

Ministry of Education and Research

Swedish National Roadmap for the European Research Area 2019–2020

Contents

Introduction and background	2
Priority 1: A more effective national research and innovation system	3
Priority 2A: Jointly meet societal challenges	6
Priority 2B: Optimise public investment in research infrastructures	8
Priority 3: An open labour market for researchers	11
Priority 4: Gender equality and gender mainstreaming in research and innovation	14
Priority 5: Open Science	17
Priority 6: International cooperation	20

Introduction and background

The vision of the European Research Area (ERA), also known as ‘the Fifth Freedom’ in the EU, is about free circulation of researchers, knowledge and technology within the EU’s internal market and with associated countries. In 2015, European Council Conclusions led to the adoption of a roadmap for the ERA up until the year 2020. The roadmap identifies a number of priorities and related key actions that are considered to be most effective in strengthening the ERA.

Since each country’s research and innovation system has its own unique character, the European roadmap does not prescribe measures that every country should take. Instead, each country is encouraged to draw up its own national roadmap, based on the country’s own circumstances, setting out initiatives or identifying needs at a national level.

This document describes the Swedish roadmap for the years 2019–2020 and the key actions linked to each priority, as performed by various actors in the national research and innovation system in support of a strong ERA. The Swedish Government intends to address the follow-up of the roadmap at a later date.

Priority 1: A more effective national research and innovation system

Background and strategy

Sweden invests over three per cent of its GDP in research and development (R&D), placing the country high up the rankings in Europe and globally. Public investment in R&D amounts to around one per cent of GDP. The direction of and funding for the Government's research and innovation policy are set out in the Research Bill that is presented every four years, the most recent of which is titled Knowledge in collaboration – for society's challenges and strengthened competitiveness (*Kunskap i samverkan – för samhällets utmaningar och stärkt konkurrenskraft*). Focusing on the years 2017–2020, this bill outlines the Government's policy on the direction and funding of research and on initiatives to improve Sweden's capacity for innovation. The bill identifies priority social challenges such as climate and environment, health, digitalisation, a sustainable society and improved results in the Swedish school and education system. A number of measures were presented in the bill, with gradual funding increases up until 2020. The total yearly funding increase will then amount to SEK 2.8 billion, of which SEK 800 million is allocated for investment in innovation.

The objective of research policy since 2017 has been for Sweden to be one of the world's foremost research and innovation countries and a leading knowledge nation, where high-quality research, higher education and innovation promote the development and wellbeing of society, enhance the competitiveness of the business sector, and respond to the challenges facing society in Sweden and globally. The Government has also highlighted the following monitorable subsidiary objectives for the 10-year period 2017–2027:

- Sweden shall be an internationally attractive country for investments in research and development. Public and private investments in research and development should continue to exceed EU goals.
- Research quality shall be reinforced overall and gender equality shall increase.
- Engagement and societal impact shall increase.

In order to promote high quality and strengthen Sweden's ability to compete and transform, the framework conditions for research and innovation (R&I) must constantly be developed in order to enable actors to conduct excellent research, to encourage collaboration between different types of stakeholders and to promote participation in national and international partnerships. The EU

Framework Programme for Research and Innovation, known in its current iteration as Horizon 2020, is extremely important for Swedish actors in terms of access to knowledge, leading networks and collaborations, and funding, which is why strategic Swedish participation should be encouraged.

Ensuring that research is conducted in line with ethical principles and best practice is fundamental for society's trust in research and its belief in the capacity of research to advance the development and wellbeing of society. Clear rules and a shared understanding among all the actors regarding the principles that govern R&I are therefore necessary.

