

Italy's Roadmap towards the European Research Area

Objectives, indicators and targets



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1. EXECUTIVE SUMMARY

Over the past decades, Europe has been facing increasing difficulties to keep pace with both traditional and emerging competitors in the domains of research and innovation.

To cope with this challenge, the only credible strategy seems to be the implementation of a genuinely European single 'market', where researchers and innovators - and their data, results and products - can circulate freely.

However, such a strong and competitive European Research Area (ERA) can only exist if it is based on **effective, responsible, accountable and open National research systems**, which are able:

- to jointly programme their strategic research agendas;
- to recruit their human resources according to gender un-biased, open, transparent and merit-based procedures;
- to make their research data and results freely and widely available;
- to co-operate with third countries to respond to common challenges.

Therefore, the European Commission and the Council of the EU invited Member States to develop their **National Roadmaps** towards the full implementation of the ERA.

Italy's National ERA Roadmap (ERA Roadmap italiana - ERI) identifies **6 Priority Areas**, and for each of them a limited number of objectives, top priority actions, indicators and targets.

In full coherence with the National Government Agenda, **human resources for research** represent the first and main axis of the Roadmap, with 3 Priority Areas and several objectives of the ERI being related to this axis, namely:

- to increase public and private investments in human resources for research;
- to adopt core principles of international peer review for allocating funds and incentives;
- to widen adoption and application of the principles for an innovative doctoral training;
- to implement open, transparent and merit based recruitment and career progression procedures;
- to overcome gender imbalance in research careers.

A second axis of the ERI relates to **streamlining national 'instruments'** among themselves and with the European instruments. The relevant objectives are:

- to establish an inter-ministerial governance for research on global challenges;
- to coordinate national participation in the Joint Programming Initiatives (JPI);
- to optimise public investments in research infrastructures;
- to simplify and harmonise national funding instruments and procedures, promoting interoperability at trans-national level.

In the wake of the recognised need for an **open science and an open innovation** framework, two ERI objectives relate to this issue, namely:

- to facilitate dissemination, uptake and exploitation of scientific results;
- to promote the role of the National Technology Clusters as catalysts of public-private partnerships in research.

Finally, in the domain of **international cooperation**, the Roadmap focuses on the Mediterranean Area, identifying 3 priority objectives:

- to complete the process toward the establishment of a *Partnership for Research and Innovation in the Mediterranean Area* (PRIMA), under article 185 of TFEU;
- to strengthen the network of research and innovation in the marine and maritime sectors in the Mediterranean (BLUEMED);
- to support the process leading to a joint research programming initiative (JPI) on issues related to migrants and migration, with a special emphasis on integration.

2. INTRODUCTION

The objective of achieving a European research area (ERA) is set out in article 179 of the Treaty on the Functioning of the European Union. Following the Competitiveness Council conclusions of 21 February 2014¹, the ERA Committee (ERAC), jointly with ERA-related groups, developed the *ERA Roadmap* with the purpose of accelerating and measuring progress towards fully achieving the European research area.

The ERA Roadmap was drawn up in full recognition that National research and innovation systems in the 28 EU Member States have different characteristics; this variety, rather than being a constraint, can become an asset in terms of promoting mutual learning and creating synergies to help advance the ERA.

Accordingly, the approach adopted at EU level was to focus the attention of all Member States on a limited number of key priorities which are expected to have a particularly strong impact, in a reasonable time; at the same time, Member States have full autonomy in identifying the key actions they intend to adopt at national level to implement each priority, including specific national priority actions and related indicators and targets, in addition to or different from those proposed at EU level.

The European Research Area Roadmap² sets out six priorities, notably:

1. More effective national research systems;
2. Optimal transnational cooperation and competition;
3. An open labour market for researchers;
4. Gender equality and gender mainstreaming in research;
5. Optimal circulation and transfer of scientific knowledge;
6. International cooperation.

In order to implement the above priorities, Italy launched a consultation exercise leading to this **National ERA Roadmap** (*ERA Roadmap italiana* - ERI) towards a European Research Area, which clearly identifies:

- i. objectives;
- ii. actions;
- iii. indicators;
- iv. targets.

¹ "Council conclusions on the progress report from the Commission on European Research Area (ERA) 2013" - http://era.gv.at/object/document/1198/attach/ST06945_EN14.PDF

² "ERAC Opinion on the European Research Area Roadmap 2015-2020" - <http://data.consilium.europa.eu/doc/document/ST-1208-2015-INIT/en/pdf>

3. A NATIONAL ROADMAP TOWARDS THE FULL IMPLEMENTATION OF THE EUROPEAN RESEARCH AREA

3.1. THE APPROACH ADOPTED

Whilst acknowledging the full autonomy of Member States in identifying the approaches most suited to the structures and dynamics of their national research and innovation systems, the ERA Roadmap 2015-2020 proposes specific actions, for each priority, which are likely to have a profound impact in accelerating the achievement of the European Research Area. An indicator³ is set for each priority and each action, in order to monitor progress towards implementing each key objective.

In the light of this, the Italian Ministry for Education, University and Research (MIUR) took on the task of drawing up a National ERA Roadmap (ERI). Building on the priorities set at EU level, the ERI develops an approach **based on the distinctive characteristics of the Italian national research and innovation system**, specifically drawing attention to the areas requiring targeted actions, so as to ensure that the contribution of Italy to the implementation of the ERA is in keeping with the role played by our country in the historical development of the European Union.

The process towards the development of Italy's National Roadmap, conducted by MIUR, was developed in full consultation with the main stakeholders from the National research and innovation system, notably RPOs and the private sector.

The process towards the development of a National Roadmap (ERI) was launched on 14 July 2015 with a meeting convened by the Department for Higher Education and Research (MIUR) to illustrate the key steps which are summarised in Fig. 1.



