	3	3	3
SI	5	5	5
ES	5	5	5
SE	9	10	10
NL	13	13	13
UK	7	7	7

GE9: HEI survey (Q°23 and Q°24)			
Country	Q2324_2014	Q2324_2015	Q2324_2016
AT	11	12	13
BE	3	2	3
BG	3	3	3
HR	4	3	3
CY	0	0	0
CZ	2	2	2
DK	4	4	4
EE	1	1	1
FI	7	7	7
FR	2	2	2
DE	3	3	3
EL	1	1	1
HU	2	2	2
IE	2	3	4
IT	4	4	4
LV	3	3	3
LT	4	3	3
MT	0	0	0
PL	0	0	0
PT	0	0	0
RO	5	5	5
SK	4	2	4
SI	3	3	4
ES	5	6	7
SE	7	7	7
NL	5	6	6
UK	3	3	4

GE9: PRO survey (Q°23 and Q°24)			
Country	Q2324_2014	Q2324_2015	Q2324_2016
AT	7	7	7
BE	1	2	2
BG	1	2	1
HR	2	4	3
CY	3	4	3
CZ	4	4	4
DK	0	0	1
FI	2	2	4
FR	3	3	3
DE	1	1	1
EL	2	1	4
HU	3	3	2
IE	2	2	3
IT	0	2	3
LV	4	4	4
LT	1	1	1
MT	0	0	0
PL	4	5	4
PT	1	2	0
RO	1	1	1
SK	2	2	2
SI	1	2	1
ES	4	4	4
SE	6	6	6
NL	6	5	5
UK	3	3	3

SLSE2: HEI survey (Q°25)			
Country	Q25_2014	Q25_2015	Q25_2016
AT	18	19	19
BE	5	5	5
BG	4	4	4
HR	7	7	7
CY	2	2	2
CZ	6	6	6
DK	8	8	7
EE	4	4	4
FI	12	12	12
FR	3	3	4
DE	8	8	8
EL	3	3	3
HU	9	9	9
IE	8	8	8
IT	13	13	13
LV	5	5	5
LT	7	7	7
MT	1	1	1
PL	2	2	2
PT	2	2	2
RO	8	7	8
SK	9	9	9
SI	5	5	5
ES	16	16	16
SE	10	10	10
NL	14	14	14
UK	17	17	17

PE5: HEI survey (Q°26 and Q°27)						
Country	Q26_total2014	Q26_total2015	Q26_total2016	Q27_2014	Q27_2015	Q27_2016
AT	18	18	18	18	18	18
BE	5	5	5	5	5	5
BG	4	4	4	3	4	3
HR	7	7	7	6	6	6
CY	1	1	1	2	2	2
CZ	6	6	6	6	6	6
DK	6	6	6	6	6	6
EE	4	4	4	4	4	4
FI	12	12	12	12	11	11
FR	3	3	3	3	3	3
DE	8	8	8	8	8	8
EL	3	3	3	3	3	3
HU	7	7	7	8	8	8
IE	7	7	7	8	8	8
IT	12	12	12	12	12	12
LV	5	5	5	5	5	5
LT	7	7	7	7	7	7
MT	1	1	1	1	1	1
PL	2	2	2	2	2	2
PT	2	2	2	2	2	2
RO	8	8	8	8	8	8
SK	9	9	9	9	9	9
SI	4	4	4	4	4	4
ES	15	15	15	15	15	15
SE	10	10	10	10	10	10
NL	14	14	14	14	14	14
UK	16	16	16	16	16	16

PE5: PRO survey (Q°25 and Q°26)						
Country	Q25_total2014	Q25_total2015	Q25_total2016	Q26_2014	Q26_2015	Q26_2016
AT	18	18	18	18	18	18
BE	3	3	3	3	3	3
BG	6	6	6	6	6	6
HR	6	6	6	6	6	6
CY	7	7	7	7	7	7
CZ	11	11	11	11	11	11
DK	1	1	1	1	1	1
FI	8	8	8	7	8	8
FR	10	10	10	10	10	10
DE	5	5	5	4	4	4
EL	11	11	11	9	9	9
HU	7	7	7	7	7	7
IE	3	3	3	3	3	3
IT	8	8	8	7	7	7
LV	5	5	5	5	5	5
LT	3	3	3	3	3	3
MT	2	2	2	2	2	2
PL	7	7	7	7	7	7
PT	2	2	2	2	2	2
RO	2	2	2	2	2	2
SK	3	3	3	2	2	2
SI	5	5	5	5	5	5
ES	5	5	5	4	4	4
SE	10	10	10	9	10	10
NL	13	13	13	13	13	13
UK	7	7	7	7	7	7

PE7: RFO survey (Q°21 and Q°23)						
Country	Q21_2014	Q21_2015	Q21_2016	Q23_2014	Q23_2015	Q23_2016
AT	6	6	6	5	5	5
BE	3	3	3	3	3	3
BG	2	2	2	2	2	2
HR	2	2	2	2	2	2
CY	1	1	1	1	1	1
CZ	4	4	4	4	4	4
DK	9	9	9	9	9	9
EE	4	4	4	3	3	4
FI	3	5	5	4	5	5
FR	2	2	2	2	2	2
DE	2	2	2	1	1	1
EL	2	2	2	1	1	1
HU	1	1	1	1	1	1
IE	3	3	3	3	3	3
IT	4	3	3	2	2	2
LT	3	3	3	3	3	3
MT	3	3	3	3	3	3
PL	1	1	1	1	1	1
PT	1	1	1	1	1	1
SK	4	4	4	4	4	4
SI	2	2	2	2	2	2
ES	4	4	3	4	4	4
SE	7	7	7	7	7	7
NL	3	3	3	3	3	3
UK	2	2	2	1	1	1

