



Norwegian Ministry  
of Education and Research

# **National ERA Roadmap, 2016-2020**

# National ERA Roadmap, 2016-2020

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## Introduction

Norway hereby presents its national European Research Area Roadmap (ERA Roadmap). Its purpose is to contribute to a successful European Research Area by stating goals and actions, which implement the Top Action Priorities identified in the ERA Roadmap 2015-2020.

Active participation in ERA is a clear priority in the Norwegian Government's strategy for research and innovation cooperation with the EU (Horizon 2020 and ERA) of May 2014. Through ERA – a unified internal market for research - the EU's member states, EEA / EFTA states and other associated countries seek to strengthen their scientific and technological bases, their competitiveness as well as their capacity to collectively address grand challenges.

Norway has taken part in the development of ERA from the start, notably through full participation in the sixth EU Framework Programme (FP) for Research, and later on in FP7 and Horizon 2020. Norway has been active in the follow-up of the new EU-partnerships since 2008 and the follow-up of the European Commission's 2012 policy Communication on the ERA, including contributions to the ERA Progress Reports. Norway currently participates in all 10 Joint Programming Initiatives (JPIs) and are involved in 24 of the projects related to the European Strategy for Research Infrastructure (ESFRI) process. Norway will host three ESFRI projects. Participation in the European Research Area and Innovation Committee (ERAC) and other ERA-groups has high priority.

Norway shares the concern that to complete ERA and maximise the return on research investments, increased efficiency and effectiveness of the public research system is crucial. Intensified and improved cooperation is also needed to enable the brightest minds to work together to make a significant impact on the grand challenges such as an ageing population, energy security, mobility, environmental degradation, and to reduce duplication of research and infrastructure investments. ERA can also bring more competition to ensure that the best researchers and research teams receive funding - those able to compete in the increasingly globalised and competitive research landscape.

Norway makes substantial contributions to social and economic cohesion in Europe through the European Economic Area (EEA) and Norway Financial Mechanisms. For the new period from 2014, the EEA and Norway Grants may contribute to a strengthened cooperation between Norway and beneficiary countries on research and on the development of ERA.

With the explicit objective of opening up and connecting European research systems, the ERA agenda focuses on six key priorities:

- **More effective national research systems**
- **Optimal transnational co-operation and competition**  
On common research agendas, grand challenges and infrastructures
- **An open labour market for researchers**  
Facilitating mobility, supporting training and ensuring attractive careers
- **Gender equality and gender mainstreaming in research**  
Encouraging gender diversity to foster science excellence and relevance
- **Optimal circulation and transfer of scientific knowledge**  
To guarantee access to and uptake of knowledge by all
- **International cooperation**

The ERA roadmap was adopted in spring 2015 and covers the period 2015-2020. It is designed to facilitate and reinforce efforts primarily undertaken at national level to implement ERA. Norway, on the basis of a dialogue with all relevant Norwegian stakeholders, participated actively in the development of the roadmap in ERAC in 2014 and 2015. The Competitiveness Council in May 2015 encouraged the implementation of the ERA roadmap through appropriate actions in action plans and strategies at the national level (national ERA roadmaps), as well as at the EU-level.

Through the ERA roadmap, the EU and its member states, in close cooperation with EEA-EFTA and other associated countries, have decided on one Top Action Priority for each of the six ERA-priorities considered most important to fulfil the ERA-ambitions. The national ERA roadmaps set out goals and actions to be taken to realise the Top Action Priority according to the national status and context.

The ambitions of the 2015 Lund-declaration, to strengthen European efforts in the area of societal challenges, are to be taken into account in the context of the national ERA roadmaps.

A high-level indicator for each priority to enable monitoring of the European roadmap has been proposed by ERAC – cf. annex II, including a further description of each indicator. The indicators chosen are linked to the ERA-priority area, not to the individual Top Action Priority as such. National indicators assess the designated national actions.

For each ERA-priority area, the starting point is the Top Action Priority of the European roadmap, along with the designated high-level indicator, as well as Norway's current performance according to this indicator. As can be seen, Norway performs rather well on some of the top action priorities, but could also improve, and nevertheless have higher ambitions for performance on all the priorities. The goals and actions set in the national ERA roadmap are tailored to improve our performance. The roadmap has been developed in close contact with relevant Norwegian stakeholders. They will be important also in the implementation of many of the actions put forward in the national ERA roadmap.

The national ERA roadmap will be closely monitored and will be revised according to updates of the European roadmap, including possible improvements of the high-level indicators.

## ERA Priority 1: EFFECTIVE NATIONAL RESEARCH SYSTEMS

<b>Top Action Priority</b>	Strengthening the evaluation of research and innovation policies and seeking complementarities between, and rationalisation of, instruments at EU and national levels.
<b>High-level Indicator</b>	Revised version of the Research Excellence Indicator, a composite indicator published annually in the Innovation Union Progress report by the European Commission.
<b>Status Norway</b>	Norway scored above average on the composite indicator on research excellence in the Innovation Union Scoreboard for 2014 (67,7 vs. 47,8) <sup>1</sup> .

### Status

A long-term plan for research and higher education in Norway (long-term plan; Meld. St. 7, 2014-15) was presented to the Parliament in 2014. It sets out the primary objectives and priorities for how the Government will strengthen Norwegian research and higher education from 2015 to 2024. Research, innovation and education, and the relations between the three, will be reinforced to meet the challenges and seize the opportunities in the global knowledge society. World leading academic groups, innovative and adaptable industry, enabling technologies and public sector renewal are four of six prioritized areas in the long-term plan. The goal is that 3 per cent of GDP shall be invested in research and development by 2030. Public research and development appropriations shall increase to 1 per cent of GDP (2019-20). The long-term plan will be revised in 2018. Evaluation and other sources of strategic intelligence will be prepared prior to this revision. The OECD will review the national innovation policy in 2016 and 2017 with the purpose of assessing the current level of capabilities in research and development and higher education. The Government has recently presented a white paper on structural reform in the higher education sector, aimed at increasing quality in higher education and research (Meld. St. 18, 2014–15). A complementary white paper on a stronger culture of quality in higher education and relations to research and innovation will be presented in 2017.

