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The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context.

The first draft of this report was produced in December 2012 and was focused on developments taking place in the previous twelve months. The contributions and comments from DG-RTD are gratefully acknowledged.

The report is currently only published in electronic format and is available on the [ERAWATCH website](#). Comments on this report are welcome and should be addressed to jrc-ipts-erawatch-helpdesk@ec.europa.eu.

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EXECUTIVE SUMMARY

France's GERD is a large part of EU investment in research and innovation, ranking second after Germany's one. The ratio of French GERD to GDP was 2.25% in 2011, above the EU27 average of 2.03%. Over the last 30 years, France's R&D intensity has fluctuated between 2% and 2.37%. It has risen in 2007 and then reached a plateau. According to the most recent national survey on innovative companies, around 43 % of companies have reported innovation between 2006 and 2008¹. This nevertheless relatively low R&D intensity is in the first place the result of the shift of the national economy from manufacturing to services, where R&D and innovation is less easy to capture. But it is also linked to the moderate orientation of the country towards high-tech manufacturing sectors. France relies less on high-tech goods for its trade balance than the EU average² and is more specialised in goods and services of medium to high innovation and education sectors³. The share of GERD funded by the French business sector is stable, slightly above 50% (53.5% in 2010), a rather low ratio compared with countries such as Germany, US, Japan and Korea, which are more intensively innovation-driven economies.

Two main government ministries share the overall responsibility for research and innovation policy in France:

- The Ministry of Higher Education and Research (MESR⁴) designs and co-ordinates research policy. It is assisted by various consultative bodies, including the High Council for Science and Technology (HCST). The HCST advises the French Prime Minister and provides recommendations on national research and innovation strategies.
- The Ministry for Economy, Finance and Industry (MEFI⁵) is responsible for industrial and energy research and plays a specific role in relation to private sector research.

The following agencies are responsible for implementing research and innovation policy in France:

- The National Agency for Research (ANR⁶). The ANR was created in 2005 to fund research projects on a competitive basis. The ANR covers basic research, applied research, and innovation and technology transfer, which it promotes through public/public and public/private partnerships.
- OSEO⁷ provides support for R&D and innovation projects to businesses, in particular SMEs;
- The Agency for Environment and Energy Management (ADEME⁸). ADEME was created in 1991 to support and fund partnership-based environment and energy research activities;
- Public research organisations (PROs). PROs, such as the National Centre for Scientific Research (CNRS), are also involved in policy implementation.

¹ <http://www.insee.fr/fr/ffc/ipweb/ip1314/ip1314.pdf>

² European Commission (2011), Innovation Union Competitiveness report 2011 - country profile France

³ European Commission (2011 competitiveness), Innovation Union Competitiveness report 2011 - country profile France

⁴ <http://www.enseignementsup-recherche.gouv.fr/>

⁵ <http://www.economie.gouv.fr/>

⁶ <http://www.agence-nationale-recherche.fr/en/project-based-funding-to-advance-french-research/>

⁷ <http://www.oseo.fr/>

⁸ <http://www2.ademe.fr/servlet/getDoc?id=38480&m=3&cid=96>

There have been no significant changes in 2012 in French policy concerning the innovation system. During the first half of the year, government action has been focused on strengthening and deepening the structural reforms already embarked upon since the mid-2000s. The second semester has seen the new political majority organising a wide consultation process.

The key developments over the past years include the creation of competitiveness clusters ("*pôles de compétitivité*"), the clusters for Research and Higher education (PRES), and the implementation of the law on the autonomy of universities (LRU).

The French research and innovation system has been strengthened through a new dedicated "investment for the future" plan ("*Programme d'investissements d'avenir*"), which was launched in 2010.

The current French 'National Research and Innovation Strategy' was launched in January 2009. The strategy, which runs for five years, guides policy decisions in the field of RDI. It addresses three main priority areas, which correspond to key societal challenges:

- Health, care, nutrition and biotechnology;
- Environmental urgency and eco-technology;
- Information, communication and nanotechnology.

The French R&D&I system is characterised by a satisfactory level of public investment but a relatively low level of business investment in R&D, which reflects the structure of the economy as described above. Accordingly, France must address three main challenges:

- Structural change impacting French industrial specialisation and a need to create new firms in high tech sectors: France suffers from a low level of business R&D expenditure, mainly because of its relative industrial specialisation in medium and medium-high technology sectors. France is also hampered by a weak sector of new technology-based firms. The challenge is therefore to create the proper environment for allowing new high-technology companies to develop and reach a critical size.
- Support the R&D activities of mid-size SMEs (250 to 5000 employees) and strengthen the culture of innovation. A number of measures should be taken to increase the R&D effort in this category of companies. These could include focusing on SMEs and Economic and Technological Intelligence (ETI) in the governance of competitiveness clusters, for example. The Research Tax Credit also provides an opportunity to focus support on SMEs and the OSEO innovation budget should also be stabilised.
- Knowledge transfer from the public to the business sector. A key challenge is to better connect public research with business innovation activities, and in particular to increase support for the exploitation of research outcomes in a business perspective.

The current policy mix focuses on i) R&D spending by firms, and on ii) fostering collaboration between the public research and business sectors. The implementation mechanisms rely mostly on tax incentives (the research tax credit). All national priorities are in line with the National Strategy for Research and Innovation and with the structural challenges identified above.

A wide range of measures has been taken to boost business R&D investment and to foster cooperation between the public and private sectors within the French innovation system. But the range of organisations and policy instruments is deemed too broad. It adds complexity to an already multifaceted policy landscape, which could hinder the effectiveness of public support.

Overall, the individual policy instruments that have been introduced are consistent with the challenges. However, to date, neither the efficiency nor the effectiveness of the broader policy mix has been fully demonstrated, and success will depend very much on the overall governance of the national innovation system as well as on the future economic environment and the resulting public budgetary constraints. A key success factor will be the ability to carry out a

system-level evaluation of all the policies involved in view of ensuring any necessary streamlining and coordination.

In a European perspective, the French policy mix focuses on a selection of pillars of the European Research Area strategy. It addresses the issues of labour market and attractiveness of researchers' career, of efficiency of research institutions, and public-private partnerships. International cooperation and knowledge circulation across Europe have also been identified as central issues by the National Research and Innovation Strategy but no major policy initiatives have been taken recently in this area.

Major recent initiatives include the 'Investments for the Future' programme mentioned above, the purpose of which is to strengthen national research infrastructures, increase the visibility of French research and higher education institutions, and foster project-based public-private partnerships.

The French policy mix has undergone profound changes in the last few years. In the short and medium terms, therefore, France should focus on deepening existing measures and above all focus on the coherence between all the measures that have been introduced recently and, by the same token, on the clarity of the policy mix as a whole.

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1 INTRODUCTION

With 65,4 million inhabitants in 2012, France is the second largest country of the EU27 ranking second only to Germany. It is home to 12.9% of the total EU27 population. Since 2008, the economic crisis has affected France's Gross Domestic Product (GDP) growth rate, as it has in other EU countries, albeit less severely. In 2007, the GDP growth rate was 2.3%, but this fell sharply to 0.1% in 2008 and even plunged to -2.7% in 2009. However, the EU27 average recession for 2009 was even more severe: -4.2% (Eurostat). Since 2010, France's GDP growth rate climbed again to reach 1.7% in 2010, as in 2011. In 2012, GDP growth is expected to have fallen back close to 0%. Official economic projections for GDP growth for 2013 are based on rate growth of 0,8%.

In terms of R&D expenditures, France's GERD has kept growing since 2006. Within the EU27, France ranks second only to Germany. France's GERD stood at €41bn in 2008, €42.7bn in 2009, €43.4bn in 2010 and reached €44.9bn in 2011, which represents 17.5% of total EU27 expenditure (the figure for Germany was 28.7%).

The ratio of GERD to GDP was 2.25% in 2011. France ranks 7th, above the EU27 average (which was 2.00% in 2010 and 2.03% in 2011), even though R&D intensity has sharply decreased since the 1990s (it stood at 2.38% in 1992). GBAORD⁹ has kept growing since 2007 and reached €16.8b in 2011 (€14.1b in 2007), which represents 0.85% of GDP.

In most OECD countries, the impact of the crisis resulted in a decline in the real growth rate of R&D expenditures in 2008 (-8.6% for Japan, -2.9% for Finland, -0.6% for the UK, and -0.4% for Germany). France is one of the few OECD countries that have increased their R&D effort during the crisis (+1.9% in 2008 and +3.5% in 2009)¹⁰.

France's R&D&I system is characterised by a satisfactory level of public investment but a relatively low level of investment by business. A major objective, therefore, is to better link public and business research, and in particular to increase the support for the exploitation of research outcomes in a business perspective.

A recent report suggested that France's gap with the USA in R&D intensity is due to two main factors: patterns of French industrial specialisation, on the one hand, and a lack of R&D-intensive enterprises of intermediary size (ETI)¹¹, on the other (CAS, 2010).

The three most R&D intensive sectors in France are:

- Pharmaceuticals and biotechnology,
- Software and computer services and,
- Material and technological equipment.

These three sectors represent 5.5% of the total net sales of French businesses, whereas they represent 23.3% in the USA. Also, low R&D intensive sectors represent half of French firms' net sales, which is twice the rate recorded in the USA. In addition, French companies with more than 25,000 employees contribute about 89% of R&D expenditures in France, compared to 83% in the EU, and 64% in the USA, which shows that France suffers from a lack of R&D-intensive SMEs.