PE8: RFO survey (Q°24)			
Country	Q24_2014	Q24_2015	Q24_2016
AT	5	5	5
BE	3	3	3
BG	2	2	2
HR	2	2	2
CY	1	1	1
CZ	4	4	4
DK	9	9	9
EE	4	4	4
FI	4	5	5
FR	2	2	2
DE	2	2	2
EL	1	1	1
HU	1	1	1
IE	3	3	3
IT	2	2	2
LT	3	3	3
MT	3	3	3
PL	1	1	1
PT	1	1	1
SK	4	4	4
SI	2	2	2
ES	3	3	3
SE	7	7	7
NL	2	2	2
UK	1	1	1

E1.1: HEI survey (Q°30 and Q°39)						
Country	Q30_2014	Q30_2015	Q30_2016	Q39_2014	Q39_2015	Q39_2016
AT	21	21	21	21	21	21
BE	6	6	6	6	6	6
BG	5	5	5	5	5	5
HR	6	6	6	6	6	6
CY	2	2	2	2	2	2
CZ	6	6	6	6	6	6
DK	8	8	8	8	8	8
EE	4	4	4	4	4	4
FI	12	12	12	12	12	12
FR	4	4	4	4	4	4
DE	10	10	10	10	10	10
EL	4	4	4	4	4	4
HU	10	10	10	10	10	10
IE	9	9	9	8	8	8
IT	13	13	13	13	13	13
LV	5	5	5	5	5	5
LT	7	7	7	7	7	7
MT	1	1	1	1	1	1
PL	2	2	2	2	2	2
PT	2	2	2	2	2	2
RO	8	8	8	8	8	8
SK	10	10	10	10	10	10
SI	4	4	4	4	4	4
ES	17	17	17	16	16	16
SE	10	10	10	10	10	10
NL	14	14	14	14	14	14
UK	16	16	16	16	16	16

E1.1: PRO survey (Q°29 and Q°38)						
Country	Q29_2014	Q29_2015	Q29_2016	Q38_2014	Q38_2015	Q38_2016
AT	20	20	20	19	19	19
BE	3	3	3	3	3	3
BG	6	6	6	6	6	6
HR	6	6	6	6	6	6
CY	7	7	7	7	7	7
CZ	11	11	11	11	11	11
DK	1	1	1	1	1	1
FI	8	8	8	8	8	8
FR	10	10	10	10	10	10
DE	5	5	5	5	5	5
EL	12	12	12	12	12	12
HU	7	7	7	7	7	7
IE	4	4	4	3	3	3
IT	7	7	7	7	7	7
LV	6	6	6	6	6	6
LT	3	3	3	3	3	3
MT	2	2	2	2	2	2
PL	7	7	7	7	7	7
PT	2	2	2	2	2	2
RO	2	2	2	2	2	2
SK	3	3	3	3	3	3
SI	5	5	5	5	5	5
ES	4	4	4	4	4	4
SE	10	10	10	10	10	10
NL	13	13	13	13	13	13
UK	7	7	7	7	7	7

E3.1: RFO survey (Q°25)			
Country	Q25_2014	Q25_2015	Q25_2016
AT	6	6	6
BE	3	3	3
BG	3	3	3
HR	2	2	2
CY	1	1	1
CZ	4	4	4
DK	10	10	10
EE	4	4	4
FI	5	5	5
FR	2	2	2
DE	2	2	2
EL	3	3	3
HU	1	1	1
IE	6	6	6
IT	4	4	4
LT	4	4	4
MT	3	3	3
PL	1	1	1
PT	1	1	1
SK	4	4	4
SI	2	2	2
ES	3	3	3
SE	7	7	7
NL	4	4	4
UK	1	1	1

OA6: HEI survey (Q°51, Q°52 and Q°53)									
Country	Q51_2014	Q51_2015	Q51_2016	Q52_2014	Q52_2015	Q52_2016	Q53_2014	Q53_2015	Q53_2016
AT	3	6	8	3	5	6	6	6	7
BE	2	2	3	1	3	4	1	2	4
BG	0	0	0	0	0	0	0	0	0
HR	0	0	0	0	0	0	0	0	0
CY	0	0	0	0	0	0	0	0	0
CZ	1	1	1	1	1	1	1	1	2
DK	2	2	2	1	1	1	0	0	0
EE	2	2	2	2	2	2	1	1	1
FI	4	6	8	4	4	8	2	3	7
FR	0	1	2	1	1	2	2	2	3
DE	2	3	3	2	2	2	2	2	3
EL	1	1	1	1	1	1	1	1	1
HU	2	2	2	2	3	3	2	2	2
IE	1	1	1	3	3	3	2	2	2
IT	1	2	1	0	1	1	1	3	3
LV	1	1	2	1	1	3	2	2	2
LT	5	6	6	5	6	5	4	5	5
MT	0	0	0	0	0	0	0	0	0
PL	0	0	0	0	0	0	2	2	2
PT	2	2	2	2	2	2	1	1	1
RO	1	1	1	3	3	3	2	2	2
SK	0	0	0	1	1	1	0	1	1
SI	0	0	0	0	0	0	0	0	0
ES	3	4	5	6	6	7	3	3	5
SE	5	5	6	5	5	6	4	4	4
NL	5	5	7	5	6	6	6	7	8
UK	10	11	11	9	11	13	8	11	12