Internationalisation is a priority in Norwegian research policy, and is deemed a prerequisite for ensuring high research quality. The long-term plan and the Government's Strategy for research and innovation cooperation with the EU states the primary, qualitative objectives for Norway's research and innovation cooperation with the EU through Horizon 2020 and ERA. The quantitative ambition is to reach a participation level where Norwegian participants retrieve a minimum of 2 per cent average of the grants announced in Horizon 2020. Where there is overlap in national and EU-priorities, synergies and complementarities and division of labour is sought between the national activities and programmes and participation in the EU research. A strategic balance between national and EU activities is sought for. All national

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<sup>1</sup>High-level indicator: Composite indicator based on the Research Excellence Indicator developed by JRC (components: Highly cited publications; PCT patents; ERC grants; MSC actions) <http://ec.europa.eu/research/innovation-union/pdf/state-of-the-union/2014/countries/norway.pdf>

programmes have been analysed by the Research Council of Norway (RCN) with respect to their complementarity with Horizon 2020. An important task for the national programmes is to qualify and mobilise for participation in Horizon 2020.

Participation in joint programming initiatives and pan-European infrastructures through the European strategy for research infrastructure roadmap are concrete examples of initiatives where we seek complementarity and division of labour between the European and the national level, *cf.* Priority 2A and B. On behalf of the ministries, the Research Council of Norway decides whether to enter into European program cooperation, such as ERA-NETs and Joint Programming Initiatives.

Norway also seeks to develop a complementary and specific national research base in areas of research and innovation not covered by the EU-research, including international research, technology and innovation cooperation outside of Europe.

## Goal

- A solid knowledge base (evaluation/strategic intelligence) for the revision of the long-term plan established.
  - *Indicator:* A high-quality OECD-review of Norway's innovation policy is conducted by May 2017
- Strengthened complementarity between national programmes and EU-instruments
  - *Indicator:* A better model for synergies and division of labor between national and EU-funding for the last part of Horizon 2020 and the next Framework Programme.
- Increased Norwegian participation in Horizon 2020.
  - *Indicator:* 2 per cent of the research funds allocated in Horizon 2020 obtained by Norwegian participants.

## Actions at national level

- To develop national knowledge base for the revision of the long-term plan based on an OECD review of the Norwegian innovation policy. Status for the Norwegian participation in Horizon 2020 and the national support measures will *inter alia* be addressed. Responsibility: MER
- Responsibility: Ministry of Education and Research (MER).
- Consider use of EU's Policy Support Facility for improving selected long-term plan-areas. Responsibility: MER, Ministry of Trade, Industry and Fisheries (MTIF) and The Research Council of Norway (RCN).
- Introduce a pilot on development contracts for higher education institutions, stating their long-term plan related ambitions (Meld. St. 18, 2014–15). Responsibility: MER.
- To follow up on the RCN-analysis of the EU-research and national programmes, and implement a policy where the programmes:
  - Secure division of work and interaction with European activities, and adapt their thematic areas to the themes in Horizon 2020 where relevant, to achieve synergies. The programmes shall make Norwegian research communities better equipped to participate in the European cooperation.
  - Offer support schemes for positioning of Norwegian research actors
  - Increase expectations that the national programmes actively contribute to participation in international cooperation

- Urge universities, university colleges and research institutes to cooperate with partners from industry and the public sector on international cooperation.

Responsibility: RCN

- Encourage especially the participation of higher education institutions and the regional health authorities in Horizon 2020. Responsibility: MER, Ministry of Health and Care Services.
- Consider the use of the EU's "Seal of Excellence" following Horizon 2020 evaluations for national financing of highly rated Horizon 2020 SME-projects - and potentially in more areas of Horizon 2020 – and also under the EEA and Norway Financial Mechanisms. Responsibility: MER and RCN.

### **Time schedule**

Dec. 2016	Clarified use of "Seal of excellence" in national programmes and EEA and Norway grants.
Dec. 2016	Trial arrangement of development contracts for universities and university colleges established.
June 2017	OECD review of the Norwegian innovation policy finalized.
Jan. 2018	Knowledge base for revised long-term plan established.
Oct. 2018	Long-term plan for research and higher education (2018 – 2022) presented.

## ERA Priority 2(A): JOINTLY ADDRESSING GRAND CHALLENGES

<b>Top Action Priority</b>	Improving alignment within and across the Joint Programming Process and the resulting initiatives (e.g. Joint Programming Initiatives (JPIs)) and speeding up their implementation.
<b>High-level Indicator</b>	National GBARD (Government Budget Appropriation for Research and Development) allocated to Europe-wide, bilateral or multilateral transnational public research and development programmes
<b>Status Norway</b>	The share of national GBARD allocated to transnational public research and development programmes in Norway was 3,24 per cent in 2011 <sup>2</sup> .

### Status

Most of the research investments in Europe is taking place at the national level, outside the framework programme. The Joint Programming Initiatives (JPIs) are set up to coordinate research related to societal challenges, with topics of global importance. The majority of the topics dealt with by the JPIs are of a cross-sectoral nature. Norway participates in all the current JPIs as well as activities under the SET-plan (Strategic Energy Technology Plan). To varying degrees, the initiatives coincide with topics of national importance with ongoing programmes and research. Most of the JPIs and priorities in the SET-plan are thematically in line with the priorities outlined in the long-term plan for research and higher education (Meld. St. 7, 2014-15). Norway is actively promoting alignment between national activities and the European ones to contribute to more impact of the JPIs and the SET-plan, in line with the 2015 Lund-declaration. The decision to enter into a JPI is taken at ministerial level. For each JPI one ministry is appointed as responsible ministry, according to the remit of responsibility, in coordination with other, relevant ministries. The Research Council of Norway is responsible for the strategic and financial management of all the JPIs, which have the same status in the RCN as national programmes. As part of Norway's Strategy for research and innovation cooperation with the EU (2014), the Ministry of Education and Research is in charge of efforts to develop a common model for the management and funding of the JPIs. The model includes regular cooperation and meeting points between relevant actors (ministries, research performing organisations, research funding organisations and stakeholders). Both the strategic research agenda and funding issues should be addressed in the coordination process.

### Goals

- Broader national commitment to the grand challenges addressed in the JPIs.
  - *Indicator:* Common funding of JPI activities and projects from the relevant ministries.
- Increased involvement through more knowledge and better information about the JPIs in Norway.
  - *Indicator:* Widened participation from national research institutions and end-users.

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<sup>2</sup>High-level indicator: Eurostat: [http://ec.europa.eu/eurostat/statistics-explained/index.php/File:National\\_public\\_funding\\_to\\_transnationally\\_coordinated\\_research\\_2007-2011.PNG](http://ec.europa.eu/eurostat/statistics-explained/index.php/File:National_public_funding_to_transnationally_coordinated_research_2007-2011.PNG) EU-average not available.