In 2011, about one third of Government budget outlays for research and development (GBAORD) was focused on four objectives: defence (6.8%), the exploration and exploitation of space (12.9%), health (6.8%), transport and telecommunications and other infrastructures (6%).

⁹ GBAORD is composed of the MIREs budget plus the "hors-MIREs" (non-MIREs).

¹⁰ [http://www.strategie.gouv.fr/content/levolution-recente-des-systemes-de-recherche-note-danalyse-275-avril-2012?xtor=EREC-1014-\[13042012-Newsletter026-L%27%C3%A9volution%C3%A9centedessyst%C3%A8mesderecherche\(Noted%27analyse275-Avril2012\)\]](http://www.strategie.gouv.fr/content/levolution-recente-des-systemes-de-recherche-note-danalyse-275-avril-2012?xtor=EREC-1014-[13042012-Newsletter026-L%27%C3%A9volution%C3%A9centedessyst%C3%A8mesderecherche(Noted%27analyse275-Avril2012)])

¹¹ *Entreprises de Taille Intermédiaire* (ETI): an enterprise with between 250 and 5000 employees and either less than €1.5b turnover or a balance sheet of less than €2b.

French spending on the first two objectives is especially high compared to the EU average and represents a national characteristic (Eurostat).

Research and innovation governance

Research governance, development and innovation (RDI) policies have not changed since the reforms of the 2000's, which aimed at establishing three clear separate levels of action, namely: i) policy making, ii) implementation (funding and programming) and iii) execution (enforcement of regulation).

At the policy making level, two main government ministries share the responsibility for research and innovation policy in France:

- The Ministry of Higher Education and Research (MESR¹²) designs and co-ordinates research policy. It is assisted by diverse consultative bodies including the High Council for Science and Technology (HCST¹³). This consultative body advises the French Prime Minister and provides recommendations on national research and innovation strategies.
- The Ministry for Economy, Finance and Industry (MINEFI¹⁴) is responsible for industrial and energy research and plays a specific role in relation to private sector research. Innovation is the responsibility of both the Ministry for Economy, Finance and Industry and the Ministry of Higher Education and Research.

All funding devoted to research and innovation is channelled through the general budget of the Research and Higher Education Interministerial Mission (MIREs). The MIREs brings together funding from the Ministry of Research and Higher Education, the Ministry for Economy, Finance and Industry as well as funds from several other ministries (Defence, Culture and Communication, Ecology, Energy, Sustainable Development and Sea, Food and Agriculture and Fishing). The Ministry for Higher Education and Research is the leading ministry within the MIREs and is responsible for implementing the agreed budget plan. It proposes public policy priorities for all research programmes by defining, on an annual basis, objectives and the means necessary to achieve them.

The general trend in research innovation governance has been to bring research and innovation stakeholders closer in order to coordinate their activities as much as possible, particularly through the creation of Research and Higher Education Clusters (PRES), the “Alliances” and the Competitiveness clusters.

The 2007 Law on the autonomy of universities (LRU), combined with the development of Research and Higher Education clusters (PRES), is designed to give higher education institutions, specifically universities, a central position in the research and innovation system through a better linking of universities, PROs, “Grandes Ecoles”, and other stakeholders.

In 2010, coordination institutions called “Alliances” were created. Their aim is to bring closer different stakeholders in a given research domain to better coordinate research programming. Currently, five alliances are in place in the fields of: life sciences and health, energy, the environment, marine sciences, ICT and SSH (Social Sciences and Humanities).

At the operational level, the French research system is mainly composed of the following agencies. They are responsible for implementing R&D and innovation policies:

- **The National Agency for Research (ANR)** was created in 2005 to fund research projects on a competitive basis and through public/public and public/private partnerships. The ANR had an amount of expenditures estimated at €728m in 2011 (compared with €807m in 2010¹⁵). The ANR covers basic research, applied research, innovation and technology transfer. The ANR was created with the aim of providing a new impulse to the French

¹² See <http://www.enseignementsup-recherche.gouv.fr>

¹³ <http://www.hcst.fr>

¹⁴ See <http://www.economie.gouv.fr/>

¹⁵ 2010: ANR's Annual Report 2010; 2011: ANR's presentation (8 March 2012)

research and innovation system and to: i) develop new concepts through exploratory research with the so-called “white programmes” (*programmes blancs*) which are non-thematic calls, ii) foster research on economic and social priorities through thematic calls for projects; iii) promote collaboration between public and private research through collaborative research, and iv) increase international partnerships.

- **OSEO** provides support for R&D and innovation projects to businesses, in particular SMEs, with **OSEO** (with a budget of €414millions in 2012 and €513m in 2011) is the national agency dedicated to promoting and supporting the industrial development, growth SMEs, through (mainly technological) innovation and to promote technology transfer. Its subsidiary, ‘Oseo Innovation’, merged with the main structure OSEO in December 2010. The aim of the merger is to reinforce the public effort to promote innovation, especially for SME’s.
- The Agency for Environment and Energy Management (ADEME) was created in 1991 to support and fund environment and energy research on a partnership basis (with a budget of €1b in 2010). ADEME is a dedicated public agency with a remit to promote innovation in the field of environment. ADEME’s missions consist in promoting, supervising, coordinating, facilitating and carrying out activities aiming at protecting the environment and improving energy savings.
- Public research organisations (PROs) such as the National Centre for Scientific Research (CNRS, €3.3b budget in 2012) also contribute to policy implementation.

Research and innovation policies are also defined and implemented at the regional level. Even though regions have increased their budgets dedicated to research, technology transfer and innovation by 60% since 2003, regional funding remains limited when compared with national funding. In 2010, French regions dedicated €1.2b to R&T. Regional and local authorities have their own budgets, they have been granted autonomy for deciding the amount they spend on R&D support.

As part of the European cohesion policy for 2007-2013, each French region has developed its own regional innovation strategy (SRI) with the aim of ensuring a more effective steering of its regional innovation system. The design of RDI policies at sub-national level is in the remit of Regional Councils, which are usually supported in the implementation stages by Regional Innovation Agencies. Regions are allowed to develop a Regional Research Strategy (SRR) or a Regional Research and Higher Education Strategy (SRESR).

In practice, relationships between the regional authorities and the central government are organised through seven-year contracts called a State-Region Projects Contract (CPER). A CPER sets out the financial aid provided by the central government to meet regional policy objectives. One chapter of these contracts is dedicated to research. The design of the new generation of CPERs has been co-ordinated with the European Structural Funds programmes, which have the same time horizon (2007–2013). CPERs focus on competitiveness, on attractiveness of territories as places to do business, on the promotion of sustainable development and on territorial and social cohesion.

Research performers groups

The main public research performers (in terms of funds) are higher education institutions (HEI), which comprise a group of 81 universities (2012) and a smaller number of “*Grandes Ecoles*”, which are a specific trait of the French higher education system.

Government sector research activities are primarily carried out by universities. University expenditures on research increased from €5.2b in 2009 to €5.6b in 2010. Universities are now the largest public research performers. Research is also carried out by Public research organisations (PROs). In 2009, the gross domestic expenditure on research and development by PROs grew

rapidly to €8.8b, accounting for 57% of public civil research. They can be considered as key actors in the French research. Among them, the National Centre for Scientific Research (CNRS) and the Atomic Energy Commission (CEA) stand out. Indeed, with €5.4b, they account together for more than one third of public civilian research (20% for the CNRS and 16% for the CEA). Other large PROs include the National Institute for Agronomic Research (INRA), the National Institute for Computer Science and Automation (INRIA), and the National Institute for Health and Medical Research (INSERM).

Knowledge production

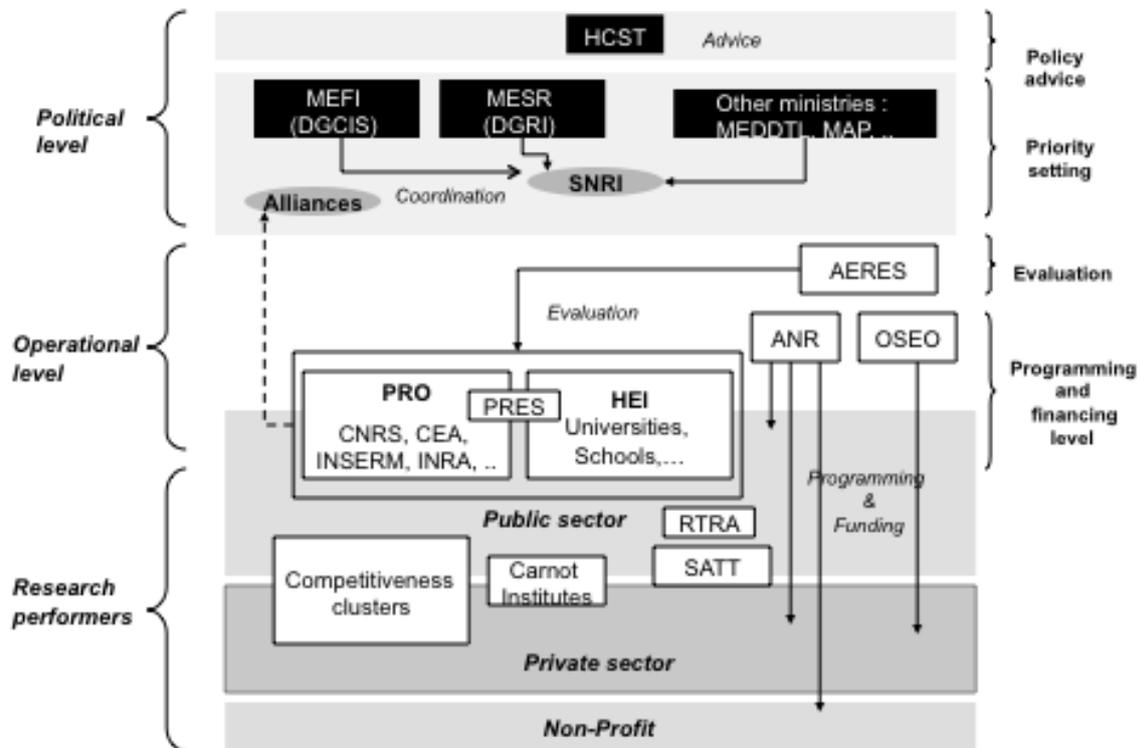
The production of scientific knowledge is the core function that a research system must fulfil. France's R&D&I system is characterised by a satisfactory level of public investment but a relatively low business counterpart. A major policy goal therefore is to better link public and private research, and in particular to increase support for the exploitation of research outcomes. Compared with the EU27, France ranks 6th in terms of world share of scientific publications per researcher (2009 figures). In 2009, France's share in the world output of scientific publications was 4.1%, and its share in citations (in a 2 years moving window) was 4.3%. Both percentages have been declining since 1999, particularly due to the entry of new countries on the international scientific stage such as China, India or Brazil¹⁶. With regard to patents, in 2009, France ranked 4th worldwide according to the European system (6.3% of European patent applications) and 8th according to the American system (2% of US patents granted). In both systems, France's overall share has been declining since 2004. This decrease is due to the rise of new 'players' such as China or South Korea.