OA6: PRO survey (Q°49, Q°50 and Q°51)									
Country	Q49_2014	Q49_2015	Q49_2016	Q50_2014	Q50_2015	Q50_2016	Q51_2014	Q51_2015	Q51_2016
AT	17	17	17	17	17	18	15	17	18
BE	2	2	2	2	2	2	1	1	2
BG	5	5	5	5	5	5	5	6	5
HR	5	5	5	6	6	6	4	4	4
CY	7	7	7	7	7	7	6	6	5
CZ	10	10	10	11	11	11	11	11	11
DK	1	1	1	1	1	1	1	1	1
FI	6	7	7	7	8	8	7	8	7
FR	8	8	8	7	7	7	8	8	8
DE	4	4	4	4	4	4	4	4	4
EL	10	10	10	11	11	11	10	10	10
HU	7	7	7	7	7	7	7	7	7
IE	3	3	3	3	3	3	2	3	3
IT	5	5	5	4	4	4	4	4	3
LV	5	5	5	5	5	5	5	5	5
LT	2	3	3	3	3	3	2	3	3
MT	2	2	2	2	2	2	2	2	2
PL	5	5	5	5	5	5	7	7	7
PT	1	2	2	2	2	2	2	2	2
RO	2	2	2	2	2	2	2	2	2
SK	1	1	1	1	1	1	1	1	1
SI	5	5	5	5	5	5	5	5	5
ES	3	3	3	4	4	4	4	4	4
SE	8	8	8	8	8	8	9	9	9
NL	12	12	12	10	10	11	10	10	11
UK	7	7	7	7	7	7	7	7	7

GOV2: HEI survey (Q°7)			
Country	Q7_HEI_2014	Q7_HEI_2015	Q7_HEI_2016
AT	21	22	23
BE	5	5	5
BG	5	5	5
HR	6	6	6
CY	2	2	2
CZ	6	6	6
DK	5	7	7
EE	3	4	3
FI	11	12	12
FR	4	4	5
DE	10	10	10
EL	3	3	3
HU	5	5	6
IE	7	7	8
IT	13	12	12
LV	3	4	4
LT	8	8	8
MT	1	1	1
PL	1	1	1
PT	5	5	5
RO	8	8	9
SK	8	8	8
SI	3	4	4
ES	18	19	19
SE	10	10	10
NL	15	15	15
UK	18	18	18

GOV2: RFO survey (Q°7)			
Country	Q7_RFO_2014	Q7_RFO_2015	Q7_RFO_2016
AT	8	8	8
BE	3	3	3
BG	2	2	2
HR	3	3	3
CY	1	0	0
CZ	4	4	4
DK	11	12	9
EE	4	4	4
FI	3	5	5
FR	1	1	1
DE	2	2	2
EL	2	4	4
HU	0	0	0
IE	6	6	6
IT	4	5	5
LT	3	2	3
MT	2	2	2
PL	1	1	1
PT	1	1	1
SK	4	4	4
SI	1	1	2
ES	3	4	4
SE	10	11	11
NL	6	6	6
UK	4	4	4

GOV2: PRO survey (Q°7)			
Country	Q7_2014	Q7_2015	Q7_2016
AT	22	22	22
BE	5	5	5
BG	8	8	8
HR	6	6	6
CY	7	7	7
CZ	13	13	13
DK	1	1	1
EE	1	1	1
FI	8	8	8
FR	10	10	10
DE	6	6	6
EL	13	13	13
HU	11	11	11
IE	7	7	7
IT	9	9	9
LV	6	6	6
LT	3	3	3
LU	1	1	1
MT	2	2	2
PL	7	7	7
PT	2	2	2
RO	4	4	4
SK	3	3	3
SI	7	7	7
ES	6	6	6
SE	11	11	11
NL	14	14	14
UK	8	8	8

GOV3: HEI survey (Q°13)					
Country	Q13_2016_Ethics	Q13_2016_Engagement	Q13_2016_Open	Q13_2016_Gender	Q13_2016_Responsible
AT	27	25	26	27	26
BE	6	6	6	6	5
BG	5	5	5	5	5
HR	7	7	7	7	7
CY	2	2	2	2	2
CZ	6	6	6	6	6
DK	8	7	8	8	8
EE	4	4	4	4	4
FI	12	12	12	12	12
FR	4	4	4	4	3
DE	10	11	11	11	10
EL	4	4	3	4	4
HU	12	12	12	12	12
IE	10	10	10	10	10
IT	15	15	15	15	14
LV	5	5	5	4	4
LT	8	8	8	8	8
MT	1	1	1	1	1
PL	2	2	2	2	2
PT	3	3	3	3	3
RO	10	10	10	10	10
SK	10	10	9	10	10
SI	5	5	5	5	5
ES	19	18	18	19	18
SE	12	12	12	12	12
NL	16	16	16	16	15
UK	19	19	19	19	19