- Increased cooperation between national and international research institutions and other actors on solving the grand challenges.
  - *Indicators*: Increased common initiatives (projects, calls, networks) within the JPIs and increased Norwegian participation in Horizon 2020 projects on societal challenges.

## **Actions**

- National level:
  - Implementing a common model for management and funding which will ease the administration of and the communication between the different actors within and between the JPI(s). Responsibility: MER and RCN.
  - Raising the general awareness by spreading knowledge about, disseminate results from, and visualize impact of the JPIs, to speed up their implementation. Responsibility: relevant ministries and RCN.
  - Utilize different arenas (regular and irregular, new and existing) for the JPI-responsible persons to meet the end-users, public or private, both to ensure commitment and to seek new ways of approaching the societal challenge. Establish regular arenas for the JPI-responsible persons to meet to secure common learning, e.g. in foresight activities, that may pave way for innovative solutions. Responsibility: RCN.
- EU-level:
  - Contribute to increased communication between involved countries and the European Commission on how to cooperate through JPIs - spreading good practices and visualizing impact - in order to further speed up their implementation. Responsibility: MER, various other ministries and RCN.

## **Time schedule**

Dec. 2016	A common model for the ministries' management and funding of the JPIs implemented.  Plan for dissemination of results/impact.
Dec. 2017	All JPIs presented in the ministries regular meeting on research and innovation (DFU); National (scientific) meeting for all JPIs.
Dec. 2018	Evaluation of the ten JPIs and the SET-plan.
Dec. 2019	Evaluation of common model for the ministries' management and funding of the JPIs.

## ERA Priority 2(B): RESEARCH INFRASTRUCTURES (RI)

<b>Top Action Priority</b>	Making optimal use of public investments in research infrastructure is by setting national priorities compatible with the ESFRI priorities and criteria taking full account of long-term sustainability.
<b>High-level Indicator</b>	Availability of national roadmaps with identified ESFRI projects and corresponding investment needs
<b>Status Norway</b>	The Norwegian roadmap for research infrastructure, where research infrastructures of national importance are highlighted, includes Norway's participation in RIs on the ESFRI roadmap <sup>3</sup> . Norway participates in 24 of 48 ESFRI projects, and we have so far committed to the full implementation of 12 of these projects, of which three will be hosted by Norway.

### Status

Research infrastructure is an important element in Norwegian research policy. The Government's long-term plan for research and higher education (Meld. St. 7, 2014-15) states that the funding of infrastructure is to be reinforced based on strategic assessments and priorities. A national financing initiative for research infrastructure was launched as part of the follow-up of the government white paper on research, "Climate for Research" (Meld. St. 30, 2008-09) and the national strategy for research infrastructure, "Tools for Research" (RCN, 2008-17). The white paper establish a system that clarifies responsibility and principles for investments in research infrastructure based on three categories: a) research infrastructure investments by the institutions, b) research infrastructures of national strategic importance and c) broad, international cooperation on investments in research infrastructures, including the projects highlighted by the European Strategy Forum on Research Infrastructures on the ESFRI roadmap.

Regarding c) , this includes participation in the implementation phase of projects on the ESFRI roadmap following their preparatory phase. For distributed international research infrastructures, funding can be provided for the building-up and the operation of the Norwegian part of the relevant research infrastructure.

To ensure long-term sustainability, ministries with responsibility for research in the field which the particular ESFRI-project represents must approve national participation. In addition, for research infrastructure projects (national as well as ESFRI) to receive funding, clear requirements are set for cooperation and task sharing between research institutions and between research institutions and players from industry, public administration and/or regional health authorities. RCN stipulates corresponding requirements for cooperation and task sharing between Norwegian research institutions with regard to funding of Norwegian participation in joint international infrastructures, such as projects on the ESFRI Roadmap.

Increased use of ESFRI infrastructures across research sectors are encouraged.

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<sup>3</sup> High-level indicator: Availability of national roadmaps with identified ESFRI projects and corresponding investment needs.  
[http://www.forskningsradet.no/prognett-infrastruktur/Artikkel/Samlet\\_oversikt\\_over\\_veikartprosjekter/1253995493903](http://www.forskningsradet.no/prognett-infrastruktur/Artikkel/Samlet_oversikt_over_veikartprosjekter/1253995493903)

Research infrastructure operational costs are eligible costs in all RCN financing schemes, including national utilization of ESFRI projects. The RCN direct funding scheme may allocate basic funding of operational costs of large-scale research infrastructure if ongoing projects or host institutions cannot be expected to fully cover such costs. The RCN policy on open access to research data emphasizes the establishment of well-designed infrastructure for data storage and data management in part through the national financing initiative for research infrastructures, *cf.* 5B.

The ERIC-regulation was incorporated into the EEA-Agreement in March 2015. As of January 2016, new national legislation is in place to make it possible for Norway to host ERICs. Norway will host the following ESFRI-projects: CESSDA, EXCEL and SIOS.

## Goals

- Reinforced national infrastructure scheme in the period 2015-18 in accordance with the long-term plan (Meld. St. 7, 2014-15), to enable cutting-edge research within the national priorities, considering the ESFRI roadmap where relevant.
  - *Indicator:* Expanded appropriations by NOK 400 million by 2018.
- Norway has become a member of pan-European research infrastructures on the ESFRI roadmap of high strategic relevance for Norway's research priorities.
  - *Indicator:* Number of memberships in ESFRI-projects within national priorities in the long-term plan (Meld. St. 7, 2014-15).
- The Charter of Access to Research Infrastructures is used as a guideline for all research infrastructures of national importance with funding from the RCN.
  - *Indicator:* Access information.
- To secure the establishment of pan-European research infrastructures on the ESFRI roadmap where Norway is host country.
  - *Indicator:* Number of established ESFRI research infrastructures hosted in Norway

## Actions

- National level:
  - Bi-annual calls under the National Financing Initiative for research infrastructures will, in accordance with the long-term plan give high priority to:
    - Funding of research infrastructures in research areas of national priority, including research needs of industries of national importance.
    - Funding of research infrastructures that facilitate open access to publicly funded research data and safeguards important Norwegian data series.
    - Funding of national nodes in research infrastructures on the ESFRI roadmap and other international collaborative efforts on research infrastructure.
    - Revision of the roadmap after major funding decisions.

Responsibility: RCN

- Actively promote larger research infrastructures in all scientific fields in the national roadmap. Responsibility: RCN
- Encourage the research institutions to make their core research infrastructures visible and available to the scientific community. Responsibility: RCN.
- Consider the European potential of major on-going construction projects (i.e. the Lifesciences Research Center at UiO and the Ocean Space Center in Trondheim). Responsibility: MER, host institutions.