Revenues from intellectual property (IP) are decreasing and are highly concentrated between three research organisations, namely the CNRS, the CEA and the *Institut Pasteur*, which account for 90% of national revenues from IP¹⁷. Universities and other HEIs suffer from a lack of historic institutional capacity in terms of research and patents, resulting in an absence of IP strategies. In order to overcome these weaknesses, the 2011 national policy is geared towards i) awareness raising and promotion of IP policies to public research performers and ii) the identification of a single IP manager in case of co-ownership (as set out in the Decree published in 2009) specifically dedicated to CNRS-University common research units (90% of CNRS research units).

¹⁶ 'L'état de l'Enseignement supérieur et de la Recherche en France', MESR, 2011

¹⁷ IGF, IGAENR, 2007

Figure 1: Overview of the French research and innovation system governance structure



SNRI: National Strategy for Higher Education and Research; **MESR:** Ministry for Research; **DGRI:** General Directorate for Research and Innovation; **MEFI:** Ministry for Economy, Finance and Industry **MEDDTL:** Ministry for Ecology, Sustainable Development Transport and Housing, **MAP:** Ministry for Agriculture; **PRO:** Public Research Organisation; **RTRA** : Thematic Advanced Research Networks; **HEI:** Higher Education Institution; **CNRS:** National Centre for Scientific Research (the CNRS also funds research); **ANR:** National Agency for Research, **HCST:** High Council for Science and Technology; **SATT:** technology transfer acceleration companies.

2 RECENT DEVELOPMENTS OF THE RESEARCH AND INNOVATION POLICY AND SYSTEM

2.1 National economic and political

François Hollande's election as President of Republic on 6 May 2012 could impact the research and innovation system in the medium term. But the new socialist majority is not likely to discard the current national RIS, whose main axes have been confirmed by the new Ministry for HER.

This change of political majority is still too recent for having produced any significant policy measures. Moreover, unemployment having been already identified as the main challenge to be tackled in 2013, budgetary constraints leave very little room for manoeuvre for increasing public support for RI.

Within a budgetary framework that should ensure a timely correction of the excessive deficit and the achievement of the structural adjustment effort specified in the Council recommendations, the few adjustments for RI policy which are being considered should aim at:

- Better balancing the statutory autonomy newly acquired by French universities (through the LRU) with corresponding financial resources – most of universities are currently running into an alarming cash flow crisis.
- Clarifying the articulation between the “Investments for the Future programme” (see details in part 3) and the existing RI system. Two contrasted scenarios are possible. According to the first one, the projects supported by this programme take momentum and contribute to reorganise mid term research priorities within universities and PROs. According to the second scenario, this series of excellence-based initiatives institutions remain peripheral with a structuring influence that would not exceed their funding (up to 5 years).

2.2 Funding trends

	2009	2010	2011	EU27
GDP growth rate	-2.7	1.7	1.7	- 0.3 (2012)
GERD (% of GDP)	2.27	2.25	2.24	2.03s (2011)
GERD (euro per capita)	664.6	670.6	690.6	510.5s (2011)
GBAORD - Total R&D appropriations (€ million)	13693	13955	15670	91,277.1 (EU27 total 2011)
R&D funded by Business Enterprise Sector (% of GDP)	1.41	1.41	1.43	1.26 (2011)
R&D performed by HEIs (% of GERD)	20.7	21.6	21.2	24% (2011)
R&D performed by Government Sector (% of GERD)	16.3	14.0	14.1	12.7% (2011)
R&D performed by Business Enterprise Sector (% of GERD)	61.8	61.9	62.3	62.4% (2011)
Share of competitive vs. institutional public funding for R&D	n/a	n/a	n/a	n/a

s - EUROSTAT estimate

Data Source: EUROSTAT, March 2013

Although BERD accounts for about 2/3 of French GERD, business R&D remains far from the 2% initial Lisbon target, despite the strong public support policies implemented such as fiscal incentives - the research tax credit (CIR) - and more recently the Competitiveness clusters. The

research tax credit, implemented first in 1983, is generally considered as an effective (albeit costly: 4,5 billion Euros in 2012) measure for fostering business expenditures on R&D.

The rise of competitive funding is a main feature in the French RIS. ANR has been central in this transformation. Firstly, through its proper funding: this new resource agency established by the French government in 2005¹⁸ has been allocated a €759,85m budget for 2012 - partly used for funding international joint calls. Secondly, ANR holds an important function through the competitive selection processes it steers for the “Investments for the Future programme”. This programme provides a compelling illustration for the place of competitive funding: 21,9 billion Euros from this programme are dedicated to higher education and research, out of which 17,9 are to be allocated on a competitive basis.

2.3 New policy measures

Six months have been a short notice for the new socialist majority for shaking up the RI public policies - in case they had planned to. Actually, no clear political signal could nurture the prospect for such an upheaval. The main strategic lines defined in the SNRI have been maintained.

The new majority has nevertheless announced a new law on research and higher education due to be discussed in the Parliament in spring 2013. Four main objectives have been announced: better ensure the employability of students; simplify the organisation of research and its assessment; facilitate the decompartmentalization between schools, universities and research organizations and finally reconcile efficiency and collegiality in academic forums

Other likely adjustments could concern the steering of the previously adopted “Investments for the Future” programme (from which 22 billion Euros have been earmarked for higher education and research). Another series of measures could concern the “Clusters of competitiveness” whose recent assessment could drive to a renewed roadmap.

2.4 Recent policy documents

The budget law for 2013 has introduced an extension for the research tax credit scope (until then strictly restricted to research-based investments) by henceforth granting SMEs the possibility to include innovation costs (such as trademark and design registration). This measure is expected to generate a cost of 200 millions Euros (for a total cost of 4,5 billions Euros for the whole research tax credit scheme).

This measure has a double objective: first, a specific focus on SMEs, which are considered lagging behind considering innovation; second a widening of support towards the exploitation of research outcomes, that reaches beyond pure technological novelty.

2.5 Research and innovation system changes

The French RIS hosts since two years a large number of new institutions stemming from the bulk “Future investments” programme, which has been promoted by the former government.

As a consequence of the series of far-reaching measures which have been implemented since 2006, the university landscape has hosted most of these changes.

In the first place, the 2006 programme law on research has created clusters of research and higher education (PRES) which gather on the same site various types of institutions (universities, specialised schools of engineering or management, PROS...) in order to mutualise resources and activities. The main objective was to clarify the supply of higher and education (assessed as too fragmented) and to increase the size and reduce the number of research and higher education institutions. Between March 2007 and September 2012, 26 PRES have been created by

¹⁸ <http://www.assemblee-nationale.fr/13/budget/plf2012/a3807-tix.asp>

government decrees - 23 of them as EPCS (public status), 3 of them as FCS (private status)¹⁹. These new institutions include more than 60 out of the 81 French universities²⁰.

Simultaneously, and notwithstanding some inconsistency, the April 2007 Law on Research and Universities (LRU) has increased (progressively) the universities' autonomy.

Finally, the "Future Investment Programme" has been a strong incentive for the PRES' components to develop joint strategic projects. The IDEX initiative, whose aim was to select 5 to 10 campuses to be flagships for the entire French research and education system, provides a good illustration for this structuring effect. Out of the 17 proposals submitted, 8 have been selected as of 2012 (2 more could be added in 2015); 7 of them being projects led within PRES.

Table : Selected IDEX as of December 2012

Region	Acronym	Nom	Leading institution
Provence-Alpes-Côte d'Azur	A-M IDEX	Aix-Marseille Initiative d'excellence	PRES Aix-Marseille Université
Ile-de-France	CPS	Campus Plateau Saclay	Fondation Digiteo Triangle de la physique
Aquitaine	IDEX Bordeaux	Initiative d'excellence de l'université de Bordeaux	PRES université de Bordeaux
Ile-de-France	PSL Etoile	Paris Sciences et Lettres étoile	Paris Sciences et Lettres
Ile-de-France	USPC	Université Sorbonne Paris Cité	Sorbonne Paris Cité
Ile-de-France	SUPER	Sorbonne Universités à Paris pour l'enseignement et la recherche	Sorbonne Universités
Midi-Pyrénées	Uniti	Toulouse initiative d'excellence	PRES Université de Toulouse
Alsace	Unitra	Université de Strasbourg	Université de Strasbourg

As a double conclusion, the extent of the transformation of French universities should neither be overstated nor understated.