Key actions

- Increased funding for higher education institutions (HEIs) over the period 2017–2020.
- A commission of inquiry appointed by the Government to conduct a general review of HEI governance, including allocation of resources. The committee reported its findings in February 2019.
- A new government agency for the ethical review of human research to replace the six regional Ethical Review Boards and create a more consistent application of the regulations (from 1 January 2019).
- New regulations for dealing with research fraud, where suspicions can be reported to an official board that will investigate the cases (target date 1 January 2020).
- Tighter regulations for the ethical review of human research, including tougher sanctions and clarification of supervisory responsibility (target date 1 January 2020).
- National initiative to promote Swedish participation in the framework programme Horizon 2020 through the National Contact Points (NCPs), which are mandated to provide correct and relevant information about the opportunities offered by the programme.
- Greater participation in R&I partnerships through continued collaboration between the research funding agencies through the joint coordination body EU-Sam, with the secretariat at Sweden's innovation agency, Vinnova.
- Stimulation of cooperation and collaboration between different sectors and actors, in order to connect research with innovation and business, for example through initiatives such as improving the landscape for

testbeds in Sweden via the provision of test and demo environments, plus investments in industrial research institutes and strategic areas of innovation.

- In 2017, the Swedish Research Council and the Swedish Higher Education Authority were jointly tasked with developing the monitoring of Swedish research. This entails developing performance indicators based on the objectives expressed in the research policy. The Swedish Research Council reported back to the Government Offices (Ministry of Education and Research) in April 2018. The Government Offices will prepare a proposal in order that the Government will be able to present new performance indicators in the Budget Bill for 2020.
- Focus on improvements in the quality of research. Since July 2017, the Swedish Higher Education Authority has been tasked with quality assuring the research activities of higher education institutions. A more cohesive system for quality assurance that includes the HEI's entire operation is considered helpful in strengthening the link between research and education.

Priority 2A: Jointly meet societal challenges

Background and strategy

Allowing researchers to freely design research projects is considered to strengthen the quality and breadth of research, and often forms the basis for scientific breakthroughs. Strictly enforcing this approach may, however, counter attempts at the thematic coordination of research, for example in order to jointly meet societal challenges. The absence of a thematic connection can also make it difficult to participate in international research programmes. Ten-year national research programmes have recently been introduced into the Swedish research system as a new instrument for meeting societal challenges. The aim is to create long-term conditions for research to help with resolving societal challenges, for multidisciplinary and cross-sectoral collaborations, and to strengthen the links between research and education.

With multiple government agencies funding research, each one designed to suit their particular mandate and area of competence, Sweden has a heterogeneous research system. These differences serve their purpose, but they may also create unnecessary obstacles to collaboration between the government agencies and other actors. The national research programmes thus have a strong emphasis on collaboration and coordination.

Sweden is involved in numerous research collaborations within the EU, including all 10 Joint Programming Initiatives, several Article 185 initiatives and ERA-Nets. Participation in a range of partnership programmes can be strategically beneficial for a small country with a relatively well-funded research system. When the number of collaborations outstrips the available resources, however, it is necessary to have tools in place to identify and focus resources on fields of research that are a particular national priority.

The national research programmes are designed to serve as platforms for cooperation with international partners and therefore form a natural interface with partners in priority areas.

Key actions

- A stronger focus on societal challenges is being launched primarily through the 10-year national research programmes in seven areas. The strategic research agendas of the programmes adopt a broad, inclusive

and long-term perspective. The national research programmes serve as platforms for EU and international research collaborations. The programmes are implemented by the Swedish Research Council; the Swedish Research Council for Health, Working Life and Welfare; and the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning, with the participation of other government agencies.

- As a basis for participation in EU research collaborations, the Government Offices intend to develop strategies for scientific, social and political priorities, in cooperation with the public research funders and other relevant actors. The national organisation for communication, supervision, evaluation, data gathering and strategic prioritisation of participation in partnerships and joint programmes is to be developed and formalised. Data and statistics from the public research funders provide the basis for the national work.
- The public research funders will continue with initiatives to increase the dissemination of research results within society, including evidence-based policy work and raising the profile of EU and international partnerships, as well as the research results that originate from these knowledge hubs.
- Continued strong involvement in EU and international research and innovation collaborations through whichever new form of partnership is agreed by the Member States for the next framework programme, Horizon Europe. The Government Offices and the public research funders will participate in setting the priorities and design of the new partnerships.