Fig. 1. The process towards the development of Italy's National ERA Roadmap (ERI)

³“ERAC Opinion on the ERA Roadmap - Core high level indicators for monitoring progress” - <http://data.consilium.europa.eu/doc/document/ST-1213-2015-INIT/en/pdf>.

The key stakeholders in the national research and innovation system (listed below) were invited to provide their feedback via questionnaire, in view of:

- *Identifying a limited number of **priority areas** (and related objectives) for Italy's research and innovation system, in line with priorities set out at EU level;*
- *Defining related **actions** to be implemented;*
- *Developing suitable **indicators** to measure progress towards shared objectives;*
- *Defining **targets** to be met for each indicator.*

The 42 responses received by the set deadline (30 September 2015) were analysed and developed in the following two months, in the light of the Government's policy objectives and, more specifically, of priorities set out in the National Research Plan 2015-20.

A draft conclusion was presented to stakeholders in a meeting held at MIUR on 9 February 2016 to convey results. The outcome of this process is summarised in the following pages, with individual fact sheets for each priority area.

LIST OF STAKEHOLDERS INVITED TO TAKE PART IN THE PUBLIC CONSULTATION ON THE IMPLEMENTATION OF THE ERA ROADMAP

National Agency for the Evaluation of the University System and Research – ANVUR
Italian National Agency for New Technologies - ENEA
Italian Space Agency – ASI
Conference of Italian University Rectors – CRUI
Confindustria (Association representing manufacturing and service companies)
National Research Council – CNR
Agricultural Research Council – CREA
Area Science Park
Institute of Services for the Agricultural Market – ISMEA
Italian Institute of German Studies
National Institute of Advanced Mathematics “F. Severi” – INDAM
National Institute for Astrophysics – INAF
National Institute for Nuclear Physics – INFN
National Institute of Geophysics and Volcanology – INGV
National Institute of Oceanography and Experimental Geophysics - OGS
National Institute of Metrological Research – INRIM
National Institute of Statistics – ISTAT
National Institute of Health – ISS
Enrico Fermi Centre
Zoological station Anton Dohrn – SZN

3.2. PRIORITY AREAS OF THE NATIONAL ERA ROADMAP (SPECIFIC OBJECTIVES, ACTIONS, INDICATORS AND TARGETS)

PRIORITY AREA 1 – A MORE EFFECTIVE NATIONAL RESEARCH AND INNOVATION SYSTEM

The effectiveness of a national research system (and its implications on the innovation potential of a country) depends, first and foremost, on the quality of its human resources. However, the quantitative aspect - i.e. the extent of the pool of researchers in a country and the density of R&D human resources in relation to the size of the population – cannot be ignored.

In the Italian research and innovation system, these two aspects take on distinctive features which make the Italian situation *unique* in the European landscape.

While the quality of Italian researchers, including young researchers, is confirmed by their excellent results in European funding programmes fostering excellence in research⁴, the situation as regards the quantitative aspect is quite different. The most recent official statistics (EUROSTAT 2013⁵) show that the number of Italian researchers in full-time equivalents (FTE) is a mere 118 000, less than half of those recorded in France (265 000) and in the UK (259 000), and less than a third of those employed in Germany (360 000).

The comparatively low number of researchers in Italy regards both the private sector - with 48 000 researchers compared to 203 000, 160 000 and 94 000 in Germany, France and the UK respectively - and the public sector with 66 000 researchers employed in Italy compared to 157 000, 102 000 and 161 000 in the same countries quoted above, respectively.

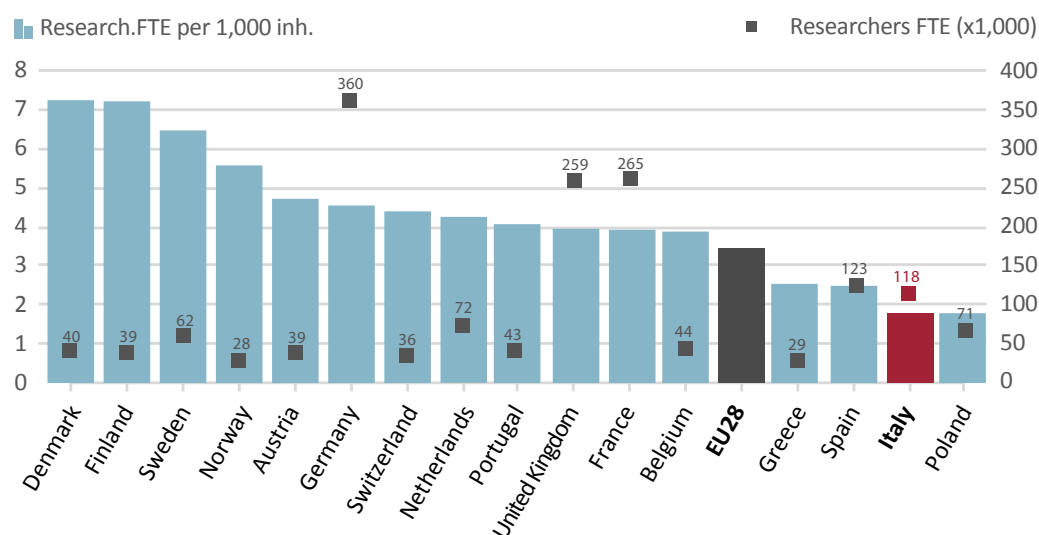


Fig. 2. Number and density of Researchers as full-time equivalents in relation to the size of the population.

⁴ Our country, with 288 ERC (*European Research Council*) starting grants awarded to Italian researchers in the period between 2007-2015, ranks only behind Germany (513) and France (336), and before the United Kingdom (267).