- Introduction of the Charter of Access to Research Infrastructures (funded by RCN) to all RIs of national importance. Responsibility: RCN
- Establish CESSDA ERIC and ECCSEL ERIC and SIOS with Norway as host country. SIOS Responsibility: MER.
- Develop a strategy for access to and optimal reuse of data. Responsibility: MER, RCN
- European level:
  - Norway will actively contribute to the implementation of the ESFRI roadmap through participation in ESFRI, ESFRI Board and ESFRI implementation group. Responsibility: Responsible ministry, RCN.

## **Time schedule**

Ongoing/cont.	Decisions by the Ministries on new memberships in projects on ESFRI roadmap from the call in 2014
June 2016-Dec. 2017	Call for applications, decision on projects to finance and final contracts on projects receiving financing from the call in 2016.
June 2017	CESSDA (Consortium of European Social Science Data Archives) established as an ERIC.
	ECCSEL (Centres of Excellence on Carbon Capture, Transport and Storage research (CCS)) established as an ERIC.
	SIOS (Svalbard Integrated Earth Observing System) established.
Dec. 2017	Strategy for access to and optimal reuse of data finalised
June 2018-Dec. 2019	Call for applications, decision on projects to finance and final contracts on projects receiving financing from the call in 2018.
Dec. 2019	All research infrastructures of national importance (funded by RCN) use the Charter of Access to Research Infrastructure as a guideline

### ERA Priority 3: AN OPEN LABOUR MARKET FOR RESEARCHERS

<b>Top Action Priority</b>	Using open, transparent and merit based recruitment practices with regard to research positions.
<b>High-level Indicator</b>	Open recruitment: Researcher's posts advertised through the EURAXESS job portal per thousand researchers in the public sector per year.
<b>Status Norway</b>	According to EU-statistics, 66 per cent of Norwegian research post are advertised on the EURAXESS Jobs portal, while the EU average lies at 43,7 <sup>4</sup> .

#### Status

Norway follows the principles set in the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers (Charter and Code), adopted by the European Commission: Open, transparent and merit-based recruitment should comprise the process of defining qualification requirements for research positions/academic positions, advertising, selection and evaluation of candidates and appointment. It is also important to make the positions attractive to all groups, by enhancing a welcoming culture and equal opportunities for all, without biases as for gender, ethnicity, nationality or others.

A recent survey on researchers in higher education institutions (MORE II, Higher Education study (2012)), shows that 62 per cent of researchers in Norwegian universities and university colleges consider that recruitment processes in their home institution are open, 66,7 per cent consider them transparent, and 69 per cent consider them based on merit. A recent study indicates that lack of inclusion and insufficient diversity management is a problem for recruiting and retaining international scholars in top positions in higher education institutions in Norway (AFI-report 2016:03), and reveals that there are still challenges to be met.

The proportion of researchers with a foreign citizenship has increased from 11 per cent in 2001 to 20 per cent in 2012 (Forskingsbarometeret, 2014).

To support the development of open, transparent and merit based recruitment, the EU has developed a Human Resources Strategy for Researchers building on the Charter and Code for researchers. In Norway six universities, two university colleges and the Research Council of Norway have been awarded the "HR Excellence". The rest of the universities, some university colleges and some research institutes have confirmed the first stage by signing the Charter and Code.

#### Goals

- Improved openness and transparency of recruitment to research in Norway
  - *Indicators:* Share of national scientific positions advertised in EURAXESS; number of institutions awarded the "HR Excellence".

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<sup>4</sup> Researcher posts advertised through the EURAXESS Jobs portal per thousand researchers in the public sector per year

## Actions

- National level:
  - Encourage the higher education institutions, research institutes and other research organisations to actively implement a comprehensive career policy, including the Charter and Code and the Human Resources Strategy for Researchers, and particularly work to enhance a welcoming culture. Responsibility: MER, UHR, FFA.
  - Consider the rules and regulations with respect to barriers to open recruitment for all groups, and expect the research performing organisations to do likewise. Responsibility: MER, Ministry of Labour and Social Affairs, UHR, FFA.
  - Expect the higher education institutions, research institutes and other research institutions to advertise research positions on the EURAXESS portal. Responsible actors: MER, UHR, FFA.
  - Consider whether the EU pension system RESAVER is relevant for Norway. Responsibility: MER.
- EU-level:
  - Increased communication, through relevant international fora, on open, transparent and merit-based recruitment practices with regard to research positions. Responsibility: MER, UHR, FFA and RCN.
  - Contribute to the discussion on simplifying and enforcing Charter and Code as a tool for improving the Human Resources Strategy for Researchers. Responsibility: MER, UHR, FFA and RCN

## Time schedule

Dec. 2018      Rules and regulations with respect to barriers to open recruitment considered.

Adoption of national regulations to allow researchers to join the EU pension system RESAVER considered.

Charter and Code implemented in a majority of research performing organisations.

Considerations regarding RESAVER for Norway.

## ERA Priority 4: GENDER EQUALITY AND GENDER MAINSTREAMING IN RESEARCH

<b>Top Action Priority</b>	Translating national equality legislation into effective action to address gender imbalances in research institutions and decision making bodies and integrating the gender dimension better into R&D policies, programmes and projects.
<b>High-level Indicator</b>	Proportion of women in A grade in higher education sector
<b>Status Norway</b>	In 2014, 26 per cent of the professors were women.

### Status

*Gender balance:* In Norway women are still underrepresented in academic posts within several disciplines, and they are generally underrepresented in grade A positions. In 2014, 26 per cent of the professors were women (Database for statistikk om høgre utdanning; <http://dbh.nsd.uib.no/>). The proportion of women varies significantly between disciplines and fields of research. In medical sciences and the humanities, around 30 per cent of the professors are women, in engineering and technology around 10 per cent. Norway lies above average in a European context with respect to female professors<sup>5</sup>.

Female full-time equivalents in the research institutes (institutes for which the Norwegian guidelines for public funding apply) lies at 40 – 50 per cent within the social and life sciences. Within technical industrial institutes, women occupy 26 per cent of these positions. Industry lies far behind the other sectors with only 20 per cent female researchers (2012).

*Gender perspectives in research:* Both Horizon 2020 and the RCN require researchers to comment on the role of gender and sex in the projects they propose. In 2013 1,7 per cent of all the research funded by the RCN was labelled as gendered research.