GOV3: RFO survey (Q°13)					
Country	Q13_2016_Ethics	Q13_2016_Engagement	Q13_2016_Open	Q13_2016_Gender	Q13_2016_Responsible
AT	8	8	8	8	8
BE	3	3	3	3	3
BG	3	3	3	3	3
HR	3	3	3	3	3
CY	1	1	1	1	1
CZ	4	4	4	4	4
DK	12	12	12	12	12
EE	4	4	4	4	4
FI	5	5	5	5	5
FR	2	2	2	2	2
DE	2	2	2	2	2
EL	4	4	4	4	4
HU	1	1	1	1	1
IE	6	6	6	6	6
IT	5	5	5	5	5
LT	4	4	4	4	4
MT	3	3	3	3	3
PL	1	1	1	1	1
PT	1	1	1	1	1
SK	4	4	4	4	4
SI	2	2	2	2	2
ES	4	4	4	4	4
SE	10	10	10	10	10
NL	6	6	6	6	6
UK	3	3	3	3	3

GOV3: PRO survey (Q°13)					
Country	Q13_2016_Ethics	Q13_2016_Engagement	Q13_2016_Open	Q13_2016_Gender	Q13_2016_Responsible
AT	22	22	22	22	22
BE	4	4	4	4	4
BG	6	6	6	6	6
HR	6	6	6	6	6
CY	7	7	7	7	7
CZ	11	11	11	11	11
DK	1	1	1	1	1
EE	1	1	1	1	1
FI	8	8	8	8	8
FR	10	10	10	10	10
DE	6	6	6	6	6
EL	13	13	13	13	13
HU	10	10	10	10	10
IE	6	6	6	6	6
IT	9	9	9	9	9
LV	6	6	6	6	6
LT	3	3	3	3	3
MT	2	2	2	2	2
PL	7	7	7	7	7
PT	2	2	2	2	2
RO	4	4	4	4	4
SK	3	3	3	3	3
SI	5	5	5	5	5
ES	6	6	6	6	6
SE	11	11	11	11	11
NL	13	13	13	13	13
UK	8	8	8	8	8

Appendix 6: Meltwater search keys

Public education

("citizen engagement" OR "Bürgerbeteiligung" OR "Bürgerdialog" OR "participación ciudadana" OR "engagement citoyen*" OR "envolvimento cidadão" OR "zaangażowanie obywateli" OR "impegno dei cittadini" OR "kodanike kaasamise" OR "pilsonis iesaistīšanās" OR "pilietis vestuvinis" OR "betrokkenheid van burgers" OR "állampolgár elkötelezettség" OR "občan zapojenie" OR "občan zapojení" OR "ангажираността на гражданите" OR "de participare" OR "medborgar engagemang" OR "kansalainen sitoutuminen" OR "borgernes engagement" OR "εμπλοκή των πολιτών")

near/10

(research OR Innovation OR science or Forschung OR wissenschaft OR Innovation OR investigación OR ciencia OR innovación OR recherche OR inovação OR pesquisa OR ciência OR innowacja OR badania OR nauka OR innovazione OR ricerca OR "scienza innovatsioon" OR teadustöö OR "teadus inovācija" OR pētniecība OR zinātne OR naujovė OR tyrimas OR mokslas OR innovatie OR onderzoek OR wetenschap OR innováció OR kutatás OR tudomány OR inovácie OR výskum OR "veda inovace" OR výzkum OR věda OR нововъведение OR проучване OR "наука inovație" OR cercetare OR "știință innovation" OR forskning OR "vetenskap innovaatio" OR tutkimus OR "tiede innovation" OR videnskab OR καινοτομία OR έρευνα OR επιστήμη)

SLSE

("science literacy" OR "science education" or "Wissenschaftliche Bildung" OR "wissenschaftliche Ausbildung" or "Formación científica" OR "educación científica" or "enseignement des sciences" or "éducation scientifique" or "formação científica" OR "educação científica" or "Edukacja naukowa" or "insegnamento delle scienze" or "teaduse kirjaoskuse" OR "teadushariduse" or "zinātne lasītprasmes" OR "zinātniskā izglītība" or "Mokslas raštingumo" OR "mokslinis švietimas" or wetenschap near/10 geletterdheid OR "wetenschappelijk onderwijs" or "geslachtsgelijkheid" or "természettudományos ismeretek" OR "tudományos oktatás" or "prírodovedné gramotnosti" OR "vedecká výchova" or "přírodovědné gramotnosti" OR "vědecká výchova" or "науката грамотност" OR "научното образование" or "alfabetizare stiinta" OR "educația științifică" or "vetenskap läskunnighet" OR "vetenskaplig utbildning" or "Luonnontieteiden osaamisessa" OR "tieteellinen koulutus" or "science literacy" OR "videnskabelig uddannelse" or "επιστημονικού αλφαβητισμού" OR "επιστημονική εκπαίδευση")

near/10

(research OR Innovation OR science or Forschung OR wissenschaft OR Innovation OR investigación OR ciencia OR innovación OR recherche OR inovação OR pesquisa OR ciência OR innowacja OR badania OR nauka OR innovazione OR ricerca OR "scienza innovatsioon" OR teadustöö OR "teadus inovācija" OR pētniecība OR zinātne OR naujovė OR tyrimas OR mokslas OR innovatie OR onderzoek OR wetenschap OR innováció OR kutatás OR tudomány OR inovácie OR výskum OR "veda inovace" OR výzkum OR věda OR нововъведение OR проучване OR "наука inovație" OR cercetare OR "știință innovation" OR forskning OR "vetenskap innovaatio" OR tutkimus OR "tiede innovation" OR videnskab OR καινοτομία OR έρευνα OR επιστήμη)