On the one hand, the 26 PRES are new structures sheltering institutions that keep having their own existence: very few have properly merged; Strasbourg being one of the few examples of a university fully-fledged merger. Moreover, these IDEX should be considered as PRES strategic projects rather than brand new institutions: there is a large overlap between both notions.

On the other hand, the current transformation of the university landscape should not be reduced to a simple exercise of new and double labelling, in the sense that the long term projects developed in general within the PRES and in particular within the IDEX contribute to redefine the actors involved in it, as a new strategy is a key dimension in an actor identity.

¹⁹ The 26 PRES as of September 2012 : Université de Bordeaux; PRES Bourgogne Franche-Comté -aka "ESTH-Innovation Université"; Université européenne de Bretagne; Centre - Val de Loire Université; Clermont Université; Université de Grenoble; HESAM (Hautes Etudes-Sorbonne-Arts et Métiers); Université Lille Nord de France; PRES Limousin Poitou-Charentes; PRES de l'Université de Lorraine; Université de Lyon; Université Sud de France; Université Nantes Angers Le Mans; Université de Toulouse; ParisTech (Institut des Sciences et Technologies de Paris); Sorbonne Paris Cité; Université Paris Est; Paris Sciences et Lettres - Quartier latin; Sorbonne Université; UniverSud Paris; Normandie Université; UPGO (Université Paris grand Ouest); UFECAP (Université fédérale européenne Champagne-Ardenne Picardie); Campus Condorcet; Collegium Île-de-France; PSL-formation.

²⁰ Futuris 2012, La Recherche et l'Innovation en France, Odile Jacob, Paris

2.6 Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3)

Smart specialisation has become an important concept in French innovation regional strategic discourse, although as of end 2012 it has yet hardly been put into practice. Most regions explain and highlight “smart specialisation strategies” (S3) as a guiding organising principle for future innovation strategic plans; but few (among which Nord-Pas-de-Calais, Alsace and Réunion which have presented draft RIS3 or envisaged approaches in peer review workshops) have already started formulating projects accordingly.

The wide diffusion of the S3 concept stems from strong European and national incentives.

At the EU level, the need to formulate regional projects candidate for European regional funding in the framework of a smart specialisation strategy provides obviously a very efficient leverage for this notion. Most French regions present the concept of S3 in relation with this conditionality.

National public policies have also contributed to the wide spreading of this concept.

In the first place, the Interministerial Delegation for Territorial Development and Regional Attractiveness (DATAR) is developing public measures for supporting regions in their shift from former regional innovation strategies (RIS) towards smart specialisation strategies. Datar has issued in October 2012 a call for proposal²¹ for elaborating a didactic and methodological guide on smart specialisation for preparing future operational programmes 2014-2020 in the framework of a strategy of "smart specialisation".

This guide is designed for: Introducing the concept of "smart specialisation"; clarifying the function assigned to the "S3" in the implementation of the future European policies and the strengthening of their synergies; presenting the logic of "smart specialisation" in the vision of the next generation of policy cohesion and future operational programmes; identifying the evolution from Regional Innovation Strategies to smart specialisation-based innovations strategies; providing step by step methodological elements for developing S3.

Above all, and beyond this current support, national policies have already laid two important bases that will foster smart specialisation. In the first place the regional innovation strategies elaborated by all French regions in 2008-2009 provide a sound stepping stone for smart specialisation. The next phase of their S3 will therefore most likely aim at focusing on some of sub fields of these areas.

²¹ Avis n°12-210395 publié le 30/10/2012 - BOAMP n°210B, Annonce n°121

Table : the 13 thematic areas identified in the RIS and the positioning of regions²²

Thematic areas	Regions
Biotechnology, Nanotechnology, Life Sciences	Auvergne, Haute-Normandie, Île-de-France, Rhône-Alpes
Preservation of the environment, management of resources, biodiversity, Risk Prevention	Alsace, Basse-Normandie, Corse, Guadeloupe, Guyane, Île-de-France, Languedoc-Roussillon, Lorraine, Martinique, Midi-Pyrénées, Nord-Pas-De-Calais, Pays-de-la-Loire, Picardie, Provence-Alpes-Côte-d'Azur, Réunion, Rhône-Alpes
Aeronautics and Spatial construction industry	Guyane, Île-de-France, Corse, Midi-Pyrénées Île-de-France, Nord-Pas-De-Calais, Picardie, Provence-Alpes-Côte-d'Azur, Réunion
Mobility, Transport	Auvergne, Île-de-France, Haute-Normandie, Nord-Pas-De-Calais, Picardie, Poitou-Charentes, Provence-Alpes-Côte-d'Azur
Innovation through services, Engineering, Social Sciences and Humanities	Alsace, Centre, Guyane, Haute-Normandie, Limousin, Martinique, Nord-Pas-De-Calais, Réunion, Rhône-Alpes
Health Care	Auvergne, Auvergne, Basse-Normandie, Île-de-France, Haute-Normandie, Languedoc-Roussillon, Lorraine, Martinique, Midi-Pyrénées, Nord-Pas-De-Calais, Pays-de-la-Loire, Picardie, Provence-Alpes-Côte-d'Azur, Réunion
Tourism	Corse, Guadeloupe, Languedoc-Roussillon, Réunion
Energy	Centre, Corse, Guadeloupe, Haute-Normandie, Nord-Pas-De-Calais, Pays-de-la-Loire, Réunion, Rhône-Alpes
Materials, Mechanics, Chemistry	Basse-Normandie, Champagne-Ardenne, Guadeloupe, Haute-Normandie, Limousin, Lorraine, Midi-Pyrénées, Nord-Pas-De-Calais, Poitou-Charentes
Agro-food, Agro-resources, Fishery	Limousin, Martinique, Midi-Pyrénées, Picardie, Poitou-Charentes, Réunion
ICT, Informatics, Digital, Complex Software, Electronics	Basse-Normandie, Corse, Guadeloupe, Île-de-France, Languedoc-Roussillon, Limousin, Lorraine, Midi-Pyrénées, Nord-Pas-De-Calais, Pays-de-la-Loire, Poitou-Charentes, Provence-Alpes-Côte-d'Azur, Réunion
Creative industries	Île-de-France, Nord-Pas-De-Calais, Poitou-Charentes

Bourgogne, Franche-Comté and Bretagne regions do not appear in this thematic table as they have chosen for their RIS cross-functional approaches for supporting innovation, e.g. training, networks building etc.

Second dimension of national support for S3: through a series of calls of excellence such as IDEX (Initiatives of excellence) that have been launched in the framework of the “future investment” programme, most regions have already selected the scientific and technological fields they have chosen to specialise in.

2.7 Evaluations, consultations

The French government has launched in July 2012 the so-called round table on Higher Education and Research. The aim announced for this consultation process was to prepare the next law on Higher Education and Research, which will be debated in the Parliament during the first semester of 2013.

The consultation process that took place between July and October 2012 has involved a wide range of stakeholders. All the major French HEIs and PROs have produced contributions for the round table. Over these four months, 106 institutions' representatives have been auditioned by the National Steering Committee; regional round tables have been organised to debate the propositions and, finally, on November 26th and 27th, the concluding national round table gathered over 600 people, who debated the propositions that emerged from the regional round tables.

The resulting report summarising the propositions expressed during the debates includes 135 proposals²³. Four main themes can be singled out:

²² Délégation interministérielle à l'Aménagement du Territoire et à l'Attractivité Régionale (2012). Guide pour la préparation des stratégies de spécialisation intelligente des régions françaises, édition novembre 2012.

- Improve the success of students during the first cycle of higher education - the drop out rate reaches currently 60%.
- Reorganise the research system deemed by many actors as too complex (every new reform adding a new institutional layer) and reduce the share of competitive funding.
- Change the governance structure of universities, with a pending controversy about the extent of regions' role versus central steering
- Improve the research assessment; the current procedures led by AERES being criticised as too bureaucratic.

It is not yet known to what extent the future law on Higher Education and Research will build on these propositions.

²³ Berger V., 2012, Assises de l'enseignement supérieur et de la recherche, rapport au Président de la République.

3 STRUCTURAL CHALLENGES FACING THE NATIONAL SYSTEM

According to the IU Scoreboard 2011, France belongs (with Austria, Belgium, Cyprus, Estonia, Ireland, Luxembourg, Netherlands, Slovenia) to the category of “innovation followers”, a group of European countries whose performances are close to EU average but are lagging behind the small group of EU countries “innovation leaders” (Denmark, Finland, Germany and Sweden) that outperform the average.

Overall, France performs above the average within this group of “innovation followers”. French relative strengths relate to human resources, to openness excellence and attractiveness research systems and to finance and support functions. French relative weaknesses relate to R&D firms investments, intellectual assets and Innovators²⁴.