The Ministry of Education and Research requires that all higher education institutions have action plans for gender equality. The Committee for Gender Balance and Diversity in Research (KIF) works actively to promote gender equality in the university and college sector, and cooperates with the education institutions, the research institutes and with RCN (see <http://www.kifinfo.no>). The universities' gender equality advisers work continuously through the LUN network (network of gender equality advisers at the Norwegian universities) to improve gender equality in Norwegian universities. The RCN follows up targets and funds in the BALANSE program, <http://www.forskningsradet.no/>, aiming at gender balance in top positions and research management. RCN provides funding for "Kilden", information and news about gender research in Norway, <http://kjonnsforskning.no/en>.

### Goals

- Better gender balance in grade A positions.
  - *Indicator:* Share of women in grade A positions.
- Better gender balance in disciplines where either men or women are underrepresented.

<sup>5</sup> She-figures, 2015 [http://ec.europa.eu/research/swafs/pdf/pub\\_gender\\_equality/she\\_figures\\_2015-leaflet-web.pdf](http://ec.europa.eu/research/swafs/pdf/pub_gender_equality/she_figures_2015-leaflet-web.pdf)

- *Indicator*: Share of men and women among beginner students, Ph.D. students and among scientific staff in permanent positions.
- Better integration of sex and gender analysis in research.
  - *Indicator*: To be developed (see actions).

## **Actions**

- National level:
  - Support the integration of sex and gender perspectives in research through:
    - Interaction with researchers and managers, users of research and research funders.
    - Building competence (knowledge and awareness) in staff and boards, among evaluators and researchers.
    - Research funding; learning from experience and good practice in other countries.
    - Monitoring state-of-play and progress of the mainstreaming of gender in research contents in funding instruments.

Responsibility: RCN, KIF

- Align information on women in senior/grade A positions (research institutes comparable to positions in universities and university colleges) through relevant national and international bodies in order to get comparable data for a cross-sectorial grade A indicator. Responsibility: MER and RCN
- Address the underrepresentation of women in international research programs and identify measures to counter for this. Responsibility: MER, UHR, KIF, RCN
- Encourage and monitor the universities and university colleges' performance regarding share of women in grade A positions. Responsibility: MER and KIF
- Monitor the actions (described in the universities and university colleges' action plans and strategies) for gender equality and diversity. Responsibility: MER, KIF
- Implement measures to increase the number of women who apply for and are awarded Horizon 2020 grants. Responsibility: MER, RCN and KIF.
- European level:
  - Contribute to improved gender balance in research and integration of sex and gender analysis in research through active participation in Steering Group on Human Resources and Mobility, the Helsinki Group, Gender Net, through input to meetings and other follow-up activities, including information on strategic priorities and joint activities. Responsibility: MER, RCN and KIF.
  - Promote monitoring of female coordinators (and PIs) in Horizon 2020 applications and projects (eCorda). Responsibility: MER and RCN

## **Time schedule**

Dec. 2018	A cross-sectorial monitoring tool for women in senior/grade A positions developed.
Dec. 2019	Tool for monitoring state-of-play and progress of the mainstreaming of gender in research contents in funding instruments



## ERA Priority 5(A): OPTIMAL CIRCULATION AND TRANSFER OF SCIENTIFIC KNOWLEDGE

<b>Top Action Priority</b>	Fully implementing knowledge transfer policies at national level in order to maximize the dissemination, uptake and exploitation of scientific results. Research performing – and research funding organisations should make knowledge transfer second nature by integrating it in their everyday work.
<b>High-level Indicator</b>	Percentage of product or process Innovative firms cooperating with higher education institutions or public research institutions for their innovation activities
<b>Status Norway</b>	13,1 per cent of Innovative firms in Norway collaborated with higher education institutions during 2010-2012, and 14,1 per cent with research institutes <sup>6</sup> .

### Status

Through a wide range of measures, Norway follows a broad approach to stimulating knowledge transfer. The long-term plan for research and higher education (Meld. St. 7, 2014-15) emphasizes the importance of knowledge transfer in order for research to gain optimal impact on society. "Innovative and adaptable industry" and "Public sector renewal, better and more effective welfare, health and care systems", are two of six prioritized areas, emphasising more research-based innovation, spin-off companies and commercialisation. Knowledge transfer is also central in the RCNs main strategy "Research for Innovation and Sustainability" (2015-20). Three aspects are deemed important to succeed in knowledge transfer: to strengthen collaborative research, to increase inter-sectoral mobility and the creation of start-ups and, and to professionalise IP management. Technology Transfer Offices (TTOs) at the universities and the university colleges, and industrial and regional clusters, have important roles to play in this regard. The role of research and innovation to improve the quality of higher education is getting increased attention, with a white paper on a stronger culture of quality in higher education to be presented in 2017 – cf. ERA-priority 1.

*Strengthened collaborative research:* Collaborative research is addressed through a number of programmes and activities in the RCN and Innovation Norway (IN), including cluster and center programmes. Private and public sector PhD-schemes also contribute to enhanced knowledge transfer. To strengthen the cooperation between the universities and university colleges and the public and private sector, the Government suggests in its white paper on structural reforms in the higher education sector (Meld. St. 18 (2014-2015)), to introduce new, indicator-based financial incentives as part of a new funding system for the sector from 2017.

*Increase the creation of start-ups and inter-sectoral mobility:* RCNs "FORNY2020" programme seeks to promote the establishment of new companies based on research result

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<sup>6</sup> Eurostat/Forskningsbarometeret:

<https://www.regjeringen.no/no/tema/forskning/innsiktsartikler/forskningsbarometeret/samarbeid/innovasjonssamarbeid/id758045/>

and to generate growth in existing companies by providing funding to projects based on research results. In addition, it aims to enhance the professionalism and efficacy of the Technology Transfer Offices affiliated with universities, university colleges, hospitals and independent research institutes in their respective fields. The universities promote entrepreneurship through their own education programmes. The government recently launched an entrepreneurship plan, aimed at stimulating and reinforcing a culture for entrepreneurship in Norway (The National Entrepreneurship Plan: Good ideas, Future Jobs, 2015).

*Professionalised IP management:* Norwegian companies register far fewer intellectual property rights compared to countries with a similar level of development. This is partly due to the structure of Norwegian industry, which is characterised by a large predominance of SMEs, and by a smaller proportion of patent intensive industries than in other Nordic countries. A white paper on innovation policy in the field of IPR (Meld. St. 28 (2012-13) *Unique ideas, major assets*), addresses this issue. One of the proposed goals is improving IPR training and education.

Open Science (e.g. open access to scientific publications and open access to data) is seen a prerequisite for successful knowledge transfer policies, *cf.* 5B.