Priority 2B: Optimise public investment in research infrastructures

Background and strategy

Access to high-quality research infrastructure is a necessity for leading research. In order to ensure that Swedish investments in research infrastructures cover the needs that exist in Swedish research, the Swedish Research Council has set up a separate council for research infrastructure that includes representatives for Swedish researchers and other funding bodies. This council has overall responsibility for funding Swedish and international infrastructures that involve Swedish participation, as well as funding Swedish contributions to international research facilities such as CERN and ESRF, plus Swedish participation in projects prioritised in the roadmaps of the European Strategy Forum on Research Infrastructures (ESFRI). The Swedish Research Council has made sizeable investments in facilities such as the MAX IV synchrotron radiation facility, the Swedish parts of the European Spallation Source (ESS) and SciLifeLab, a joint venture by KTH Royal Institute of Technology, Karolinska Institutet, Stockholm University and Uppsala University. Work at MAX IV is now focused on building and developing instruments for more beamlines. SciLifeLab is a national resource, providing life science research infrastructure while also conducting its own research. Access to registers, databases and biobanks entails a vital resource for Swedish life science research and for researchers in the EU and the international community. The Swedish system of personal identity numbers allows data to be connected across different registers and provides important contributions to medical and social sciences research. The Swedish Research Council has specifically been tasked with promoting the use of register-based data in research. The Register Utiliser Tool (RUT) has been developed within the framework of this task, providing an e-infrastructure that describes the rich metadata content of registers and biobanks.

Sweden is currently involved in 16 infrastructures that have been prioritised by ESFRI. The Swedish Research Council has not prioritised any of the projects that arose from the 2018 roadmap, but Swedish researchers are participating in some of them, with funding from other sources. Two facilities in ESFRI's roadmap are located in Sweden: the European Spallation Source in Lund and the radar facility for Eiscat_3D outside Kiruna. Both facilities are under construction.

Sweden will continue to be actively involved in ESFRI and in its work to draw priorities for its roadmap. New projects in the roadmap must constitute

strategic assets for European research. All projects must show advances in funding, design and participation to qualify for continued inclusion in the roadmap. Evaluations of earlier projects must continue in order to follow their progress. The possibility of broadening the scope for ESFRI to review and take part in existing research infrastructures from before ESFRI existed should be investigated. It should also be possible to fund research infrastructures from the framework programmes and then include both construction and operation.

The Swedish Research Council is actively involved in a work to change to the funding system, whereby the host HEIs are expected to take greater responsibility for funding the infrastructures that they are hosting. Funding from the HEIs shows local support for the facilities and to a greater extent makes them and the research conducted at them part of the HEI's strategic priorities.

In terms of research infrastructures, the Government's Research Bill for the period 2017–2020 contains continued support for ESS, MAX IV and SciLifeLab, plus new investments in biobanks and registers, future research vessels for polar expeditions, the digital research infrastructure SUNET and a separate investment in data-driven research. The purpose of these investments in digital infrastructure is to support the transition to more data-intensive and data-driven research. As more and more fields contend with high amounts of data, supporting digital infrastructure is increasingly needed for data analysis and processing. Although this is an international trend, it is particularly important in Sweden, where several of the research infrastructures that have been built, such as MAX IV and SciLifeLab, require extensive data processing. The investments in registers and biobanks must also be accompanied by access to computing power in order to process their data. Moreover, there is a need to secure technical solutions that give researchers access to sensitive data and opportunities to link up such data from multiple sources. Access to databases, large volumes of data and high processing capacity is also of growing importance in humanistic research, and the Research Bill placed a focus on increasing access to digital data from cultural heritage institutions.

The Research Bill also emphasises the importance of research infrastructure for research and development within companies and in the public sector. The Government continues its drive to increase the use of research infrastructure by companies and the public sector, separately and in research collaborations between HEIs and companies.

Key actions

- Balance between funding research infrastructure and research projects.
- Continue to develop a model for basic funding from host HEIs for construction and operation.
- Support for registers and biobanks, and for greater opportunities to use these in research, including data generated within the health service.
- Prioritise construction and operation of ESS and the expansion of beamlines at MAX IV.
- Continue prioritising greater Swedish use of ESS, MAX IV, SciLifeLab and Eiscat_3D.
- Prioritise the development of synergies between research facilities such as ESS and MAX IV in line with one of the core messages in the Government Communication *En nationell strategi för ESS och den omgivande kunskapsmiljön* (A national strategy for ESS and the surrounding knowledge environment), which was published in 2018.
- The National Library of Sweden received an updated public service agreement in 2018 requiring it to promote the quality of Swedish research and democratic social development by making available source material and an effective research infrastructure. Part of this task involves providing a complete and comprehensive data source for the evaluation of Swedish scientific publications.