HUMAN RESOURCES	
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	1.5
Percentage population aged 25-64 having completed tertiary education	43.5
Open, excellent and attractive research systems	
International scientific co-publications per million population	645
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	10.09
Finance and support	
R&D expenditure in the public sector as % of GDP	0.85
FIRM ACTIVITIES	
R&D expenditure in the business sector as % of GDP	1.39
Linkages & entrepreneurship	
Public-private co-publications per million population	31.8
Intellectual assets	
PCT patents applications per billion GDP (in PPSE)	3.95
PCT patents applications in societal challenges per billion GDP (in PPSE) (climate change mitigation; health)	0.54
OUTPUTS	
Economic effects	
Medium and high-tech product exports as % total product exports	58.56
Knowledge-intensive services exports as % total service exports	32.58
License and patent revenues from abroad as % of GDP	0.41

Source: IU Scoreboard 2011

From an historical perspective, France’s public research system has been good at generating new knowledge, thanks to its large public research organisations (such as CNRS), which are oriented towards specific scientific fields. Public universities have undergone radical changes since the early seventies: they have changed from often being unspecialised to being specialised in a limited number of research fields. These changes have occurred while public research organisations and universities have, since the 1980s, been strengthening their links, through the development of ‘mixed research units’ (UMR), i.e. research units funded by both the university and a public research organisation. In 2008, a report was published on the effectiveness of the UMR model²⁵. Its main focus was on administrative and management difficulties. The author recommended appointing one person to take responsibility for the management of each UMR, although the UMR would retain a mixed scientific steering committee. This new feature is now in place in several UMR but has not been adopted by all. Moreover, to date no study has been

²⁴ Source : IU Scoreboard 2011

²⁵ [Vers un partenariat renouvelé entre organisme de recherche, universités et grandes écoles \(rapport d'Aubert\)](#) (French)

carried out on the impact of this change on the management and effectiveness of the UMR model.

Since the mid 2000's, the public research system has undergone profound changes regarding its governance regime (University reforms), its funding scheme (with the creation of the National Research Agency and the Competitiveness clusters), and through the reorganisation of the public research organisations. At the same time, the state funding for public sector higher education and research has increased: the public budget appropriation for research grew from €9.031b in 2002 to €15.087b in 2011 (+67 %). The public effort to support research has also increased, through the 'Investments for the Future' programme, which is providing €22b of investments for higher education and research.

Despite these transformations, the French innovation system keeps facing three main challenges:

Challenge 1: Ongoing structural change in France's industrial specialisation and need to create new firms in high-tech sectors

The level of privately funded R&D in France is linked to its **industrial specialisation**: low and medium technology sectors account for a significant share of employment and added value. This affects the level of R&D expenditure. For instance, only 52% of industrial R&D expenditure is on high technology sectors, whereas it is 62% in the United Kingdom²⁶ (data for 2008). The size of medium or high technology manufacturing sectors is smaller in France than in other comparable EU countries²⁷: Knowledge intensive activities account for 39.5% of total employment, a percentage that is above the EU average, but below the percentage characterising the reference group for France in the Innovation Union Competitiveness report (France, Belgium, Austria and the UK: 40.9%).

84.1% of business expenditure for R&D (BERD) is carried out by the manufacturing sector, with three industries – automotive, pharmaceuticals, and aeronautics – concentrating 40% of spending. Only 6% the French companies belonging to the group of largest R&D investors are high technology intensive companies; the remaining ones being medium or low technology intensive companies²⁸.

A possible solution would be to increase the share of the manufacturing sector in the total added value of the economy and the share of high-technology industries in the overall manufacturing sector.

The challenge France is facing in this area relates to the effectiveness of:

- policies supporting the growth of companies in the technological industries of the future (e.g. the Competitiveness clusters' policy);
- policies aimed at supporting the exploitation of research outcomes.

Challenge 2: Support R&D activities of mid-size SMEs and promote a culture of innovation

French private R&D expenditures are highly concentrated in certain categories of firms. A 2011 study from the Ministry of Industry argued that the capacity of companies to innovate is determined by two main factors²⁹: the size of the company and its market power. Larger companies have higher capacities to engage in some form of innovation. The results of a survey carried out by the Ministry of Industry in 2007 showed that 81% of the largest companies in the

²⁶ CPCI (2010), *Investissement, R&D et innovation – rapport 2009*

<http://www.industrie.gouv.fr/p3e/cpci/cpci2009.pdf>

²⁷ European commission (2011), *Innovation Union Competitiveness Report, 2011 edition*

<http://ec.europa.eu/research/innovation-union/pdf/competitiveness-report/2011/iuc2011-full-report.pdf#view=fit&pagemode=none>

²⁸ Centre d'Analyse Stratégique (2010), *R&D et structure des entreprises, une comparaison France / Etats-Unis*

²⁹ MINEFI (2011), *L'innovation dans les entreprises: moteurs, moyens et enjeux*

manufacturing sector had engaged in some form of innovation in the immediately preceding years, whereas this percentage was only 30% among companies with less than 50 employees³⁰. This phenomenon is related to the employment of R&D staff: in 2009, companies with more than 500 employees performed 71 % of GERD and 53 % of all R&D employees worked in companies with more than 100 employees³¹.

One challenge is therefore to foster the growth of SMEs into enterprises of intermediary size (ETI) with improved capacity to undertake R&D - in comparison with the USA, France has approximately the same percentage of intermediate-sized companies; however, they spend less money on R&D than US firms of the same size³².

Another challenge that public authorities face is the poor interest shown by companies for innovation. This is due to the weak culture of innovation characterising French companies. The 2008 Community Innovation Survey underlined that only 43.4% of French companies with more than 9 employees are innovative.

In France, there are twice less ETIs than in Germany or UK. Yet they are successful businesses³³. Medium-size companies (ETI) have long been neglected by the government: this is demonstrated by the fact that they have only been statistically defined in 2008. Contrary to SMEs and large groups, ETIs are not prime targets for government support to R&D. France is lacking ETIs, and the challenge is to encourage growth and innovation in this category of firms.

Tackling these challenges requires a long-term focus of public policy on support for innovation and research projects in SME, in particular for the firms of intermediary size and SMEs that do not belong to big conglomerates.

Challenge 3: Transfer of knowledge from the public to the private sector

This challenge is connected with the first two challenges mentioned above and concerns **the insufficient transfer of knowledge from the public to the private sector**. This poor performance results from the bounded capacity of business actors to exploit public research outcomes but also from an insufficient tuning of public research ‘knowledge transfer’ offices with actual business needs.

For instance, a recent study by Robin and Schubert³⁴ has shown that cooperation between public and private sectors in France contributes less to companies’ innovation capacity than in Germany. The authors base their conclusion on an econometric study on the share of innovative products in total turnover and link this feature to the deficient effectiveness of public-private partnerships. More specifically, it is difficult for private companies to cooperate effectively with public research teams in such partnerships. The reason for this is the complexity of the ‘knowledge transfer’ system, and stems in particular from the fact that private companies face difficulties for finding the right partners³⁵.

The French government has taken measures to overcome these weaknesses. Two of them stand out: the competitiveness clusters policy (*pôles de compétitivité*), which was launched in 2005 and the reform of the Universities, launched in 2008. The competitiveness clusters policy has contributed to increasing the number of collaborative projects between public research teams and private

³⁰ CPCI (2007), *Innovation dans l'industrie manufacturière*

³¹ MESR Data

³² Centre d'Analyse Stratégique (2010): *R&D et structure des entreprises, une comparaison France / Etats-Unis, Note de veille n°173, Avril 2010*

³³ B. Retailleau (2010), “Les entreprises de taille intermédiaire au coeur d’une nouvelle dynamique de croissance”

³⁴ S. Robin et T. Schubert (2011), “Partenariats public/privé et innovation dans les entreprises”, in MINEFI (2011), *L'innovation dans les entreprises: moteurs, moyens et enjeux*

³⁵ Inspection Générale des Finances (2007), *Rapport sur la valorisation de la recherche*
<http://www.ladocumentationfrancaise.fr/rapports-publics/074000113/index.shtml>

companies and the reform of French Universities has changed University governance in that companies are now represented on their boards of directors. The goal of this new representation is to better match higher education qualifications with business needs.

More recently, the 'Investments for the Future' programme has also led to the introduction of new instruments for supporting the exploitation of research outcomes: e.g. SATT (Technology Transfer Acceleration companies), IRT (Technological Research Institutes), IEED (Institutes for Excellence in the field of carbon-free energies).

4 ASSESSMENT OF THE NATIONAL INNOVATION STRATEGY

4.1 National research and innovation priorities

The implementation of the ‘Investments for the Future’ programme has mobilised significant efforts from both policymakers and the research community. But 2012 has not seen any key policy developments for national research and innovation priorities. During the first half of the year, the structural reforms undertaken since the mid-2000s have been pushed as far as possible before the presidential election. The second part of the year has been dedicated to carry out a wide-ranging Consultation Process. Possible changes have been postponed to 2013 in the framework of the new Law on Research planned for the first semester of 2013.

Since 2005, the French research and innovation system has been the subject of far-reaching reforms with, among others, the creation of competitiveness clusters, the National Agency for Research (ANR), the strengthening of university autonomy, and all the measures deriving from the ‘Investments for the Future’ programme, such as the creation of the SATT (Technology Transfer Acceleration companies), the IRT (Technological Research Institutes), PFT (Technology Platforms), the IHU (Excellence Initiatives, University-Hospital Institutes) and IEED (Institutes for Excellence in the field of carbon-free energies). The objective has been to increase the performance, the visibility, the international influence and the exploitation of French research.

Since 2009, France has a multi-annual RDI strategy, which is called the National Research and Innovation Strategy (SNRI). The 2009 priority-setting exercise involved individuals from various stakeholder communities (research, business and civil society) organised into nine working groups with a remit to identify France’s strengths and weaknesses. The strategy that was developed covers five years from 2009 onwards and is guiding policy decisions in the field of R&D&I. Three main priority areas were identified that address key societal challenges:

- Health, care, nutrition and biotechnology;
- Environmental urgency and eco-technology;
- Information, communication and nanotechnology.