⁵ [http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Researchers_in_full-time_equivalents_\(FTE\),_by_sector,_2013_\(%C2%B9\)_YB15.png](http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Researchers_in_full-time_equivalents_(FTE),_by_sector,_2013_(%C2%B9)_YB15.png)

Another commonly used parameter resulting from the previous one is the density of researchers in relation to the population: Italy has 1.9 researchers (FTE) per 1,000 inhabitants, i.e. **less than half** the value recorded in Germany (4.4), United Kingdom (4.2) and France (4.1).

As a result, the OECD '*Science, Technology and Innovation Country Profile*' (2014)⁶ identifies the main weaknesses in Italy as being:

1. *Low R&D expenditure to GDP ratio*⁷ [see graph below];
2. *Low share of researchers, especially in the private sector*⁸;
3. *Low capacity to attract international students, researchers and private investments in R&D*⁹.

Therefore, public investment in research and higher education is key to the success of national policies in this area, along with the need to cut red tape and other redundant bureaucratic procedures which may hinder the efficiency of our national research system.

Key areas for improvement include: poor coordination between Public Administrations involved in programming and implementing objectives, funds and incentives; lack of continuity, uncertainty, unpredictability in the short to medium term and, in some cases, overlapping of implemented actions.

Consequently, improving effectiveness requires primarily **increasing public investments in human resources** in order to widen the research and innovation 'productive base', while maintaining or possibly enhancing quality, although in this respect Italy is already aligned with major European and non-European competitors.

In the private sector, **programmes incentivising employment of researchers**, such as the one currently underway¹⁰, **should benefit from greater certainty and continuity**, while possibly extending their scope.

⁶ OECD (2014), OECD Science, Technology and Industry Outlook 2014, OECD Publishing, Paris.

⁷ In 2012 R&D spending was 20.5 billion euro (+1.9% compared to 2011), that is 1.26% of GDP, which is far from the Italian target of 1.53% and from the EU target of 3% by 2020. Business R&D expenditure is particularly low with investments at 0.68% of GDP, compared to the EU average of 1.27%.

⁸ In 2013 the number of researchers in Italy (in full time equivalents) was 118 000, i.e. 5.2 researchers per thousand labour force (with a 6% percentage point increase compared to 2012) compared to the European average (EU28) of 8.0 researchers per thousand labour force. Almost 60% of researchers are employed in the public sector, while only 37% works in the private sector. With its comparatively low number of PhDs (14.4% of the population) Italy lags well behind the European average (EU28 25.4%) and the OECD average.

⁹ Italy hosts only 2.3% of foreign PHD students who decide to study abroad; 24.2% of Italy's R&D expenditure from the private sector comes for foreign multinationals, with a significant decrease in the last 5 years (-3.8% from 2007 to 2012); an ad-hoc study by ISTAT (*National Institute of Statistics*) conducted on 18,000 PHDs students from Italian universities, who graduated between 2004 and 2006, showed that 1,300 PHD graduates (7%) worked abroad between 2009 and 2010. This percentage increases to 10% when taking into consideration only PHDs employed in research activities.

¹⁰ Recent changes in legislation (art. 24 - Law Decree no. 83/2012) have led to the gradual adoption of a specific tax credit scheme for investments in research development activities, open to all businesses, regardless of their juridical nature or core sector: eligible costs include costs incurred when hiring young PHD graduates or PHD students (art. 3 Legislative Decree n. 145/2013 and subsequent amendments).

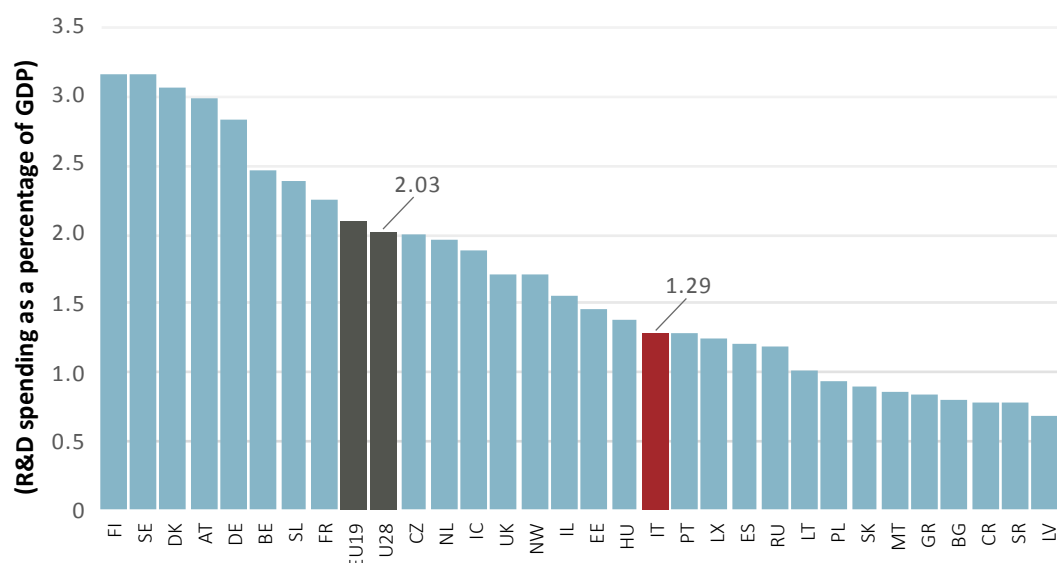


Fig. 3. R&D spending as a percentage of GDP

Defining a **national Model Grant Agreement** for beneficiaries of research funding, similar to the one used in the European Framework Programme¹¹, would be a useful tool to overcome these weaknesses and improve interoperability between Italy and other EU Member States. Naturally, increased resources go hand in hand with increased accountability of the research system, therefore, performance will have to continue to be measured on the basis of criteria aligned to the best international practices.

The following fact sheet summarises the above points.