Priority 3: An open labour market for researchers

Background and strategy

Good terms, mobility and research exchanges are keys to high-quality research. Successful recruitment and retention of researchers, both nationally and internationally, depends on the HEIs being able to offer everyone – women and men – predictable, attractive and secure terms of employment. Security of employment during doctoral studies makes studying more attractive and improves the conditions for doctoral students to complete their studies within the appointed timeframe. After graduation, clear and attractive career paths are often decisive in encouraging more leading young researchers to continue their career at the university.

Higher education institutions are the largest employers in the state sector. In October 2017, HEI staff accounted for 28 per cent of all state employees. The proportion of university staff with research and teaching duties rose by 27 per cent over the period 2001–2017. Research and teaching staff as a group includes the employment categories of professor, senior lecturer, lecturer, associate senior lecturer (and the former position of research associate), postdoctoral researcher and other research and teaching staff. The percentage increase was greatest for the career-development positions. The number of doctoral students has varied over the past ten years or so. The proportion of doctoral students with a doctoral studentship rose steadily from 38 per cent in 2008 to 68 per cent in 2017, as a result of the Government's ambition to improve social conditions for doctoral students.

The Government has taken a number of measures to encourage attractive terms for doctoral students and young researchers. In the Higher Education Ordinance, the Government has introduced the position of associate senior lecturer, which lasts four to six years and gives the researcher the option of permanent employment following successful assessment. This form of employment was introduced in January 2018, as part of a drive to create a clearer career path and to increase the proportion of postgraduate researchers who are employed on this basis. It is also important to increase national and international mobility among teachers and researchers at higher education institutions, and that mobility is considered a useful qualification for higher positions. Open and transparent advertisement of university posts is crucial for this. The primary funding form for doctoral students should be paid employment, which entitles the students to the same social security benefits as any other job. The Government has also introduced a raft of measures to

improve the position of doctoral students who still have grants as their primary form of income.

It is important for higher education institutions to work with the local community in order to help with society's challenges, development and wellbeing, not to mention sustainable growth, competitiveness and employment opportunities. Under the Higher Education Act, higher education institutions are required to promote the use of research findings. One means of achieving these objectives is increased mobility between academia and wider society.

The measures drawn up by the Government will continue to be implemented and make inroads at higher education institutions over the coming years, with the work of the HEIs playing a crucial role in their success. Based on the conditions set by the Riksdag (Swedish Parliament) and the Government, higher education institutions need to accept greater responsibility for carefully constructed career systems and better terms for young researchers.

Key actions

Sweden needs to attract and retain leading young researchers from Sweden and other countries. The Government is pushing for attractive terms for young researchers and greater gender equality at higher education institutions. This will be achieved as follows:

- Doctoral students are to be offered good and equitable terms. The rules for postgraduate programmes have been clarified in order to establish secure terms during the period of study.
- The use of grants for doctoral students is to be reduced. Under the clarified rules for postgraduate programmes, the primary funding form for doctoral students should be paid employment.
- Higher education institutions are recommended to develop and create a clear and open national career system with a sufficient number of positions for young researchers and teachers.
- More researchers are to be employed as associate senior lecturers, a position that entitles them to assessment for a permanent position. The rules for associate senior lecturers have been clarified in order to create a clear career path.

- Open and transparent recruitment processes must be applied to all forms of employment, and to postgraduate programmes.
- Mobility should be highly valued in recruitment and the assessment of qualifications.
- The Swedish Higher Education Authority has been tasked with monitoring the reforms.
- The Association of Swedish Higher Education (SUHF) has declared its commitment to the European Charter and Code of Conduct for Recruitment of Researchers. Several Swedish higher education institutions are working systematically on implementation with the help of the European Commission's tool HRS4R (Human Resources Strategy for Researchers). As part of this process, most Swedish HEIs have registered with the EURAXESS portal for the recruitment of researchers.