Generally speaking, the national strategy acknowledges the major role of innovation for business competitiveness and puts the emphasis on the necessity to improve research exploitation.

More precisely, in order to create an effective and competitive innovation ecosystem, the National Research and Innovation Strategy laid down the following targets:

- avoid the scattering of resources and aim for excellence by: 1. Incentivising collaboration between universities, research bodies, businesses and competitiveness clusters; 2. Making the research exploitation systems more professional; 3. Simplifying public-private partnerships.
- reinforce the growth capacity of new innovative companies,
- reduce patenting costs,
- strengthen the access to “public procurement” for innovative SMEs,
- promote the spirit of entrepreneurship.

In 2012 France pursued the strategy set out in the 2009 National Research and Innovation strategy (SNRI). In the last three years, the French context has experienced two major

institutional and policy developments, namely: i) the creation of “*Alliances*” and ii) the implementation of the “Investment for the Future programme”.

The ‘*Alliances*’

The major recent institutional development was the creation of **the Alliances**³⁶. In order to optimise coordination between PROs on the one hand, and PROs and Higher Education Institutions on the other, “*Alliances*”, which were launched in April 2009. Their aim is to bring together the different stakeholders in a given research domain to better coordinate research programming. Five *alliances* are currently in place in the fields of life science and health, energy, marine sciences, ICT and the last one created in 2010 in SSH³⁷.

The “Investments for the Future programme”

Through the injection of “fresh money”, the ‘**Investments for the Future programme**’³⁸ is a further key recent policy development designed to boost the effectiveness of the higher education, research and innovation system. Following the economic crisis, the French government decided in mid-2009 to launch a national loan³⁹. A Commission was set up to determine the priorities that the loan should address. Projects in these priority areas receive funding to enable them to respond to long-term challenges such as the knowledge economy, business competitiveness and strategic investment in industry.

In December 2009, it was agreed that the national loan would make €35bn available for five priorities: support to higher education (€11b), support to research (€8b), support to industry and SMEs (€6.5b), support to the digital economy (€4.5b), and support to sustainable development (€5b). The loan provides €21.9b for investment in research and higher-education, of which €17.9b has been made available through competitive calls from 2010 to 2012.

The “Investments for the Future” programme includes a wide range of measures from which can be singled out :

- IDEX - 8 campuses have been selected as flagships for the entire French research and education system;
- LABEX - 171 research laboratories have been selected excellence and provide them with financial resources to compete with international research institutions, attract internationally recognised researchers and perform high level research and education programmes;
- IRT – 8 Technologic Research Institutes, located within existing campuses around France have been selected⁴⁰;
- IHU: 6 projects of high-level research in the field of health and biomedical science have been selected aims to finance⁴¹.

4.2 Evolution and analysis of the policy mixes

Over the past few years, France has made significant efforts to improve the effectiveness and performance of its research and innovation system. The French research and innovation policy

³⁶ <http://www.enseignementsup-recherche.gouv.fr/cid56287/les-alliances.html>

³⁷ AVIESAN, ANCRE, ALLISTENE, AllEnvi, ATHENA

³⁸ <http://www.enseignementsup-recherche.gouv.fr/pid24578/investissements-d-avenir.html>

³⁹ The loan has been subscribed on the money market. It has been forecast that the National loan will become self-financing by 2020, thanks to the business activities generated.

⁴⁰ Nanoélec; AESE; Lyon Biotech, M2P, Railenium; Jules Verne, SystemX; B-COM

⁴¹ Institut de neurosciences translationnelles; Institut de cardiométabolisme et nutrition; Imagine (maladies rares); Institut de rythmologie et modélisation cardiaque; Chirurgie mini-invasive guidée par l’image; Maladies infectieuses.

mix now in place offers a wide range of public support measures in support of public and business research. Public support to R&D is also increasingly provided on a competitive basis.

The French system has a number of weaknesses, such as stagnating private expenditure, a poor outlook for R&D employment growth, a scientific and technological specialisation in relatively mature fields and weak knowledge circulation beyond strategic sectors.

The set of measures developed over the last three years have had the goals of strengthening the public policy response to the challenges facing business R&D and connections between public and private sector R&D efforts.

The current policy mix is focused on i) stimulating private R&D investment, with a particular focus on SMEs; ii) increasing the attractiveness of scientific careers and, iii) fostering collaboration between public and private sectors.

Stimulating R&D private investments

Over the last three years, France has increasingly focused on incentivising private research and to this end has developed a set of measures to stimulate greater private R&D investments, in particular through the research tax credit scheme, competitiveness clusters and the Young Innovative Companies programme (*Jeunes Entreprises Innovantes*, JEI).

The **Research Tax Credit** (*Crédit d'impôt Recherche - CIR*) is the most important measure for supporting business R&D investment. In 2009, the Research tax credit reached €4.7b, which is equal to 60% of the total public funding allocated to businesses. It accounted for €5,09b in 2011, and €4,5b in 2012. The 2008 reform of the Research Tax Credit (see Erawatch country report 2010) was designed to encourage companies that already perform R&D to increase their efforts and it has succeeded in doing so. In a recent document⁴², the French Ministry for Higher Education stated that this measure has been effective in mitigating some of the consequences of the economic crisis, especially in tackling offshoring. Procedures have been eased and according to the government, almost all SME's involved in R&D activities now use the research tax credit scheme. The 2011 Budget Act has also refined the eligibility conditions for the research tax credit in order to avoid possible windfall effects. To avoid potential abuses a number of modifications have been adopted regarding the basis and methods for calculating the tax credit and on reporting requirements⁴³.

Competitiveness Clusters are also an important policy and are seen to be a means of encouraging greater R&D investment by companies. The goals are: to support the strategic governance of clusters, finance structuring projects — such as innovation platforms — and develop other aspects of cluster ecosystems such as competence management, international development, IPR management and introduce incentives to leverage more private funding to support the growth of SMEs. Competitiveness clusters bring together companies, training centres and public and private research organisations around innovative collaborative projects. Industry and public research institutions collectively identify innovation projects with an international dimension which are then supported by public funds. France launched its national

⁴² *Ministère de l'Enseignement supérieur et de la recherche* (2011), *Crédit Impôt Recherche, un outil anti-délocalisation*

⁴³ For instance:

- The temporary measure of anticipated reimbursement of the tax for 2010 is limited to SMEs and SMEs with the Young Innovative Entreprises status (JEI);
- The bonus for research tax credit newcomers was reduced from 50% tax break the 1st year to 40% and from 40% the 2nd year to 35% starting January 2012;
- The overall calculation scheme is modified (from 75% to 50% for R&D employees' wages).
-

competitiveness cluster policy to make businesses more competitive, to build up employment in promising markets and to strengthen the regions. The total budget of the second phase of the competitiveness clusters policy (2009-2011) amounts to €1.5 billion.

The **Young Innovative Companies** initiative (*Jeunes Entreprises Innovantes*, JEI), is another major support measure for innovation. It was reformed by the 2011 finance law. The JEI status is applied to innovative SMEs (innovative being defined as 15% of turnover devoted to R&D) operating for less than 8 years. Companies that benefit the JEI status become eligible for a series of tax rebates including exemptions on corporate earnings taxes, local taxes and social charges associated with the employment of highly qualified personnel. There were 2600 JEI in 2010 (1,353 in 2004); the total tax break amounted to €121,7m in 2009 (€62,3m in 2004); data shows that tax reductions have on average contributed to the work of 5 employees in a JEI; the average number of employees in such companies is 8 (for 2009). The main change is that the tax-break on R&D employees' wages will decrease as off the fourth year of the company's life (the tax-break was previously fully applied from the 8th year).

France's innovation policy also recognizes the importance to SMEs via the **OSEO Agency**, which supports SMEs in their innovative activities (mainly through measures such as support to innovative projects, support to strategic industrial projects and the single inter-ministerial funds that finances R&D projects within the competitiveness clusters through calls for projects). One of its roles is to distribute subsidies and loans. OSEO Innovation focuses on supporting innovative projects undertaken by a single business where the maximum cost does not exceed €3 million. OSEO's funding to innovation reached €744m in 2012 (compared to €659m in 2011 and €650m in 2010). OSEO has a wide range of tools and instruments to support R&D and innovation in SMEs and ETIs and a very wide spectrum of funding from 15000 € to about €3 million.

In addition to this, the lion's share of the **"Investments for the Future"** programme is devoted to innovation. Indeed, €3.09b have been over the last three years allocated to business financing measures⁴⁴. The management of the funds is delegated to national agencies. In the field of innovation the ANR, OSEO and the ADEME are the three main operators.

4.3 Assessment of the policy mix

Policy objectives and priorities — notably increasing the private sector R&D effort — are in line with the challenges facing France but significant effects are not yet demonstrated. Indeed, despite the increase in the public funding for private R&D expenditures (mostly through increased project funding), the private resource mobilisation for R&D is still relatively low (1.39% of GDP in 2009⁴⁵/ 1.27% of GDP in 2008). Funding of GERD by the French business sector has decreased compared with 2006 and stood at 51.0% in 2010. As a consequence, the percentage of GERD financed by the business sector in France is still below the overall objective of having two-thirds of GERD financed by private enterprises (laid down in Lisbon).

Moreover, private resource mobilisation for R&D is still dependent on a few large companies operating in relatively low R&D-intensive sectors. In 2008, companies with more than 25,000 employees accounted for about 89% of R&D expenses in France compared to 83% in the EU and 64% in the USA (CAS 2010). Compared to the USA, France suffers from a deficit in R&D intensive intermediate-sized companies (ETI). Several studies on this category of company were published in 2009 and 2010 and advocated specific public support measures targeting them.