Specific objective 1a

Increase public investments in human resources for research	
action	Launch a recruitment programme in the medium-term, in order to align Italy with other European countries of similar size and traditions
indicator	The gap between the EU average density of researchers (EU ₂₈) in the public sector per 1 000 inhabitants (currently at 1.7) and the density of researchers in Italy in the same sector (currently 1.1)
target	Close the gap (currently 0.6 researchers/1 000 inhabitants) within the next 10 years

¹¹ H2020 General MGA - http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf

Specific objective 1b

Support private investments in human resources for research	
action	Launch of a 10-year incentive programme in the private sector building on the programme currently underway while strengthening the impact of policy measures focusing on human resources, by expanding tax credit and social security schemes for companies recruiting research staff, especially doctoral degree holders
indicator	The gap between average density of researchers in the EU (EU ₂₈) <u>in the private sector</u> per 1 000 inhabitants (currently at 1.6) and the density of researcher in Italy in the same sector (currently at 0.8)
target	Close the gap (currently 0.8 researchers/1 000 inhabitants) within the next 10 years

Specific objective 1c

Implement on a wider scale international peer review procedures to allocate funds and incentives	
action	Adoption of peer review procedures open to international experts as the only method for allocating the competitive portion of R&D funding to Public Research Organisations or tax credits to the private sector
indicator	Share of public funding or tax credit schemes applying peer review procedures with the involvement of international experts
target	80% of public funding or tax credit schemes to apply peer review procedures open to international experts by 2020 (for instance, in 2015 only 2 out of 6 MIUR Programmes based on competitive calls appointed peer commissions with international experts)

Specific objective 1d

Harmonise rules and procedures for participating in research funding calls and promote interoperability between Italy and other EU Member States	
action	Defining a national 'standard' Model Grant Agreement (MGA) for beneficiaries of research funding
indicator	Adoption of a national MGA
target	Adoption of a national MGA by 1 September 2017 (currently, there is no single grant agreement model for beneficiaries of research funding)

PRIORITY AREA 2 – ALIGNING NATIONAL AND EUROPEAN PROGRAMMES

Italy is involved in all ten *Joint Programming Initiatives* – JPIs (see list below), however, five years into the launch, persistent weaknesses are slowing down progress in this area. These include the lack of mutually shared evaluation procedures, common rules and terminology in implementing research and innovation programmes. Against this background, pro-active and regular participation in European negotiations is key to ensuring the effectiveness of our national effort in all the phases of joint programming, and, more generally, in all research work programmes by the European Commission.

The process of aligning national programmes to the EU level must be supported, and possibly preceded, by a similar process to reduce fragmentation within the national regulatory and funding systems. Establishing strong links between central and regional governments - as well as among all Ministries involved, with different levels of engagement, in **national, transnational and international research programmes and activities** - is essential in order to advance national priorities and capacities in EU negotiations and speak with a collective voice, rather than through a single although significant “fraction”. At the same time, closer coordination within the national scientific community should also be supported through initiatives aimed at forging links, such as *Joint Research Units*, envisaging the setting up of stable workgroups to implement programmes in a specific research field.

Defining a *governance framework* to coordinate Italy’s participation in Joint Programming (JP) activities and, more generally, in European negotiations would mark a significant step forward.

The 10 Joint Programming Initiatives (JPI)

JPI-CH	Cultural Heritage and Global Change: A New Challenge for Europe
JPI-FACCE	Agriculture, Food Security, and Climate Change
JPI-HDHL	A Healthy Diet for a Healthy Life
JPI-MYBL	More Years, Better Lives: The Potential and Challenges of Demographic Change
JPI-UE	Urban Europe - Global urban challenges, joint European solutions
JPI-AMR	The Microbial Challenge - An Emerging Threat to Human Health
JPI-OCEAN	JPI Healthy and Productive Seas and Oceans
JPI-WATER	Water challenges for a changing world
JPI-CLIMATE	Connecting Climate Change Knowledge for Europe
JPI-ND	Combating neurodegenerative diseases, in particular Alzheimer's disease

With regards to Research infrastructures (RIs), the *European Strategy Forum for Research Infrastructures*¹² (ESFRI) plays an important role - complementary to that of JPIs - in further supporting the integration of the European research community and increasing its international impact through a focused strategy for RI development policies. The ESFRI provides guidance and coordination mainly through the periodical publication of a Roadmap of Research Infrastructures (RIs), an approach which can be replicated at national level in order to identify (inter)national RIs which are best aligned with the priorities of the national research system.

In order to ensure a timely and efficient implementation of the process described above, it is essential to develop a governance framework to ensure guidance, coordination, monitoring and policy impact assessment, as described in detail in the National Programme for Research Infrastructures (PNIR)¹³, the Italian multiannual strategy for RIs.

In the light of the above, the following specific objectives have been identified in order to drive the process towards strategically aligning national and European priorities.

Specific objective 2a

<i>Set up a joint ministerial governance framework for research on grand societal challenges</i>	
action	Launching a joint ministerial consultation in order to set up a steering board to coordinate national and EU research programmes on Grand Societal Challenges (<i>Tavolo di ricerca sulle Grandi Sfide della Società Contemporanea</i> - TASSC). One of the tasks of the TASSC (see Fig. 4) will be to develop strategies and match funding schemes for shared EU priorities and national specialisations, in view of optimising transnational research and innovation investments on Grand Challenges. The TASSC will be supported by Thematic Focus Groups (<i>Tavoli Tematici</i> - TT) bringing together representatives from authorities responsible for national research activities and programmes, National representatives in JPIs and in the configurations of the Committee for the Specific Programme Implementing Horizon 2020, representatives from National Technology Clusters (<i>Cluster Tecnologici Nazionali</i> - CTN) and relevant Regional Directors. The TASSC, acting as a steering board, will be chaired by the Head of the Department for Higher Education and Research (MIUR), and its members shall include the Head of the Department for Economic Development and Social Cohesion and DGs from relevant Ministries.
indicator	Joint ministerial consultation and setting up of the TASSC and the TTs.
target	First meeting of the TASSC and the TTs by end of second semester 2016 (the TASSC has not been established at this time).