GE

("gender equality" OR "Gleichstellung der Geschlechter" OR "Geschlechtergleichstellung" OR "igualdad de género" OR "égalité des sexes" OR "igualdade de gênero" OR "równość płci" OR "parità di genere" OR "soolise võrdõiguslikkuse" OR "zinātne lasītprasmes" OR "zinātniskā izglītība" OR "lyčių lygybė" OR "geslachtsgelijkheid" OR "nemek közötti egyenlőség" OR "rodovej rovnosti" OR "rovnosti žen a mužů" OR "равенството между половете" OR "egalitatea de gen" OR "jämställdhet" OR "sukupuolten tasa-arvo" OR "ligestilling" OR "ισότητα των φύλων")

near/10

(research OR Innovation OR science OR Forschung OR wissenschaft OR investigación OR ciencia OR innovación OR recherche OR science OR inovação OR pesquisa OR ciência or innowacja OR badania OR nauka OR innovazione OR ricerca OR "scienza innovatsioon" OR teadustöö OR "teadus inovācija" OR pētniecība OR zinātne or naujovė OR tyrimas OR mokslas or innovatie OR onderzoek OR wetenschap or innováció OR kutatás OR tudomány or inovácie OR výskum OR "veda inovace" OR výzkum OR věda or нововъведение OR проучване OR "наука inovație" OR cercetare OR "știință innovation" OR forskning OR "vetenskap innovaatio" OR tutkimus OR "tiede innovation" OR forskning OR videnskab OR καινοτομία OR έρευνα OR επιστήμη)

Open access

("OPEN ACCESS" OR "OPEN SCIENCE" OR "open data" OR "åben adgang" OR "vaba ligipääs" OR "avoin pääsy" OR "accès ouvert" OR "accès libre" OR "ανοιχτή πρόσβαση" OR " accesso libero" OR "otvoreni pristup" OR " brīva pieeja" OR "atviros prieigos" OR "vrije toegang" OR "otwarty dostęp" OR "acesso livre" OR "acces deschis" OR "fri tillgång" OR "otvorený prístup" OR "odprt dostop" OR "acceso abierto" OR "otevřený přístup" OR "nyílt hozzáférés" OR "отворен достъп")

near/5

(research OR Innovation OR science OR Forschung OR wissenschaft OR Innovation OR investigación OR ciencia OR innovación or innovation OR recherche OR science or inovação OR pesquisa OR ciência or innowacja OR badania OR nauka or innovazione OR ricerca OR "scienza innovatsioon" OR teadustöö OR "teadus inovācija" OR pētniecība OR zinātne or naujovė OR tyrimas OR mokslas or innovatie OR onderzoek OR wetenschap or innováció OR kutatás OR tudomány or inovácie OR výskum OR "veda inovace" OR výzkum OR věda or нововъведение OR проучване OR "наука inovație" OR cercetare OR "știință innovation" OR forskning OR "vetenskap innovaatio" OR tutkimus OR "tiede innovation" OR forskning OR videnskab or καινοτομία OR έρευνα OR επιστήμη)

not "Royal Society Open Science"

Ethics

("ethic" OR "ethics" "Ethik" OR "ética" OR "éthique" OR "ética" OR "etyka" OR "etica" OR "eetika" OR "ētika" OR "etika" OR "ethiek" OR "etika" OR "etika" OR "etika" OR "етика" OR "etică" OR "etik" OR "etiikka" OR "etik" OR "δεοντολογία")

near/5

(research OR Innovation OR science or Forschung OR wissenschaft OR Innovation or investigación OR ciencia OR innovación or innovation OR recherche OR science or inovação OR pesquisa OR ciência or innowacja OR badania OR nauka or innovazione OR ricerca OR "scienza innovatsioon" OR teadustöö OR "teadus inovācija" OR pētniecība OR zinātne or naujovė OR tyrimas OR mokslas or innovatie OR onderzoek OR wetenschap or innováció OR kutatás OR tudomány or inovácie OR výskum OR "veda inovace" OR výzkum OR věda or нововъведение OR проучване OR "наука inovație" OR cercetare OR "știință innovation" OR forskning OR "vetenskap innovaatio" OR tutkimus OR "tiede innovation" OR forskning OR videnskab or καινοτομία OR έρευνα OR επιστήμη)

NOT "ethics, innovation" NOT "innovation, ethics"