## Goals

- Increase and strengthened collaborative research between public and private research performers
  - *Indicator:* Percentage of business enterprises collaborating with universities, university colleges and other research performing organisations.
- Refine indicators to quantify the economic and social impact of knowledge transfer policies.
  - *Indicator:* New set of indicators developed, including a possible composite indicator.
- Follow up an evaluation report by the Nordic institute for studies in innovation, research and education (NIFU) about "Measures promoting commercialization of public funded research" and the Entrepreneurship Plan (18/2015).
  - *Indicators:* Recommendations considered, plans developed and put to work.
- Professionalize IPR-management and the negotiation of collaborative and contract research at universities, university colleges and other research performing organisations.
  - *Indicators:* Increased number of Norwegian patent applications resulting from collaborative and contract research with research performing organisations to the European Patent Office. Establishment of new research and development intensive businesses.

## Actions

- National level:
  - Improve and promote education and training in entrepreneurship and corporate culture such as Student Entrepreneur programs. Responsible actors: RCN, MER, MTIF.

- Increase the number of students who obtain their PhD's within the Industrial PhD and Public sector PhD schemes. Responsible actors: MER, MTIF, RCN.
- Promote training in IP for students in entrepreneurship and legal, technical and business administration curricula, especially in the field of innovation management and building business concepts and value propositions on the basis of IP and IPR. Responsible actors: RPOs.
- Strengthen transfer of scientific knowledge through centre and cluster schemes. Analyse the effects of cluster-schemes. Responsible actors: RCN, IN.
- Stimulate Norwegian participation in PPI (Public Procurement of Innovation Solutions) and PCP (Pre-Commercial Procurement) instruments within H2020. Responsible actors: MTIF, RCN, IN.
- To further strengthen collaborative research through new tools, such as "IdeaLab" (a broad range of stakeholders invited to come together and introduce new radical research-based solutions to societal challenges). Responsible actors: MER, MTIF, RCN, IN.
- Improvement of knowledge transfer indicators, including a possible composite indicator that reflects the broad range of knowledge transfer activities. Responsibility: MER, MTIF and RCN.
- Assess the need for, and possible content of, a free online help tool meant mainly for IPR-handlers in HEIs' administrations and PRIs. Responsible actor: MTIF
- Improvement of the indicator for business disclosures within RPOs and HEIs. Responsible actors: MER, MTIF and RCN.
- EU-level:
  - Contribute to policy development processes for more innovation friendly regulations. Responsible actors: MTIF, MER.
  - Contribute to a better knowledge transfer policies in Europe through participation in ERA groups. Responsibility: MER, MTIF.

## Time schedule

Dec. 2016	<p>Follow-up on the evaluation; general promoting of knowledge transfer; strengthening Norwegian participation in and contribution to the Horizon 2020 PPI and PCP instruments.</p> <p>Revision of the RCN's innovation strategy.</p> <p>Increased number of students in industrial PhD and Public sector PhD schemes.</p> <p>Improved user orientation in instruments like the Centres for research driven innovation at the RCN.</p> <p>Improved measures for entrepreneurship amongst students in higher education institutions.</p> <p>Analysis of the effects of cluster-schemes</p>
Dec. 2018	<p>Follow-up on a new steering parameter and indicator in the funding system for the higher education institutions, measuring the public and private revenue.</p> <p>Discussion of the composite-indicator scheme.</p>



## ERA Priority 5(B): OPTIMAL CIRCULATION AND TRANSFER OF SCIENTIFIC KNOWLEDGE

<b>Top Action Priority</b>	Promote open access to scientific publications.
<b>High-level Indicator</b>	Revised version of the Research Excellence Indicator, a composite indicator published annually in the Innovation Union Progress report by the European Commission.
<b>Status Norway</b>	The Norwegian government's white papers (Meld. St. No 30 (2008-09) and No 18 (2012-13)) stress the need for Open Access (OA) to scientific publications resulting from publicly funded research and encourage RCN, universities and university colleges and other research performing organisations to promote open access. Norway lies slightly above the EU average when it comes to open access publication <sup>7</sup> .

### Status

The Norwegian government's white papers (Meld. St. No 30 (2008-09) and No 18 (2012-13)) stress the need for open access to scientific publications resulting from publicly funded research and encourage RCN, higher education institutions and other research performing organisations to promote open access. Norway lies slightly above the EU average when it comes to open access publication<sup>8</sup>.

The RCN published its policy on open access to publications in 2008 and revised it in 2014. The policy calls for mandatory archiving of post-print copies of scientific articles (green OA) and promotes financial support for open access journals (gold OA). Most Norwegian universities and university colleges have implemented similar policies requiring mandatory archiving of scientific publications for all new employees.

Most Norwegian higher education institutions and some larger research institutes have set up special financial mechanisms (publication funds) to provide funding for article processing charges (APC) for all employees. Up to 50 per cent of annual costs of these funds, during the period 2014-19 through the RCNs STIM-OA programme. Its first call was in February 2015.

The national research information system – CRISTin – is the computer system and the organization for the national archive on scientific publications and scientific results in Norway. CRISTin registers a high percentage of the scientific publications with Norwegian authors and co-authors. Through the "channel register", it is easy to keep track of how many articles are published in open access journals (gold). The integrated NORA service (Norwegian Open Research Archives) is a service that procure all the Norwegian institutional repositories and open access journals in Norway.

Based on the OECD recommendations from 2007 a Norwegian government white paper (Meld. St. 30, 2008-09) recommended steps to promote sharing of data from publicly funded research activities. Since then, technological and societal developments, as well as increased awareness, have fostered better infrastructures and a stronger culture for sharing of research data. RCN issued its policy for open data in 2014 under the auspices of the Ministry of

<sup>7</sup> 2008-2013; [http://science-metrix.com/files/science-metrix/publications/d\\_1.8\\_sm\\_ec\\_dg-rtd\\_proportion\\_oa\\_1996-2013\\_v11p.pdf](http://science-metrix.com/files/science-metrix/publications/d_1.8_sm_ec_dg-rtd_proportion_oa_1996-2013_v11p.pdf)

Education and Research. Although it is a "soft" policy, it strongly promotes open data and signals mandatory requirements for sharing of data; projects funded by RCN are required to "store data in a secure manner", but not to share or make openly accessible.

The MER in cooperation with research performing organisations are in the process of establishing guidelines for open access to research output, and aims to establish a strategy for access to and re-use of data, including through the financing mechanism for research infrastructures.