¹² http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri

¹³ To be published



Fig. 4. Horizontal and vertical governance structure - Grand societal challenges

Specific objective 2b

Define a shared governance framework to coordinate Italy's participation in Joint Programming Initiatives (JPIs)	
action	Setting up an Inter- Ministerial Executive Board (<i>Gruppo Operativo Interministeriale</i> – GOI: see Fig. 5) to coordinate Italy's participation in Joint Programming activities (especially JPIs). The Group, led by MIUR, shall include representatives from relevant Ministries and Regions. It shall support and coordinate Italy's participation in JPIs, according to guidelines set out by the TASSC (see Specific objective 2a), and shall provide output to Italian representatives in the JPI scientific and management bodies.
indicator	Setting up and establishment of the Group
target	First GOI meeting by second semester 2016 (the Group has not been established at this time)



Fig. 5. Horizontal and vertical governance structure – Participation in Joint Programming (JP)

Specific objective 2c

Optimise public investments in research infrastructures in order to ensure their sustainability and consistency with the ESFRI Roadmap and with the National Programme for Research Infrastructures (Programma Nazionale per le infrastrutture di ricerca – PNIR)

action	Developing a governance framework for Italy's national approach to Research Infrastructures (RIs) based on the establishment of a National Steering Committee for the PNIR (<i>Comitato Nazionale del PNIR</i> - CNI-PNIR). The CNI-PNIR will be chaired by the Minister of Education, University and Research and shall include representatives from Central and Regional administrations participating in RI fund management. The CNI-PNIR will coordinate an ongoing evaluation and monitoring process of RIs, following the approach and the objectives adopted by the ESFRI Roadmap, with the aim of identifying RIs of major interest to the Italian research community, to which medium to long-term support should be secured.
indicator	Setting up a National Steering Committee for the National Programme for Research Infrastructures (CNI-PNIR)
target	First meeting of the CNI-PNIR by the second semester of 2016 (the CNI-PNIR has not been established at this time)

PRIORITY AREA 3 – ATTRACTIVENESS OF ITALY’S RESEARCH AND INNOVATION SYSTEM

Italy strongly supports the effort towards achieving an open European area in which researchers, knowledge, technology, scientific institutions and market players circulate, compete and cooperate freely.

Making Italy a more attractive location for researchers requires national policies addressing all aspects of researcher careers, including recruitment and career progression in the public sector. Such measures should be included within a broader approach to human resources for research in Italy, currently facing a number of critical issues that need to be addressed by this Roadmap.

The urgent need for action in this area is underscored by a single fact. As mentioned earlier in this paper (see footnote 4, page 6), Italian researchers have a high rate of success in programmes funding excellence in research, notably projects financed by the European Research Council (ERC). However, there is a downside to this successful trend, emphasised in the graph in Fig. 6. The ratio between the number of Italian ERC grant holders affiliated with Italian Host institutions and of those hosted in another country is **a mere 1.2**, by far the lowest ratio among the larger European countries (e.g. 7.4 in the UK and 5.4 in France). The German ratio is the closest to our country (1.9) however, unlike Italy, the outflow of researcher from Germany is counterbalanced by the inflow of foreign researchers.

It is strikingly clear that our national research system has a limited capacity to attract the best Italian and foreign talents. To cope with this issue, MIUR has started to implement measures to reverse this trend¹⁴.

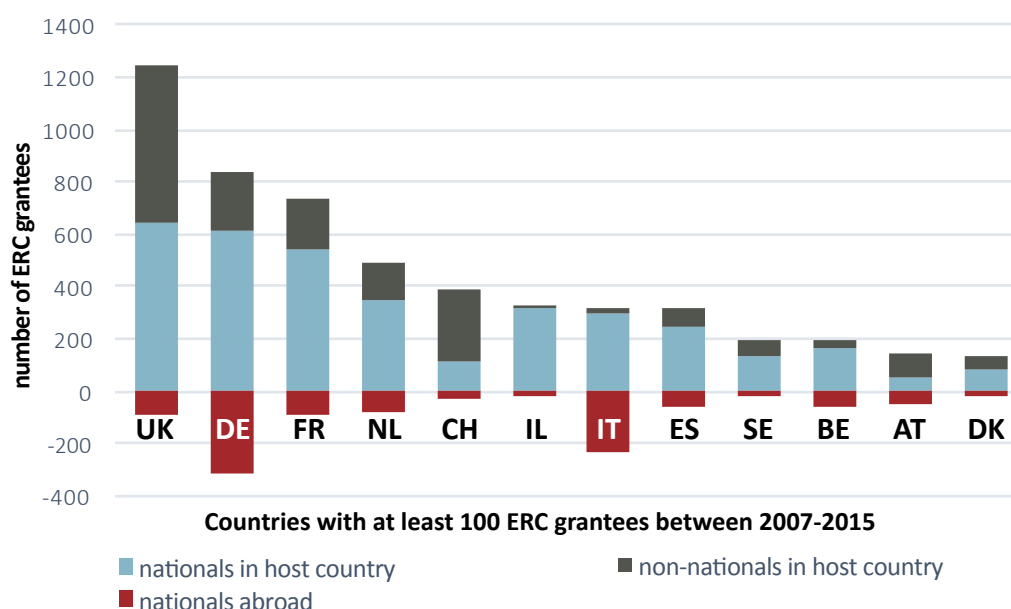


Fig. 6. Mobility of ERC grantees

¹⁴ See, for example, Ministerial Decree 28 December 2015 no. 963 introducing direct recruitment to the positions of full professor (*professore di ruolo di I e di II fascia*) and researcher (*ricercatore a tempo determinato*) for awardees of high-profile research programmes funded by the European Union (UE) or by MIUR – <http://attiministeriali.miur.it/anno-2015/dicembre/dm-28122015.aspx>

Actions outlined in this Roadmap to address this challenge are grouped according to research career profiles.