Appendix 7: Number of publications and patents

Number of publications by women (fractional counting)												
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	1195	1356	1425	1600	1645	1757	2055	2153	2321	2428	2527	2392
BE	1603	1830	1918	2183	2307	2578	2867	3219	3349	3554	3507	3410
BG	289	323	356	411	436	447	461	514	579	547	488	498
CY	39	40	57	70	93	95	130	147	181	203	193	215
CZ	809	1076	1202	1304	1487	1638	1972	2118	2341	2523	2737	2723
DE	9566	10521	11409	12078	13073	14131	15460	16481	17497	18618	18635	18342
DK	1489	1606	1784	1958	2198	2367	2781	3091	3280	3554	3678	3530
EE	136	183	233	245	311	337	330	374	436	462	458	417
ES	5299	6314	6936	7753	8532	9369	10484	11534	12520	12979	12873	12525
FI	2046	2170	2276	2465	2579	2696	2851	2947	3087	3244	3311	3170
FR	7606	8291	8650	9385	10125	10626	11274	11957	12624	12936	12555	12074
EL	1160	1413	1503	1703	1873	1847	2011	1991	2094	2107	1970	1848
HR	834	902	1042	1139	1396	1503	1792	1748	1832	1751	1642	1543
HU	540	596	662	749	767	756	858	882	884	1014	927	881
IE	646	797	936	1054	1227	1393	1575	1584	1694	1835	1684	1742
IT	9825	11114	12142	13238	14303	14685	16044	17671	19640	20612	21058	20791
LT	284	315	335	455	490	480	554	569	588	630	621	619
LU	14	23	22	34	43	63	88	93	118	130	124	145
LV	44	54	62	80	97	136	160	182	258	239	241	226
MT	13	10	16	31	23	31	37	46	59	68	62	68
NL	3180	3552	3869	4309	4931	5560	6010	6695	7083	7490	7548	7217
PL	4597	5237	5194	5732	6254	6491	7329	7893	8764	9120	9307	9171
PT	1048	1262	1444	1679	1985	2285	2699	3045	3452	3779	3786	3808
RO	755	856	989	1736	2334	2473	2876	2898	3415	3112	3266	2691
SE	3300	3581	3793	3834	4117	4270	4636	4978	5371	5725	5713	5518
SI	490	500	604	739	876	883	1078	1128	1129	1233	1153	1110
SK	367	416	403	491	475	570	650	681	865	948	976	1027
UK	15496	17089	18237	18324	19687	21023	22490	23988	25829	25845	25985	25149

Data : WoS. Calculations : Fraunhofer ISI

Number of publications by men (fractionated counting)												
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	4238	4606	4867	5018	5335	5384	5847	6032	6329	6768	6524	6129
BE	5181	5469	5859	6215	6827	6802	7232	7595	8037	8309	8022	7597
BG	332	352	458	494	504	503	521	601	602	626	600	537
CY	102	134	164	201	258	277	313	334	398	352	407	447
CZ	2013	2286	2657	2844	2973	3412	3794	4018	4457	4857	4952	4932
DE	39781	42652	43388	44083	45743	46728	49230	51341	52352	54370	52629	50550
DK	4320	4677	4832	5042	5571	5793	6462	6979	7291	7801	7440	7232
EE	244	317	363	375	420	485	518	527	581	653	642	587
ES	10494	12344	13326	14347	15752	16492	18254	19582	20907	21856	20692	19920
FI	3733	4062	4043	4076	4273	4268	4547	4687	4829	5213	4903	4728
FR	18939	20110	20926	21998	23113	23746	25074	25773	26581	27024	25932	24778
EL	3354	3971	4319	4707	4997	4841	5041	4874	4913	4959	4416	4247
HR	1123	1137	1266	1370	1619	1598	1966	1862	1853	1732	1670	1560
HU	925	1083	1079	1109	1165	1126	1278	1302	1316	1374	1346	1246
IE	1715	1940	2155	2294	2654	2910	3136	3040	3124	3208	3017	2912
IT	17353	19355	20615	21904	23301	23359	24804	26748	29253	30269	29715	29165
LT	501	607	554	773	756	774	807	801	791	896	842	805
LU	62	72	83	111	158	178	220	240	322	379	344	360
LV	47	49	61	98	123	140	183	200	236	229	239	236
MT	45	38	57	81	88	89	101	149	158	162	191	168
NL	10388	11075	11689	12131	13365	13900	14427	14993	15361	15683	15095	14193
PL	6626	7272	7375	8316	8771	9010	9774	10516	11371	11865	11878	11246
PT	1157	1452	1599	1857	2064	2340	2655	2998	3432	3645	3631	3547
RO	834	954	1115	1852	2564	2714	3031	3132	3462	3127	3063	2560
SE	7910	8237	8160	8197	8670	8794	9096	9545	10138	10634	10377	10019
SI	849	947	1125	1258	1263	1275	1488	1515	1588	1619	1514	1393
SK	657	704	768	867	872	967	1093	1090	1327	1504	1370	1462
UK	38580	41317	42954	42603	44984	45821	48389	49723	51394	51351	50600	47463

Data : WoS. Calculations : Fraunhofer ISI

Number of all publications (fractionated counting)												
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	5434	5962	6292	6618	6979	7141	7902	8185	8649	9196	9051	8521
BE	6784	7299	7778	8398	9134	9379	10099	10815	11386	11863	11529	11007
BG	620	675	814	904	940	950	982	1115	1181	1173	1089	1035
CY	140	174	221	271	351	372	443	481	579	556	600	662
CZ	2822	3363	3859	4148	4460	5049	5765	6137	6798	7380	7688	7655
DE	49347	53173	54797	56161	58817	60859	64690	67822	69849	72987	71264	68892
DK	5809	6282	6616	6999	7769	8160	9244	10070	10572	11355	11118	10762
EE	380	500	595	620	732	822	849	900	1016	1116	1100	1005
ES	15793	18658	20262	22099	24285	25860	28738	31116	33427	34834	33565	32444
FI	5779	6232	6319	6541	6852	6964	7398	7633	7916	8457	8213	7898
FR	26545	28401	29576	31383	33239	34372	36348	37730	39205	39960	38487	36852
EL	4515	5385	5822	6410	6870	6689	7052	6865	7007	7067	6386	6095
HR	1958	2039	2308	2509	3015	3101	3758	3610	3685	3484	3311	3103
HU	1465	1679	1741	1858	1932	1883	2137	2183	2200	2388	2273	2128
IE	2362	2738	3091	3348	3881	4303	4711	4625	4819	5043	4701	4654
IT	27178	30470	32756	35142	37604	38045	40848	44420	48893	50881	50774	49957
LT	786	921	889	1228	1247	1254	1360	1370	1379	1526	1463	1424
LU	76	95	105	145	202	241	308	333	439	509	468	505
LV	91	103	123	178	220	276	343	382	494	468	480	462
MT	58	48	73	113	111	120	139	195	217	229	252	236
NL	13568	14627	15559	16440	18296	19460	20436	21688	22443	23172	22643	21410
PL	11223	12509	12569	14048	15024	15501	17103	18409	20135	20984	21185	20417
PT	2205	2714	3043	3536	4049	4625	5354	6042	6884	7424	7417	7355
RO	1589	1810	2104	3588	4898	5187	5906	6031	6876	6238	6329	5252
SE	11210	11819	11953	12030	12786	13064	13733	14523	15509	16359	16090	15537
SI	1339	1447	1729	1997	2140	2157	2566	2643	2717	2851	2667	2503
SK	1024	1120	1172	1358	1347	1537	1742	1771	2192	2451	2345	2489
UK	54076	58407	61192	60926	64671	66844	70879	73711	77223	77196	76585	72612