The challenge of increasing business R&D spending is clearly addressed through the Research Tax Credit⁴⁶. As noted earlier, this instrument has been an effective tool for softening some of the consequences of the economic crisis, especially in tackling offshoring. Following the

⁴⁴ <http://investissement-avenir.gouvernement.fr>

⁴⁵ MESR-SIES Pôle Recherche et INSEE

⁴⁶ <http://www.enseignementsup-recherche.gouv.fr/pid24835/credit-impot-recherche.html>

simplification of its procedures, almost all SME's involved in R&D activities now use the Research Tax Credit scheme. Recent econometric studies suggest that the measure effectively impacts business R&D spending even though it is not enough to comply with the 3% Lisbon target. After three revisions and improvement, the Research tax credit is the costliest tool addressed to any business active in R&D in France⁴⁷. According to the Ministry for Higher Education and Research⁴⁸ the CIR was instrumental in stabilising the level of business R&D investment in 2008 (about €15bn). The simplified CIR mechanism results in the increased use of the credit by business. Moreover, a substantial number of businesses (53%) have increased their R&D expenditures thanks to the CIR. With the exception of the automotive (-20%) and the aeronautics (-20%) sectors (particularly affected by the economic crisis from 2008), French manufacturing sectors have increased their expenditures (+2%). According to a survey carried out in 2008 the CIR has also generated a number of other positive impacts: 58% of businesses consider that the reformed CIR encourages the increase of R&D expenditures; 34% recognize that the CIR fosters joint research; and 29% that it encourages the hiring of PhDs qualified personnel.

Since 2009, a substantial amount of money has been invested in the research and innovation system, in particular through the fresh money injected by the Investment for the Future programme. It is too early to judge what the real effects and impacts of this programme on the French system will be. The Investment for the Future funds have not yet been distributed, even though most of the calls for projects are now closed. It is unlikely that such an investment will be renewed in the next 5 to 10 years. It is clearly expected that the public money should trigger a strong leverage effect and that the private sector should react massively and positively. The challenges ahead deal with the management and the leverage effect of this investment⁴⁹.

At the same time, the two flagship measures in support of business R&D (Research tax credit and Young Innovative Companies – the JEI) have been affected by targeted cuts. There are now lower tax breaks for first time applicants and there has been a tightening of conditions regarding sub-contract tax breaks for CIR and lower tax breaks after 5 years for JEI. A close monitoring of the impacts of these reforms should be undertaken in order to assess their appropriateness, notably in light of the challenges France faces.

There have been efforts to tackle the long-standing barriers relating to the weakness of knowledge circulation and transfer through the development and deepening of a large range of instruments aimed at increasing the diffusion of academic knowledge (Competitiveness Clusters, SATT, and Carnot Institutes). However, these instruments have not produced immediate results, and if they have, they have not yet been assessed. However, long term effects can be expected. An evaluation of the competitiveness clusters policy is currently underway.

The Investments for the Future programme was designed to bring clarity to the French research and innovation system, but so far the increase in the number of support measures resulting from this programme seems to have had the opposite effect, e.g. new structures have been added to existing ones.

In addition, considerable efforts have been made to improve the attractiveness of academic careers. As noted by the NRP assessment 2011, although much remains to be done, France has implemented measures (*Plan Carrières*, Autonomy of universities) that are heading in the right direction but are too recent to be assessed. Universities have been assigned a third mission, namely, assisting their graduates to enter the labour market. A 2010 report commissioned by the minister for higher education and research used international benchmarks to identify the success factors that lead a university to become excellent in job market matching (Aghion P., 2010). The report proposes three recommendations for France to improve the current situation: i) increase

⁴⁷ See TrendChart 2011, Mini Country Report France.

<http://www.enseignementsup-recherche.gouv.fr/cid49931/cir-statistiques-rapports-et-etudes.html>

⁴⁸ See TrendChart 2011, Mini Country Report France.

⁴⁹ TrendChart 2011 Mini Country Report France.

the financial resources going to higher education (to reach 2% of GDP), use of the Investments for the Future programme for innovative teaching projects, ii) a more balanced governance of universities by setting up boards of trustees open to individuals from outside academia, and iii) promote the development of university colleges to be responsible for all undergraduate courses⁵⁰. All in all, a large set of measures has been taken to boost private R&D investment and to foster cooperation between public and private research. Even if most of these measures are considered useful and beneficial, the fact remains that the new instruments are many and complex and add to existing mechanisms, increasing to some extent the complexity of public support. Overall, the priorities of the policy mix are in line with the challenges. However, their efficiency and effectiveness are not yet demonstrated, and success will depend very much on the future economic environment and the resulting public budgetary constraints.

The table below presents an overall assessment of the policy mix over the last three years in terms of relevance, efficiency and effectiveness.

⁵⁰ Erawatch Country Report 2010

Assessment of the policy mix

Challenges	Policy measures/actions ⁵¹	Assessment in terms of relevance, efficiency and effectiveness
Structural change in the French industrial specialisation and creation of new firms on high tech sectors	Competitiveness Clusters ANR - rising budget for project based research OSEO Agency subsidies and loans for business driven innovation projects+wider range of diverse support instruments and financial engineering	Relevant and appropriate Policy objective and priorities are in line with challenges but significant effects are not yet in evidence. The results do not match the strong political will. Low efficiency and effectiveness: no significant change of sectorial structures of the French economy. Context is still not conducive to an increase in business R&D. Effectiveness is not proven insofar as private resource mobilisation for R&D still depends on few large companies that are operating in relatively low R&D-intensive sectors.
Strengthen innovation in French companies	Research Tax Credit	Relevant and appropriate but challenges Effectively impacts business R&D spending. But it is still not enough to comply with France's 3% target laid down by the Europe 2020 strategy
	ANR rising budget for project based research OSEO Agency subsidies and loans for business-driven innovation projects	Relevant and appropriate but challenges Effective increase in the public R&D expenditures towards the private sector in particular through increased project based funding mechanisms. Efforts may be insufficient.
	"Investment for the Future" programme	Relevant and appropriate but challenges Too early to assess the effects and impacts of this programme A large part of the programme is dedicated to innovation and in particular to funding business innovation.
Transfer of knowledge from the public to the private sector	"Investment for the Future" programme (IRT; Carnot Institutes; IEED; National Seed Fund)	Relevant and appropriate but challenges Too early to assess the effects and impacts of this programme There has been a good uptake by public and private stakeholders of the support measures for enhancing knowledge transfer.
	Competitiveness Clusters /SATT	Relevant and appropriate but challenges Development and deepening of numerous instruments able to increase diffusion of knowledge. The challenge is clearly addressed
	"Reform of universities/ "Plan carrières 2009-2011"	Companies have representation in the board of directors. This helps to improve the relevance of higher education qualifications to business needs. It is appropriate and in line with challenges insofar as the objective is to reach a better fit between education and labour market and to strengthen the link between education and research. Is in line with challenges but effectiveness is not yet Proven. Effects can be expected in the long run.

⁵¹ Changes in the legislation and other initiatives not necessarily related with funding are also included.

5 NATIONAL POLICY AND THE EUROPEAN PERSPECTIVE

Based on an analysis of the strengths and weakness of Europe's research systems and the overall objective of inducing lasting step-changes in Europe's research performance and effectiveness by 2014, [the European Commission has defined the following European Research Area \(ERA\) priorities](#) (2012):

1. More effective national research systems
2. Optimal transnational co-operation and competition
3. An open labour market for researchers
4. Gender equality and gender mainstreaming in research
5. Optimal circulation, access to and transfer of scientific knowledge.

In the last decade the French research and innovation (R&I) system has been transformed and adapted so that it better integrates international dimensions and the ERA (creation of a national research agency, a national research strategy etc). These multiple initiatives address in a large extent the ERA priorities and could go beyond those.

5.1 More effective national research systems

After the adoption of the National Strategy for Research and Innovation (SNRI) in 2008, which focuses on building a medium-term strategy and choosing priorities, the major developments in the last three years relate to the 'Investments for the future' programme, which was launched in 2010. This programme used procedures based on competitive calls for proposals. The general goal has been to equip France to compete with the leading players at a global level. This is consistent with the EU strategy of focusing on research, development and innovation (R&D&I) to create growth and jobs. Furthermore, the programme aims to strengthen France's research infrastructures, increase the visibility of French research and higher education institutions, and foster public-private partnerships.

Through this programme, the French policy mix focuses mainly on two ERA pillars: 'strengthen research institutions, including, notably, universities' and 'facilitate partnerships and productive interactions between research institutions and the private sector'.

In 2012, the French Ministry of Research launched a process of updating the initial national strategy to cover the period 2012-2020 named "France-Europe 2020". The first objective of the strategic agenda is to address Grand Societal Challenges

Because most of these developments have come in the last few years, it is difficult to assess their effectiveness. However, they are consistent with national priorities and some of the major challenges the country is facing in R&D&I. Concerns exist as University reform, the creation of the National Agency for Research (ANR) and the 'Investments for the Future' programme have

led to an increase in the complexity of the French policy mix, and national authorities have to focus on the overall coherence of these new measures.

The share of funding allocated through competitive calls has increased considerably since the creation of ANR in 2005. . There is currently a debate in France the balance of competitive funding versus institutional funding. The law⁵² points out the negative impact of the multiple calls for projects of research production especially on fundamental research. The increase in competitive funding did not result on an increase in the number of patents and start-ups created.