Actions addressed to R1 First Stage Researcher (up to the achievement of the doctoral degree) focus on developing an innovative doctoral training model, which is able to satisfy both the need for knowledge-oriented research, as well as the demand for highly skilled human resources coming from the most innovative sections of industry, while maintaining the quality of the essential research component.

More generally, researchers should be able to express their potential impact on society at their best by **playing a leading role in transferring knowledge** from the research system to the country as a whole.

A key driver to achieving this goal is **developing doctoral training programmes in collaboration with non-academic sectors** in order to broaden employment opportunities for doctoral degree holders, while improving overall balance between demand and supply for highly skilled human resources through existing albeit poorly exploited tools such as EURAXESS, or by creating new 'dedicated' tools.

With regards to the remaining researcher profiles (R2-recognised researcher, R3-established researcher, R4-leading researcher), proposed actions fall within a joint collaboration effort between national authorities and organizations involved in research activities, envisaging the setting up of funding schemes to encourage and promote **open, transparent and merit-based recruitment and career progression procedures**.

Given this context, special attention needs to be focused on defining contract types, especially permanent contracts, in order to ensure they comply with EU guidelines and legislation.

In order to pursue the above aims, the following specific objectives have been identified:

Specific objective 3a

<i>Implement the principles for innovative doctoral training on a wider scale</i>	
action	Central and local evaluation bodies to monitor implementation of the Principles for Innovative Doctoral Training (PIDT), established at EU level, with the aim of developing international, multidisciplinary profiles appealing to academia and public research, as well as industry and society as a whole.
indicator	Percentage of doctoral programmes consistent with the PIDT
target	PIDT-compliant doctoral programmes >50% by 2020 (baseline is currently being developed).

Specific objective 3b

	<i>Establish guidelines, shared at EU level, to ensure open, transparent and merit based recruitment and career progression procedures consistent with the principles of the European Charter and Code for Researchers and the The Code of Conduct for Recruitment of Researchers¹⁵</i>
action	Following the model set by the H2020 general model grant agreement ¹⁶ , Universities and Public Research Organisations to implement the “Human Resources Strategy for Researchers” (HRS4R) ¹⁷ , and, more specifically, the principles set out in the European Charter for Researchers on open, transparent and merit-based recruitment procedures.
indicator	Percentage of Universities and Public Research Organisations awarded the “HRS4R” logo
target	30% by 2020 (baseline ¹⁸ 10.6%: 9 Research Performing Organisations (RPO, i.e. Universities and Public Research Organisations) out of a total of 85, of which 66 State Universities ¹⁹ and 19 Public Research Organisations, including 12 under MIUR ²⁰ supervision)

¹⁵ The European Charter and Code for Researchers and The Code of Conduct for Recruitment – <http://ec.europa.eu/euraxess/index.cfm/rights/whatIsAResearcher>

¹⁶ Art. 32 of “H2020 General Model Grant Agreement”, Version 2.1, 1 October 2015 – http://ec.europa.eu/research/participants/data/ref/h2020/mga/gga/h2020-mga-gga-multi_en.pdf

¹⁷ The Human Resources Strategy for Researchers (HRS4R) – <http://ec.europa.eu/euraxess/index.cfm/rights/strategy4Researcher>

¹⁸ HRS4R Acknowledged Institutions - <http://ec.europa.eu/euraxess/index.cfm/rights/strategy4ResearcherOrgs#I>

¹⁹ <http://cercauniversita.cineca.it>

²⁰ <http://hubmiur.pubblica.istruzione.it/web/ricerca/enti-di-ricerca/elenco-enti>

PRIORITY AREA 4 – GENDER POLICIES IN RESEARCH

Following recent changes in national and international legislation, attention towards gender issues has increased across the country in general, and in particular in the national research system. However, there is a need for greater integration of existing practices and procedures adopted by public research institutions which can only be achieved in the wider context of national and European policies in favour of the under-represented gender²¹, while preserving the principles of open, transparent and merit-based access to career progression, especially in leadership positions.

Measures to reduce gender imbalances in research institutions and related decision-making bodies need to be accompanied by measures addressing the wider context (such as work-family life balance), if they are to be effective.

Recent legislation has introduced new provisions to promote a culture of gender equality in the public administration sector and to strengthen the principle of equal opportunities in employment, recruitment and career progression²².

Provisions advancing equal opportunities and against any form of discrimination also apply to Public Research Organisations, including Universities. However, existing legislation has not yet found full implementation with regards to leadership positions, both in the administrative and the research sectors.

In the light of the above, the following specific objectives have been identified.

Specific objective 4a

<i>Achieve gender balance in leadership positions of research organisations</i>	
action	Introduce incentives for RPOs providing employment and career advancement opportunities to the under-represented gender .
indicator	Percentage of women in 'grade A' academic positions
target	30% by 2020 (currently 20.1%)

²¹ In this regard, according to the EU Gender Equality index published yearly by the European Institute for Gender Equality, Italy ranks among countries with a percentage of gender equality below EU average, however the presence of women in leadership positions in research is aligned with the EU average, although real equality between men and women in leading positions is still far from being achieved (See *She Figures 2012. Gender in Research and Innovation*, by the European Commission, DG for Research and Innovation). Preliminary results of the 2015 report to be published shortly are available at https://ec.europa.eu/research/swafs/pdf/pub_gender_equality/she_figures_2015-leaflet-web.pdf

²² See Legislative Decree N.165/2001 and in particular articles 2, 5, 7, 35, 57. See also article 14 Law 124/2015 and article 2 Law 240/2010.