Data : WoS. Calculations : Fraunhofer ISI

Number of patents by female inventors (fractional counting)												
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	53	99	101	93	106	95	106	115	108	120	107	3
BE	148	169	175	158	157	147	163	127	131	138	156	7
BG	1	2	1	2	2	1	1	2	2	3	4	
CY			3	1	1		5	2	1	1	1	
CZ	7	6	14	10	10	12	15	16	17	20	20	1
DE	1389	1518	1605	1526	1625	1617	1631	1588	1604	1671	1714	56
DK	107	94	110	117	89	82	106	108	100	112	110	5
EE	1	3	4	3	1	3	4	2	2	4	3	
ES	253	234	265	339	358	373	343	343	310	277	309	11
FI	113	146	136	127	108	123	123	153	175	162	134	6
FR	898	979	1013	1032	1035	1029	1142	1050	1045	1003	1073	40
EL	7	12	7	7	7	5	5	6	9	5	7	0
HR	4	7	6	5	8	7	3	2	2	5	4	0
HU	19	19	19	12	18	15	13	11	13	7	10	0
IE	25	39	34	43	43	30	40	22	32	31	48	1
IT	435	445	431	441	427	439	405	399	400	436	405	9
LT	0	1	0	2	1	1	1	6	2	3	2	1
LU	3	5	5	3	3	6	4	7	6	3	8	1
LV	3	1	1	4	3	4	5	4	14	0	5	
MT	1			0		0						0
NL	160	162	205	175	174	150	190	238	228	226	245	12
PL	10	13	25	30	32	41	41	64	57	60	70	2
PT	16	23	17	25	23	31	32	27	28	30	43	
RO	5	3	3	5	2	4	5	7	7	9	11	
SE	229	242	285	227	214	234	221	239	208	201	228	8
SI	9	11	15	15	13	13	9	5	15	10	10	1
SK	1	4	3	1	2	3	5	3	3	1	6	
UK	496	503	511	449	470	438	518	440	524	536	556	32

Data : PATSTAT. Calculations : Fraunhofer ISI

Number of patents by male inventors (fractionated counting)												
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	1717	1898	1919	1803	1923	2066	2078	2063	2165	2144	2131	82
BE	1513	1555	1573	1542	1431	1514	1498	1496	1466	1455	1478	71
BG	8	15	9	15	13	13	24	18	14	24	24	1
CY	17	5	3	9	8	4	2	3	4	9	6	1
CZ	112	156	184	210	189	172	198	216	224	235	231	12
DE	25844	26902	28123	25865	25737	26379	26261	24749	23881	23875	23722	848
DK	1201	1221	1449	1383	1225	1285	1446	1307	1356	1325	1340	73
EE	2	9	16	17	21	22	9	8	15	18	14	0
ES	1429	1534	1661	1668	1834	1909	1885	1747	1625	1698	1647	78
FI	774	853	872	825	807	855	833	978	874	844	752	30
FR	8156	8370	8541	8454	8366	8382	8823	8339	7935	8272	8152	325
EL	70	70	81	78	75	52	69	80	71	65	59	2
HR	21	21	18	15	16	19	13	14	18	18	13	2
HU	114	124	149	132	137	149	149	115	64	92	89	2
IE	313	345	425	411	391	367	425	376	424	439	425	16
IT	5159	5565	5503	5196	4865	4851	4912	4702	4744	4783	4997	163
LT	3	3	6	2	3	3	5	8	3	9	3	
LU	76	96	67	84	61	73	78	74	74	72	67	1
LV	3	5	3	2	3	1	6	5	7	2	0	
MT	10	7	9	10	7	8	2	8	9	16	11	1
NL	2830	2933	2825	2790	2612	2273	2626	2814	2711	2792	2879	100
PL	124	141	177	228	268	305	320	400	365	432	542	13
PT	101	108	116	115	118	100	110	100	116	105	147	9
RO	17	21	27	31	28	26	41	48	63	63	65	5
SE	2537	2859	3224	3065	2777	2894	2962	3209	2963	3068	3000	115
SI	54	53	65	68	65	51	64	52	83	78	55	1
SK	38	39	43	33	27	48	56	40	60	44	49	4
UK	6341	6807	6740	6243	6135	6144	6140	5948	6426	6271	6242	268