Priority 4: Gender equality and gender mainstreaming in research and innovation

Background and strategy

The objective of Sweden's gender equality policy is for women and men to have the same power to shape society and their own lives. On this basis the Government is working towards six subsidiary objectives:

- Gender equal division of power and influence. Women and men are to have the same rights and opportunities to be active citizens and to shape the conditions for decision-making.
- Economic gender equality. Women and men must have the same opportunities and conditions as regards paid work that gives economic independence throughout life.
- Gender equal education. Women and men, girls and boys must have the same opportunities and conditions with regard to education, study options and personal development.
- Gender equal distribution of unpaid housework and provision of care. Women and men must have the same responsibility for housework and have the opportunity to give and receive care on equal terms.
- Gender equal health. Women and men, girls and boys must have the same conditions for good health and be offered care on equal terms.
- Men's violence against women must stop. Women and men, girls and boys must have the same right and access to physical integrity.

One of the subsidiary objectives set out in the research policy for the ten-year period 2017–2027 is for a general improvement in the quality of research and in gender equality.

Gender mainstreaming is a core strategy that is used to achieve the policy objectives for gender equality. Under this strategy, a gender equality perspective is to be included in all policies that affect people's lives, so that all women and men, girls and boys can live on equal terms. Since gender equality is established at the point where decisions are made, resources allocated and norms created, the gender equality perspective must be incorporated into everyday work. The strategy has taken shape as a means of combating the tendency for gender equality issues to be ignored or sidelined by other political issues and activities.

A specific authority, the Swedish Gender Equality Agency, was set up in 2018 to assist with the effective implementation of the gender equality policy.

According to the Higher Education Act, gender equality must always be observed and promoted in the activities of higher education institutions.

Key actions

- Since 2005, the proportion of women in professorships has risen by just short of one percentage point per year, reaching 28 per cent in 2017. In 1997, the Riksdag required targets for gender distribution to be put in place for newly recruited professors at higher education institutions. In the 2016 Research Bill, the Government introduced a new national target that 50 per cent of newly recruited professors should be women by the year 2030. For the current target period of 2017–2019, the recruitment targets were raised by an average of nine percentage points per HEI. In its public service agreement, the Swedish Higher Education Authority is required to monitor and evaluate the outcome of the HEIs' recruitment targets for professors over the period 2017–2019.
- The Government's development programme Gender Mainstreaming in Government Agencies (also known by the abbreviation JiM, from its Swedish title *Jämställdhetsintegrering i myndigheter*) aimed to reinforce the work of the various government agencies on gender mainstreaming. The Swedish Research Council for Health, Working Life and Welfare; the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning; the Swedish Council for Higher Education; the Swedish Higher Education Authority; Vinnova and the Swedish Research Council were involved in the programme, which ran from 2014–2018. Gender mainstreaming is now incorporated into the public service agreements for these government agencies, which sees the programme transition into an integral part of regular operations from 2019.
- HEIs are subject to an equivalent requirement to work on gender mainstreaming, in order to help achieve the gender equality policy objectives, for example with regard to equal opportunities for career paths, gender-based study choices and student completion. Since 2018, the HEIs have also been required to include in their annual reports a statement on how they observe gender equality in the allocation of research funding.

- Since 2018, the public service agreements for the Swedish Research Council; the Swedish Research Council for Health, Working Life and Welfare; the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning; Vinnova; the Swedish Energy Agency and the Swedish National Space Agency have stated that they must work to ensure inclusion of a gender perspective in any research being funded, where applicable. The Swedish Research Council has also begun developing methods for promoting gender equality work based on this requirement.
- The Swedish Research Council publishes recurring reports containing equality observations, where independent observers' notes on discussions, expressions of prejudice or power and lack of equal treatment during the processing of research applications are taken as the basis for future work. The most recent report was published in 2017.
- In 2018, the Swedish Council for Higher Education was commissioned by the Government to compile an overall picture of the HEIs' work to prevent sexual harassment and their procedures once they are made aware of suspected sexual harassment cases.