## Goals

- All published scientific articles based on publicly funded research are freely available to the research community and the public. The parallel paths (green and gold) are both pursued.
- Research generated data from publicly funded research is available for reuse to all interested parties.
  - *Indicator:* Open access publications as percentage of all journal articles, and divided in gold (percentage in open access journals) and green (percentage deposited in open digital repositories)
  - *Indicator:* Number and share of national research performing organisations (e.g. universities and university colleges' and state funded research institutes) with mandatory policies for open access to and preservation of scientific results.
  - *Indicator:* Reuse of research-generated data (to be developed)

## Actions

- Create new and robust "retail" and funding mechanisms that promote research quality and a sustainable publication ecosystem. Responsibility: MER, RCN and research performing organisations.
- Promote archiving in repositories through utilization of CRISTin/NORA and enforcement of mandatory requirements in RCN and institutional open access policies. Responsibility: MER and RCN.
- Develop financial mechanisms that enable publicly funded universities, university colleges and research institutes to negotiate, cover and recover costs relating to gold open access publication of the institutions research results. Responsibility: MER and RCN.
- Develop best practices on how to "showcase" effects of open access publication on research, higher education, public sector, industry and society as such. Responsibility: RCN.
- Raise awareness on open access policy through stakeholder engagement and research community outreach. Responsibility: RCN, UHR, FFA and research performing organisations.
- Include open data considerations, i.e. data management plans in research project funding schemes. Responsibility: MER, RCN and Research performing organisations.
- Finance research data management infrastructure directly and through project funding. Responsibility: RCN.
- Establish a working group with the mandate to make national guidelines for open access to research output. Responsibility: MER.
- Show impact on industry and society: create framework for identifying published datasets and metrics for assessing usage/impact. Responsibility: RCN and IN.

## **Time schedule**

- Dec. 2016    Develop standard reports from CRIStin and RCN's STIM-OA instrument on national percentage of Open access publications, "green" and "gold", and article processing charges.  
Implementation of guidelines for open access to research outputs.
- Dec. 2017    Develop national 2020 targets for green and gold open access.  
National strategy for optimal access to and re-use of data.
- Dec. 2018    Assessment of national targets.

## ERA Priority 6: INTERNATIONAL COOPERATION

<b>Top Action Priority</b>	Develop and implement appropriate joint strategic approaches and actions for international STI cooperation on the basis of Member States' national priorities.
<b>High-level Indicator</b>	International scientific co-publications per thousand researchers (FTE) in the public sector.
<b>Status Norway</b>	Norway emphasises the importance of international cooperation in research and innovation with countries outside of Europe. International scientific co-publications constituted 62 per cent of all Norwegian articles in 2014.

### Status

Norway has chosen eight priority countries for international cooperation outside of the EU: Brazil, Canada, China, India, Japan, Russia, South Africa and the US. We have roadmaps for cooperation with each priority country and a Government strategy, the Panorama strategy, for cooperation in higher education and research with Brazil, China, India, Japan, Russia and South Africa. Furthermore, the Government strategy for cooperation with the EU on research and innovation says that Norway shall seek to strengthen cooperation with priority countries outside Europe through Horizon 2020 and ERA.

Norway participates as an observer country in EU's Strategic Forum for International Cooperation (SFIC). We contribute to joint strategies and priority setting through SFIC's work on multiannual roadmaps for cooperation with priority countries/regions outside of Europe, as well as to its implementation through joint actions towards priority countries/regions and by leading the work to develop a toolbox for international cooperation.

### Goals

- Strengthened international cooperation through European research and innovation programmes and activities with the eight priority countries.
  - *Indicators:*
    - Number of joint applications to Horizon 2020 between researchers/entities in Norway and in the priority countries.
    - Number of joint publications between Norwegian researchers and researchers in the priority partner countries.
    - Participation in ERA-NETs that promote international cooperation.
- Strengthened cooperation between Norwegian embassies/Innovation Norway offices and EU delegations/MS embassies in priority countries by promoting joint activities.
  - *Indicator:*
    - Joint/coordinated activities (e.g. conferences, networking events) between Norwegian embassies/Innovation Norway offices and EU delegations/MS embassies in priority countries.
- Alignment of policy dialogue and implementation of international cooperation at European and Norwegian level.
  - *Indicators:*
    - Norwegian input to EU dialogue with priority partner countries.



- Cooperation within the EU/ERA framework as part of the dialogue with priority partner countries at political and official level.

## **Actions**

- National level:
  - Norway will implement the Panorama-strategy, relevant parts of the strategy for research and innovation cooperation with the EU, as well as the roadmaps for cooperation with priority countries. Responsibility: MER, other relevant ministries, RCN.
  - Norway will promote cooperation through EU activities through dialogue with priority partners, thereby seeking to take joint EU and Member States (MS)/Associated Countries (AC) strategies and priorities into account and to use information on joint EU and MS/AC activities. Responsibility: MER.
- European level:
  - Norway will contribute to better coordination of the objectives and priority setting for international cooperation and to joint activities towards priority countries through continued strong commitment to the work of SFIC. Responsibility: MER, RCN.
  - Norway will contribute to a better utilization of S&T agreements between the EU and priority countries by providing input to meetings and other follow-up activities, including information on strategic priorities and on joint activities. Responsibility: MER, RCN.

## **Time schedule**

June 2016	Embassies in priority countries are encouraged to initiate and/or participate in joint activities with EU delegations/MS' embassies to promote cooperation through EU research and innovation activities.
Dec. 2016	Streamline the approach/process to include EU cooperation in meetings under bilateral agreements with priority countries.
Dec. 2017	Monitor joint applications and participation in ERA-NETs and compare numbers (as of Dec. 2016) to FP7. Consider, if necessary, additional instruments or ways to promote international cooperation.

## **ANNEX 1    Abbreviations**

APC	Article Processing Charges
BOA	Bidrags- og oppdragsfinansiert aktivitet
CESSDA	Consortium of European Social Science Data Archives
CRISStin	Computer system and the organization for the national archive on scientific publications and scientific results in Norway
EEA	European Economic Area
ECCSEL	Centres of Excellence on Carbon Capture, Transport and Storage research (CCS)
EFTA	European Free Trade Association
ERA	European Research Area
ERAC	European Research Area and Innovation Committee
ESFRI	European Strategy Forum on Research Infrastructures
EURAXCESS	Pan-European job portal for researchers
FFA	The Norwegian Association of Research Institutes
FP	Framework Programme
GBARD	Government Budget Appropriation for Research and Development
GDP	Gross Domestic Product
GPC	ERA High Level Group for Joint Programming
HEI	Higher Education Institutions
IN	Innovation Norway
IPR	Intellectual Property Rights
JPI	Joint Programming Initiative
KIF	Committee for gender balance and diversity in research
Meld. St.	White paper launched by Norwegian Government
MER	Ministry of Education and Research
MORE II	Mobility Survey of the Higher Education sector: Mobility and care paths of researchers in Europe (2012)
MTIF	Ministry of Trade, Industry and Fisheries
NORA	Norwegian Open Research Archives
OA	Open Access
OECD	Organisation for Economic Co-operation and Development
RCN	Research Council of Norway
RI	Research Infrastructure