Data : PATSTAT. Calculations : Fraunhofer ISI

Number of all patents (fractional counting)												
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AT	1770	1997	2020	1896	2029	2160	2184	2179	2273	2265	2238	85
BE	1661	1723	1748	1700	1588	1661	1661	1623	1596	1594	1634	78
BG	9	17	10	17	14	14	25	20	17	27	28	1
CY	17	5	6	9	10	4	7	5	5	10	7	1
CZ	119	162	198	220	199	185	213	232	241	255	251	13
DE	27233	28420	29728	27391	27363	27996	27892	26337	25485	25546	25436	903
DK	1308	1315	1559	1501	1314	1367	1551	1415	1456	1437	1450	77
EE	3	12	20	21	22	25	12	10	17	22	17	0
ES	1681	1767	1926	2008	2192	2282	2228	2089	1935	1975	1956	88
FI	887	999	1008	952	916	977	956	1131	1049	1006	887	36
FR	9053	9349	9554	9486	9401	9411	9965	9389	8980	9276	9225	365
EL	77	81	88	85	82	58	74	86	79	70	66	2
HR	25	28	24	20	23	26	16	17	20	24	17	3
HU	133	144	168	144	154	164	161	127	77	98	99	2
IE	339	384	459	454	434	397	465	398	455	470	473	17
IT	5594	6009	5934	5637	5292	5291	5316	5102	5143	5219	5402	172
LT	4	4	6	4	4	4	6	14	5	12	5	1
LU	80	100	72	86	65	78	82	81	80	74	75	2
LV	6	5	5	6	5	5	11	9	21	2	5	0
MT	11	7	9	11	7	8	2	8	9	16	11	1
NL	2990	3095	3031	2965	2786	2423	2816	3052	2938	3018	3124	112
PL	134	154	201	257	300	346	361	464	422	492	612	15
PT	117	131	134	139	142	131	143	126	144	135	190	9
RO	22	24	30	36	30	30	46	55	70	72	75	5
SE	2766	3101	3509	3292	2991	3128	3183	3448	3171	3270	3229	123
SI	63	64	80	83	79	64	73	57	98	88	65	2
SK	40	43	46	34	30	51	60	43	63	45	55	4
UK	6836	7310	7251	6692	6605	6582	6658	6388	6951	6807	6798	300

Data : PATSTAT. Calculations : Fraunhofer ISI

Appendix 8: Open access data - mean normalised citation scores of OA publishing

	MNCS for all OA publications		MNCS Gold OA		MNCS Green OA	
	2010	**2014**	**2010**	**2014**	**2010**	**2014**
AT	1,62	1,71	0,94	0,98	1,62	1,71
BE	1,31	1,39	0,96	0,92	1,31	1,39
BG	0,89	0,58	0,72	0,42	0,89	0,58
HR	0,41	0,55	0,31	0,45	0,41	0,55
CY	0,90	1,60	0,52	0,77	0,90	1,60
CZ	1,25	1,22	0,48	0,56	1,25	1,22
DK	1,57	1,68	1,07	0,95	1,57	1,68
EE	0,92	1,32	0,45	0,56	0,92	1,32
FI	1,37	1,40	0,98	0,93	1,37	1,40
FR	1,39	1,40	0,93	1,03	1,39	1,40
DE	1,46	1,58	1,04	0,98	1,46	1,58
EL	1,17	1,06	0,79	0,69	1,17	1,06
HU	1,09	1,01	0,80	0,75	1,09	1,01
IE	1,30	1,34	1,14	0,98	1,30	1,34
IT	1,32	1,39	0,79	0,87	1,32	1,39
LV	0,83	0,67	0,43	0,53	0,83	0,67
LT	0,93	0,59	0,61	0,56	0,93	0,59
LU	1,36	1,33	1,11	0,88	1,36	1,33
MT	1,50	0,86	0,45	1,14	1,50	0,86
NL	1,56	1,64	1,09	1,02	1,56	1,64
PL	0,94	0,86	0,39	0,50	0,94	0,86
PT	1,14	1,22	0,53	0,67	1,14	1,22
RO	0,99	0,75	0,64	0,60	0,99	0,75
SK	0,88	0,82	0,50	0,41	0,88	0,82
SI	1,18	1,16	0,41	0,58	1,18	1,16
ES	1,19	1,32	0,61	0,66	1,19	1,32
SE	1,30	1,45	0,93	0,89	1,30	1,45
UK	1,62	1,70	1,22	1,17	1,62	1,70

Source: CWTS, MoRRI 2017
Note: Blue indicates positive higher as expected values, crème below and no colour around world average.

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Monitoring the Evolution and Benefits of Responsible Research and Innovation (MoRRI) was a project tasked with implementing a monitoring system for responsible research and innovation (RRI) across its five dimensions (gender equality, science literacy and science education, public engagement, ethics, open access/open data), and governance. In addition to identifying indicators for the evolution of RRI, it identified social, democratic, economic and scientific benefits of RRI, and also conducted preliminary work to lay out routes towards implementing impact indicators.

This report presents the findings of efforts to monitor the evolution of RRI in the European Union. Data come from past projects, existing data sources such as Eurostat, register data, desk-based and qualitative research, bibliometric sources, and bespoke surveys of research and innovation funding and performing organisations, higher education institutions, and participants of science/society projects.

This main report is accompanied by an appendix.

A data package for the project is available at:
https://data.europa.eu/euodp/data/dataset/MoRRI_data.

Studies and reports

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