Specific objective 4b

	<i>Promote actions to improve work and family life balance</i>
action	Allocate no less than 0.1% of the share of institutional State funding assigned to public research organisations, including Universities, for actions aimed to improve work and family life balance ²³ .
indicator	Percentage of applications for funding by RPOs to implement initiatives fostering work-family balance.
target	30% by 2020 (currently no measures envisaged)

²³ Resources promoting family and work balance could be drawn from funding allocated through the Three-year programming document for RPOs (Ministerial Decree). As an example, Universities may propose the establishment of a nursery or provide a contribution towards paying a pre-school teacher. These measures could be implemented jointly by two or more RPOs.

PRIORITY AREA 5 – OPEN ACCESS AND KNOWLEDGE CIRCULATION

Free circulation and exploitation of scientific results, by the public and private research system and by industry, play an important role in maximizing the impact of public investments in research, while encouraging the development of innovative collaboration models.

A significant step forward in this direction would be establishing a platform (compatible with similar initiatives at EU level²⁴) to provide research information services such as capturing, storing and searching contents, which would make the outputs of publicly funded research projects²⁵ more easily available and accessible.

In order to support technology transfer of research outputs to industry, the following actions have been identified: development of a simplified framework for incentives supporting technology transfer from publicly financed research activities, including those with a transnational scope (notably Research Infrastructures of Pan-european interest and the European Research Infrastructure Consortium -ERIC); measures to support RPOs adopting specific programmes to encourage spinoffs and start-ups launched by recent graduates (2nd level degree and/or doctoral degree holders) wishing to exploit the results reached during their training programme.

A key role in promoting collaborative public-private research is played by the system of National Technology Clusters (CTN - *Cluster Tecnologici Nazionali*) which act as structural drivers for research and innovation, given their correlation with the specialisation fields of applied research.

The CTNs represent a stable link fostering dialogue between Universities, Public Research Organisations and industry, and between the central and local level, according to the smart specialisation strategy, thereby promoting investments, participation and coordination of businesses in the research sector and strengthening public/private partnerships and networking aimed at circulating knowledge and competence.

The following objectives have been identified to achieve the above goals.

²⁴ OpenAIRE: the network of Open Access repositories - <https://www.openaire.eu/>

²⁵ At national level, other initiatives supporting this objective have been launched in order to set standards for: accessing data infrastructures (*Federazione Italiana delle Università e degli Enti di Ricerca per l'Autenticazione e l'Autorizzazione* - <https://www.idem.garr.it>); establish interoperable models fostering the dissemination of scientific outputs and the setting up of official repositories (*OpenAIRE compatible data providers* - <https://www.openaire.eu/search/data-providers#text:italy>) and related software programmes, to the benefit of research, industry and the wider public.

Specific objective 5a

	<i>Facilitate availability of and access to publicly funded research outputs</i>
action	Establishing a platform providing information services on research to help disseminate scientific results to the wider society, while fostering access of businesses to public research results.
indicator	Access to the services offered by the platform by tracking the number of hits
target	From 2017 ('year zero' in which the platform will be launched) >20% yearly increase in the number of users

Specific objective 5b

	<i>Promote the role of National Technology Clusters as drivers for public-private collaborative research</i>
action	Support the active role played by National Technology Clusters in creating research and innovation networks in national technology supply chains to foster investments, participation and coordination of businesses involved in the research sector, while strengthening public-private cooperation partnerships and ensuring networking of available competences.
indicator	Fraction of overall innovative businesses cooperating with CTN-associated RPOs in their research and innovation activities
target	Yearly increase of 1 percentage point for the given indicator (baseline ²⁶ 4.8%, EU ₂₈ average 10.3%)

²⁶ See *Innovative SMEs collaborating with others* in "Innovation Union Scoreboard 2015" – http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards/files/ius-2015_en.pdf

PRIORITY AREA 6 – INTERNATIONAL AND TRANSNATIONAL COOPERATION IN THE MEDITERRANEAN AREA

At a time when peaceful relations between peoples and nations are constantly challenged by serious threats, recent experiences have shown that research can act as an effective tool for dialogue and is sometimes, in fact, the only remaining connection when all other conventional diplomatic channels fail.

The Italian Government's engagement in *science diplomacy* has led to prioritise the Mediterranean Region, not only because of its geographical proximity, but also because of its increasing complexity and implications.

The national research system has rapidly understood the scale and scope of this challenge²⁷, and has reacted by committing its best resources to supporting wider Government action towards this end.

The specific objectives to address this ERI priority relate to three initiatives which are currently underway: the Partnership for Research and Innovation in the Mediterranean Area (PRIMA), Developing a Marine and Maritime Network towards a Blue Economy in the Mediterranean (BLUEMED) and a Joint Research Initiative on migrants, migrations and integration. Through these initiatives, Italy provides a significant contribution towards opening ERA to the world.

Specific objective 6a

	<i>Complete the process leading to the establishment of the “PRIMA” Programme (Partnership for Research and Innovation in the Mediterranean Area), under article 185 of the Treaty on the Functioning of the European Union</i>
action	Coordinate Member States and Mediterranean Partners, jointly with the European Commission, in order to complete the process leading to the successful establishment of the Programme
indicator	State of advancement of the process
target	Final approval by the first semester of 2017 (the Programme is currently in the ‘ <i>impact assessment</i> ’ phase)

²⁷ For example, the role of our country in the SESAME project in Jordan.