SET plan	Strategic Energy Technology plan
SFIC	EU's Strategic Forum for International Cooperation
SGHRM	ERA Steering Group on Human Resources and Mobility
SIOS	Svalbard Integrated Earth Observing System
STI	Science, Technology and Innovation
UHR	The Norwegian Association of Higher Education Institutions

**ANNEX 2 The ERAC Opinion on the ERA Roadmap - Core high level indicators for monitoring progress, as adopted at the 28th ERAC meeting on 13 November 2015**

PRIORITY	PROPOSED INDICATOR	DESCRIPTION	SOURCE, FREQUENCY AND COVERAGE
1: Effective national research systems	Revised version of the Research Excellence Indicator, a composite indicator published annually in the Innovation Union Progress report by the European Commission	<p>The modified version of the Research Excellence Indicator has 4 components:</p> <ul style="list-style-type: none"> <li>• <u>-Highly cited publications</u> (numerator: number of (top 10%) most highly-cited publications (Scopus data), denominator: total number of publications)</li> <li>• <u>-PCT patents</u> (numerator: PCT patents, denominator: population)</li> <li>• <u>-ERC grants</u> (numerator: Value of ERC grants, denominator: GOVERD+HERD)</li> <li>• <u>-Marie Skłodowska-Curie (MSCA) grants</u> (numerator: number of MSCA fellows by country of host organisation, denominator: number of national MSCA fellows).</li> </ul> <p>The indicator is normalised (min. score, max. score 100), equal weighting (depending on testing by JRC). For the indicator scores, higher is better (maximum score: 100, minimum score: 10)</p>	<p><u>Source:</u> European Commission, DGRTD/Joint Research Centre calculations (annual), methodological notes are published by JRC.</p> <p><u>Frequency:</u> yearly</p> <p><u>Scope:</u> all EU-28 countries, other ERA countries</p>
2a: Jointly Addressing Grand Challenges	National GBARD <sup>9</sup> allocated to Europe-wide, bilateral or multilateral transnational public R&D programmes	<p><u>Numerator:</u> GBARD allocated to transnationally coordinated research (Europe-wide transnational public R &amp; D programmes and bilateral or multilateral public R &amp; D programmes established between Member State governments (and with candidate countries and EFTA countries), expressed in €.</p> <p><u>Denominator:</u> Number of researchers in the public sector (government 'GOV' and higher education institutes 'HEI') measured in FTE's.</p>	<p><u>Source:</u> Eurostat</p> <p><u>Frequency:</u> Annual</p> <p><u>Scope:</u> all EU-28 countries. The possibility of calculating this number for associated countries has to be investigated with Eurostat (IS, NO are available). Numerical values are available over the period 2007-2013 (and partially 2014)</p>
2b: Make optimal use of public investments in Research Infrastructures - RI's	Availability of national roadmaps with identified ESFRI projects and corresponding investment needs.	Graphical presentation to visualise the degree of elaboration of the roadmaps	<p><u>Source:</u> ESFRI countries</p> <p><u>Frequency:</u> for ERA reporting bi-annual reporting would be sufficient</p> <p><u>Scope:</u> all ESFRI countries (EU and associated countries)</p>

<sup>9</sup> GBARD will be the new name of GBAORD in the forthcoming new edition of the Frascati manual.

PRIORITY	PROPOSED INDICATOR	DESCRIPTION	SOURCE, FREQUENCY AND COVERAGE
3: Open Labour Market for Researchers	Open recruitment: Researcher posts advertised through the EURAXESS Jobs portal per thousand researchers in the public sector per year	<p><u>Numerator</u> : Number of researcher posts advertised through the EURAXESS Jobs portal</p> <p><u>Denominator</u> : thousand researchers in the public sector (FTE)</p>	<p><u>Source</u>: European Commission: Euraxess Job Portal.</p> <p><u>Frequency</u>: Yearly.</p> <p><u>Scope</u>: All EU-28 countries, and NO, IS, CH, MK and TR.</p>
4: Gender Equality and Gender Mainstreaming in Research	Proportion of women A grade in Higher Education Sector (HES)	<p><u>Numerator</u>: Number of women grade A in HES</p> <p><u>Denominator</u>: Sum of number of men and women grade A in HES</p>	<p><u>Source</u>: She Figures Study (managed by DG RTD)</p> <p><u>Frequency</u>: Every 2 years (only for this specific indicator)</p> <p><u>Scope</u>: All EU-28 countries and CH, IS, NO, TR, (depending on contributions sent by the Helsinki Group Statistical Correspondents).</p>
5a: Scientific knowledge transfer	Percentage product or process innovative firms collaborating with higher education institutions or with public research institutions for their innovation activities	<p><u>Numerator</u>: Number of business enterprises with product or process innovation activities that have collaborated with higher education institutions or public research institutions to implement these innovations.</p> <p><u>Denominator</u>: Number of business enterprises with product or process innovation activities</p>	<p><u>Source</u>: Eurostat</p> <p><u>Frequency</u>: Every 2 years</p> <p><u>Scope</u>: All EU-28 countries, plus NO, RS, TR.</p>
5b: Promoting Open Access to scientific publications	Proportion of Open Access papers (Gold and Green OA only) per country	<p><u>Numerator</u>: total number of open access papers (gold and green)</p> <p><u>Denominator</u>: total number of papers in the sample</p>	<p><u>Source</u>: Science-Metrix or other external contractor</p> <p><u>Frequency</u>: one-time study 2008-2013, periodical update needed. A DG RTD study has been commissioned that allows for a regular update.</p> <p><u>Scope</u>: 44 countries including all EU-28 countries and all ERA associated countries</p>
6: International cooperation	International scientific co-publications per thousand researchers (FTE) in the public sector	<p><u>Numerator</u>: Number of scientific publications with at least one co-author based outside of the EU/ERA-countries</p> <p><u>Denominator</u>: Number of researchers (in thousands, FTE)</p>	<p><u>Source</u>: This indicator is not published by Eurostat but can be produced through existing bibliometric databases. This will be covered by the same study as for 5b. Data will become available in 2016 and updated on a 6-monthly basis.</p>