Priority 5: Open Science

Background and strategy

At its heart, Open Science is a question of democracy, enabling the whole of society to access, use and participate in the research resulting from public funding. The aim is to improve the quality, impact and innovativeness of the research by ensuring that more elements of the research process is made open for collaboration with wider society at as early a stage as possible. The elements in question include open research data, openly accessible publications, open source code, evaluation methods that take account of social benefit, open educational resources and citizen science. A precondition for an Open Science system is open access to scientific publications and research data. According to the European Commission, all scientific publications that are the result of publicly funded research must be published in an open access form from 2020 at the latest.

Sweden's 2016 Research Bill set a goal that open access to scientific publications, research data and works of art should be fully implemented by 2026. The switch to open access was expected to begin immediately for publications, with research data and works of art being allowed to take more time. Currently, most research funders in Sweden require that publications resulting from research that they fund must be published with open access. The Government has tasked the National Library of Sweden with coordinating the work of introducing principles to promote open access to scientific publications. The focus of this work includes sustainable funding models for the open publication of scientific papers, a matter that is also being debated by research funders, prompted by the Plan S initiative. Supported by a European consortium of research funders, Plan S aims to accelerate open access to scientific papers.

The Government has expressed a desire to improve the business community's access to our major research infrastructures (MAX IV, SciLifeLab, ESS); a requirement for higher education institutions to be open with society and encourage good dialogue on research needs, research and research results, for example demand-driven (practical) research; and a belief that a successful innovation system comprises several different types of actors, whose talents combine to develop and commercialise or in some other way derive benefits from new goods, services and processes. There is a trend in Sweden towards placing a greater focus on data as a strategic resource. Societal challenges, coupled with the opportunities of new digital technology, require a more

collaborative research system when it comes to research data. Whoever is able to process research data effectively will have the upper hand in the modern knowledge economy.

The EU has an initiative to create a virtual environment with open services for storage, processing, analysis and re-use of research data, called the European Open Science Cloud (EOSC). Through the EOSC, research data will be coordinated to make sure it meets the FAIR principles: Findable, Accessible, Interoperable and Re-usable. In 2017, the Government therefore instructed the Swedish Research Council and the National Library of Sweden to develop criteria for assessing the extent to which scientific publications and research data, fully or partially produced using public funds, meet the FAIR principles (see below). The developed criteria must also enable an assessment of whether scientific publications meet the national objective of being openly accessible immediately upon publication.

In its 2016 Research Bill, the Government announced that it would return to decisions on national guidelines for open access to research results. The Government has assigned the Swedish Research Council and the National Library of Sweden multiple tasks concerning open access to research results. Taken as a whole, these tasks provide a clear picture of the Government's direction of travel concerning Open Science. The national approach is that the products of research must meet the FAIR principles as far as possible, that scientific publications arising from publicly funded research should be openly accessible immediately on publication from 2020 at the latest, and that the cost of scientific publication must be transparent.

Key actions

- The Government has tasked the National Library of Sweden with coordinating the work of introducing principles to promote open access to scientific publications. Progress on this work is presented on an ongoing basis in the library's annual report. The Government has instructed the Swedish Research Council to coordinate national work on introducing open access to research data. Progress on this work is presented on an ongoing basis in the council's annual report.
- The National Library of Sweden has been commissioned by the Government to summarise the total cost of scientific publication for HEIs, taking particular account of subscription costs, publication fees and administrative charges. This task is to be reported in the 2018 annual report.

- The Government has instructed the Swedish Research Council to develop criteria for assessing the extent to which research data, fully or partially produced using public funds, meets the FAIR principles. The council reported on this task in December 2018.
- The Government has instructed the National Library of Sweden to develop criteria for assessing the extent to which scientific publications, fully or partially produced using public funds, meet the FAIR principles. The criteria must enable an assessment of whether scientific publications meet the national objective of being openly accessible immediately upon publication. Based on the developed assessment criteria, the National Library of Sweden is also required to suggest a method for presenting an overall picture of the extent to which scientific publications and research data meet the FAIR principles. A report on this work will be presented in spring 2019.
- The National Library of Sweden now has the task of providing a full and comprehensive data source for the evaluation of Swedish scientific publications and of reporting on this work on an ongoing basis in its annual report.