Specific objective 6b

<i>Develop a network aimed at coordinating initiatives and research and innovation programmes in the maritime and marine sector in the Mediterranean (BLUEMED).</i>	
action	Organise and advance the <i>Coordination and Support Action (CSA)</i> aimed at developing a network of Member States and Mediterranean Partners to tap the potential of a <i>blue economy</i> in the Region
indicator	Degree of scientific, managerial and financial integration among partners
target	Develop a proposal for a <i>European Joint Programme</i> on issues pertaining to the BLUEMED initiative by the second semester 2017 (the proposal has yet to be drafted)

Specific objective 6c

<i>Propose the launch of a Coordination and Support Action (CSA) to support a Joint Programming Initiative (JPI) on research and innovation activities addressing migrants and migrations, with special focus on integration.</i>	
action	Raise awareness among Member States and Associated Countries and promote actions to identify the best tools for an effective and successful research initiative on this subject
indicator	Degree of awareness and participation
target	At least 8 Member States and Associated Countries to promote this initiative by second semester 2016 (the initiative has yet to be discussed)

4. CONCLUSIONS

The National Roadmap towards full implementation of the European research area proposes actions to be carried out at national level by the Italian Government, and more specifically by the Ministry of Education, Universities and Research, as well as by other stakeholders in the national research system such as RPOs and the private sector.

Priority areas, specific objectives and especially actions were identified bearing in mind existing tools for national programming in the research sector (National Research Programme), focusing attention on the areas that are more likely to have a profound impact in a reasonable time.

Actions proposed in this Roadmap fall within 6 priority areas and follow three main axes: a) strengthening and enhancing human resources which are recognised as being a key asset in our national research system; b) opening the Italian research system to the country and internationally, by focusing attention on the grand societal challenges; c) coordinating and streamlining national and transnational research programming through a model of horizontal and vertical governance.

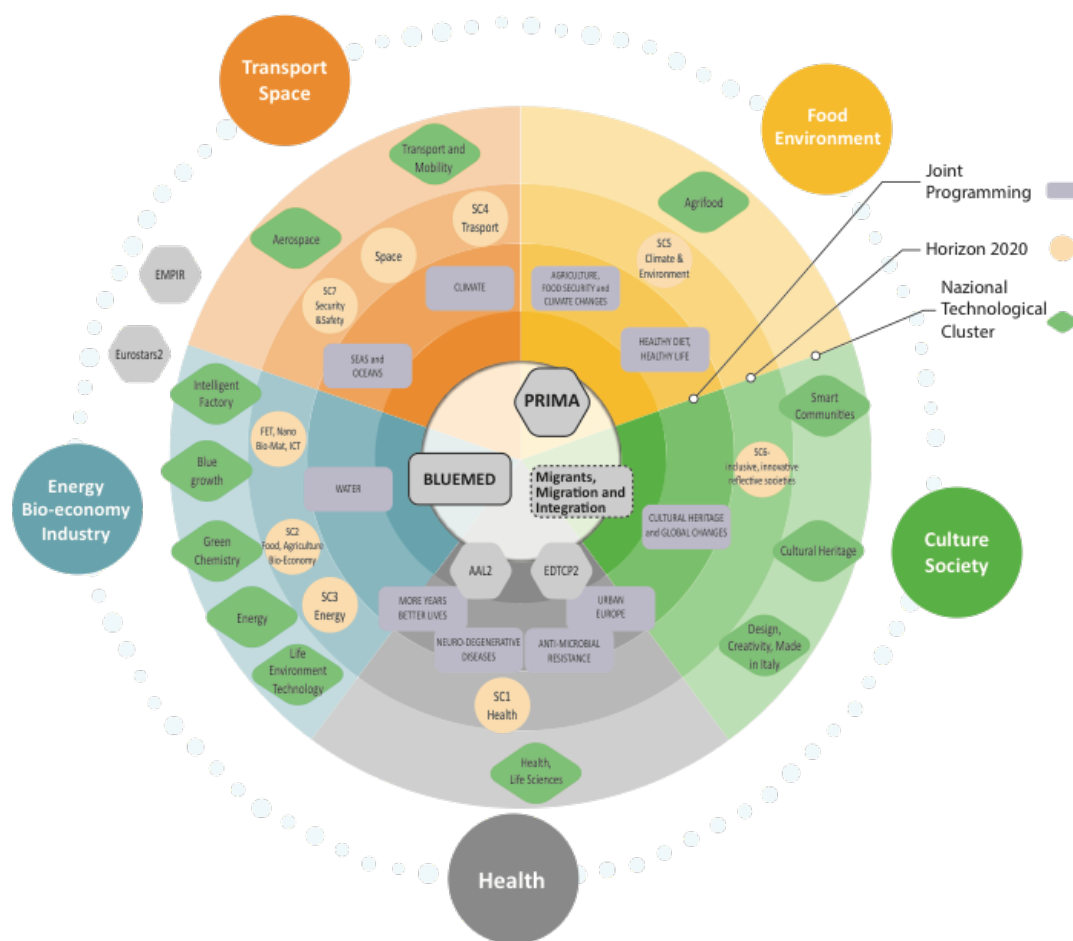


Fig. 7. National and European Programming ecosystem on grand societal challenges

The graph in Fig.7 proposes a comprehensive view of the national research ecosystem and its interactions at transnational level. In the graph, the 'grand challenges' are the biotopes in which programming activities and their system of governance evolve while the different areas of research find their own role by interacting and cooperating synergistically.

The European ERA Roadmap contains a clear recommendation to Member States that visible progress towards implementing objectives must be made by 2020. The Italian ERA Roadmap (just like all other national roadmaps) is an integral part of this process and of the ensuing monitoring activities within ERA Progress Reports. At national level, advancement will be monitored jointly with stakeholders via an evaluation questionnaire, submitted to the scientific community every two years to assess progress reached in the development of indicators relating to each action.

Finally, it must be emphasised that since Research and innovation are, by definition, rapidly evolving areas, priority actions in the Italian National Roadmap will have to be kept under constant review and possibly updated as a result of monitoring activities.