Priority 6: International cooperation

Background and strategy

Research, innovation and development are, by their very nature, international activities. Addressing the societal challenges of our age requires international cooperation, and Swedish higher education institutions, research institutes, businesses and other conductors of research should have the best possible conditions to operate internationally. Sweden therefore works actively to increase the internationalisation of Swedish research and innovation. These issues are dealt with in the Research Bill. The Government has taken a range of measures to promote international cooperation, including (1) setting up an international coordination body for research funding, (2) developing an export strategy and working further on bilateral cooperation agreements, and (3) appointing a commission of inquiry to examine how internationalisation can be increased at Swedish higher education institutions.

In order to give Swedish higher education institutions, research institutes, businesses and other conductors of research and innovators the best possible conditions to operate internationally, and to ensure that Sweden as a knowledge nation remains a powerful presence in the global arena, there is a need to bring together the international efforts of research funders, strengthen them and make them more efficient. The Government has therefore instructed the innovation agency Vinnova to work with other research funders on setting up a national coordination body (Intsam) for the funding and coordination of international research and innovation collaborations outside the EU. The agencies involved in Intsam are: the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning; the Swedish Research Council for Health, Working Life and Welfare; the Swedish Energy Agency; the Swedish Research Council and Vinnova (which is responsible for its secretariat). The purpose of the coordination body is to bring together the international efforts of research funders, strengthen them and make them more efficient, thereby helping to boost the status of Sweden and Swedish research and innovation on the international stage. Synergies with activities at EU level, the Government's research agreements with other countries and the Government's export strategy may be exploited. The Government allocated an initial SEK 15 million to support Intsam, and intends to provide funding of SEK 25 million per year thereafter.

The Government has also decided on an export strategy that includes initiatives to boost the export and internationalisation opportunities of Swedish

companies in key markets, and to increase the number of exporting companies. A specific focus has been placed on boosting the export and internationalisation opportunities of small and medium-sized enterprises. The objectives of the strategy are to increase 1) exports, in absolute terms and as a proportion of GDP, 2) Sweden's attractiveness to investors, talent and tourists, 3) the proportion of exporting companies, and 4) participation by Swedish companies in the global economy.

Sweden has bilateral cooperation agreements with a number of countries outside the EU in the field of research and innovation. These include the USA, China, Japan, India, South Korea, Canada, South Africa, Brazil, Mexico, Singapore, Indonesia and Argentina. Sweden also has research and innovation offices in the USA, China, Japan, South Korea, India and Brazil. In addition, Sweden is a member of over 30 international research infrastructures. As a result of Sweden's strength and attractiveness as a nation of innovators, innovation partnerships were secured with Germany, France and India in 2017 and 2018. Brazil was already established as a strategic partner on innovation before that time. In February 2017, with a view to increasing the internationalisation of HEIs, the Government appointed a commission of inquiry to propose a national strategy for internationalisation that includes both higher education and research, and to propose measures to improve Sweden's attractiveness as a knowledge nation. The commission presented its proposals in October 2018, and these are now subject to consultation, before the Government decides on any future initiatives and measures.

Key actions

- A coordination body, Intsam, has been set up for research funders with a view to promoting synergies and critical mass in strategic international research and innovation collaborations.
- The Swedish export strategy is in an implementation phase that includes international research and innovation collaborations relating to societal challenges and the future export of solutions.
- In 2019, the Government Offices will prepare a proposal based on the official report from the commission of inquiry on increased internationalisation of higher education institutions.
- In its 2016 Research Bill, the Government judged that the opportunities for state-run higher education institutions to take part in international collaborations should be overhauled. Work is therefore under way to provide greater clarity on certain regulations, for example.

- Operations at Sweden's six innovation and research offices in Beijing, Tokyo, Seoul, Brasilia, Delhi and Washington are being further developed, with a view to more clearly fostering Sweden's status as a leading knowledge nation and its capacity for international collaborations. The offices will conduct long-term, strategic promotion of research, innovation and higher education, and help to strengthen global ties to international environments that are important to Sweden. As part of this work, the offices will also collaborate locally in European networks to boost the international dimension of the ERA in each country.