Concerning the allocation of research funds with using the core principles of international peer reviews, ANR , the main provider of fund through competitive calls, has certified ISO 9001 the internal procedures (programming, evaluation, monitoring). The agency indicates in its evaluation guidelines⁵³ that a significant number of international experts (non-French resident) have to be involved in the evaluation process.

5.2 Optimal transnational co-operation and competition

All ANR national programmes, either thematic or non-thematic, are open to transnational research proposals without the prior signature of an agreement between the ANR and a partner funding agency. However, the foreign partner must ensure their own financing and the project coordinator must clearly explain in the proposal the following: Whether the activities are carried out with already existing funds; Whether the foreign partner has already received national funding for its contribution to the proposed project; Whether the foreign partner requested a national funding for their participation in the project by sending out the same scientific proposal to a funding organisation of in their country.

Out of ANR activities, coordination of international cooperation at the national level is a real challenge for France because most of the international agreements are decided at the institutional level. The same challenge exists for cross-border cooperation, where agreements are made at the local level. International cooperation and knowledge circulation across Europe have been identified by the National Research and Innovation Strategy (SNRI) as central issues. The objectives are:

- To reinforce the role of France and Europe in international scientific organisations
- To increase France's attractiveness to researchers worldwide
- To develop France's public and private exploitation policy abroad
- To intensify cooperation with international scientific partners
- To increase research for development.

According to ANR, the first focuses are China, India, Japan, South Korea, Brazil and Russia. Those countries have strong scientific potential and improved scientific relations will result in greater economic exchanges and closer diplomatic relations in light of major global economic change and development.

⁵² Projet de loi relatif à l'enseignement supérieur et à la recherche 20 mars adopté le 29 mai 2013 en première lecture, <http://www.assemblee-nationale.fr/14/pdf/projets/pl0835.pdf>

⁵³ http://www.agence-nationale-recherche.fr/fileadmin/user_upload/documents/uploaded/2010/Guide-Comite-Evaluation-ANR-2010.pdf

Some of the SNRI objectives relate to the creation of a general framework for international cooperation, with a special focus on the large emerging countries and developed countries in Asia, because of their high potential in the field of R&D and their increasing economic strength. In this respect the new alliances may take the initiative in organising international cooperation on behalf of their members. In this way, French research organisations are collaborating with a view to engaging in international collaboration.

Regarding infrastructures, France adopted a national Roadmap 2012-2020 for research infrastructures. This roadmap has a threefold ambition: to explain the French Government's political orientations regarding infrastructures; to draw up a global governance scheme adapted to the coordination requirements of the various operators; to propose flexible and reactive annual updating procedures for all of the infrastructures (annual dashboards) together with, for the large infrastructures, an exhaustive financial follow-up concerning all costs.

5.3 An open labour market for researchers

With regard to the five objectives identified in the ERA communication, efforts have been made in the last few years to increase the attractiveness of scientific careers including gender equality issues and to foster coordination between the national and European levels. With respect to the attractiveness of scientific careers, a 'Plan Carrières' (Career Plan) was introduced in 2009, with the idea of attracting more people into a scientific career in the public sector, including the best scientists from other countries. The plan is related to a strategy of increasing the autonomy of French universities, which includes more freedom regarding human resources management.

5.4 Gender equality and gender mainstreaming in research

A charter for gender equality between Ministry of research and conference of rectors and heads of schools of engineers has been signed at the beginning of 2013. The charters requires the nomination of a contact point in each organisation; the production of statistics taking into account the gender dimension; and actions encouraging gender-mix and professional equality

Moreover the French Ministry has signed, in April 2013, an agreement with four associations aimed at promoting gender equality within the national research system, following the January 2013 declaration of the Minister. The new law (2013) on research and higher education adopted in May 2013 particularly tackles the gender issues introducing Gender equality in governance bodies of universities and other higher education organisations **with a systematic integration of gender equality in the contractual dialogue between Ministry of Higher Education and Research, and universities and research organisation.**

5.5 Optimal circulation, access to and transfer of scientific knowledge

Regarding Open Access (OA), conference of rectors and heads of schools of engineers, signed in July 2006 a Memorandum of understanding for "a coordinated approach on a national level to open archiving of scientific outputs". Although this agreement has not been renewed, it paved the way to the development of many institutional repositories in connection with the Hyper Articles on Line (HAL) platform. In March 2005, in a joint press release, the four largest French research institutions (CNRS, INRA, INRIA, Inserm) announced their agreement to develop interconnected institutional open access repositories.

This decision provided ground to the HAL platform that became the repository supported by national-level research institutions. At the time, the platform was moving towards a repository

collecting both doctoral dissertations and scientific papers in a wide range of fields, thereby providing various subject communities with specific deposit and retrieval interfaces.

France has not yet implemented any mandates regarding article deposits. Some research institutions merely have filing requirements, while some agencies, universities or disciplinary entities enforce more or less effective incentive policies. The open archiving issue is part of a ministry programme to establish a large digital library for scientists and researchers in state-run institutions. In parallel, a host of citizen and professional initiatives have increased awareness on the need for Open Access, such as the 2011 Open Data Declaration⁵⁴.

The French Government's current (2013) strategy consists of developing green access⁵⁵, while assisting those users that prefer Gold access with the negotiation of licences with publishers, and promote a third option called "platinum" which is a hybrid between Green and Gold access⁵⁶.

Regarding Public-Private Partnership (PPP), recent reforms are ambitious. Universities were organised in so-called Research and Higher Education Clusters (PRES), The SME agency OSEO was set-up to accompany start-ups, Societies for Accelerated Technology transfer (SATTs) were set up, and France Brevet, an agency set up in 2011, aims at an improved flow of patents. The set-up of competitive clusters ("pole de compétitivité") and "instituts Carnot" is meant to stimulate PPP. In addition, the conventions CIFRE scheme was set up to encourage PhD students to pursue their thesis work in an industry setting. Also, in November 2012, the Ministry of Higher Education and Research announced a series of 15 measures aimed at technology transfer⁵⁷ to be specified and implemented after the 2013 draft legislation on higher education and research⁵⁸.

Regarding the electronic identity for researchers, Renater is the French member of the eduGAIN⁵⁹ service intended to enable the trustworthy exchange of information related to identity, authentication and authorisation between the GEANT⁶⁰ (GN3plus) Partners' federations. Renater is grouping the Ministry of Higher Education and Research as well as a number of PROs and Universities with the objective to link their IT research infrastructure and the mutualisation of research-related IT services. In France, there are 176 institutions collaborating with the identity federation platform⁶¹.

⁵⁴ <http://donneeslibres.info/opendataFR.pdf>

⁵⁵ The appeal of the Gold route to open access is that the publisher does the work of making the article freely available in an obvious, well-known place in its final typeset format. Conversely the appeal of the Green route is that it doesn't cost the author or her institution any money

⁵⁶ <http://www.enseignementsup-recherche.gouv.fr/cid66992/discours-de-genevieve-fioraso-lors-des-5e-journees-open-access.html>

⁵⁷ <http://www.enseignementsup-recherche.gouv.fr/cid66110/une-nouvelle-politique-de-transfert-pour-la-recherche.html>

⁵⁸ <http://www.enseignementsup-recherche.gouv.fr/pid29078/projet-de-loi-d-orientation-pour-l-e.s.r.html>

⁵⁹ <http://www.geant.net/service/eduGAIN/Pages/home.aspx>

⁶⁰ GEANT is the pan-European research and education network that interconnects Europe's National Research and Education Networks

⁶¹ <https://services.renater.fr/federation/participants/idp>

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LIST OF ABBREVIATIONS

AERES	Evaluation Agency for Research and Higher Education
ADEME	Agency for Environment and Energy Management
ANR	National Agency for Research
BERD	Business Expenditures for Research and Development
CEA	Commissariat à l'Energie Atomique
CERN	European Organisation for Nuclear Research
CNRS	Centre National de la Recherche Scientifique
CPER	State-Region Projects Contract
ERA	European Research Area
CIR	Research Tax Credit / Crédit d'impôt Recherche
COST	European Cooperation in Science and Technology
CPER	State-Region Projects Contract
DGRI	General Directorate for Research and Innovation
Equipex	Excellence Equipments
ERA-NET	European Research Area Network
ERDF	European Regional Development Fund
ERP Fund	European Recovery Programme Fund
ESA	European Space Agency
ESFRI	European Strategy Forum on Research Infrastructures
ETI	Economic and Technological Intelligence Entreprises de Taille Intermédiaire
FP	European Framework Programme for Research and Technology Development
EU	European Union
EU-27	European Union including 27 Member States
FDI	Foreign Direct Investments
FP	Framework Programme
FP7	7th Framework Programme
GBAORD	Government Budget Appropriations or Outlays on R&D
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
GOVERD	Government Intramural Expenditure on R&D
GUF	General University Funds
HCST	High Council for Science and Technology
HEI	Higher education institutions
HERD	Higher Education Expenditure on R&D
HES	Higher education sector
ICT	Information and Communications Technology
IDEX	Excellence initiatives
IEED	Excellence Institutes in the field of carbon-free energies
IGF	Inspection Générale des Finances
IHU	Hospital-University Institutes

INRA	Institut National de Recherche Agronomique
INSERM	Institut National de la Santé et de la Recherche Médicale
IP	Intellectual Property
IRSTEA	Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture
IRT	Technological Research Institute / Institut de recherche technologique
JEI	Young Innovative Company / Jeune Entreprise Innovante
KT	Knowledge transfer
LABEX	Excellence laboratories
MAP	Ministry for Agriculture
MEDDTL	Ministry for Ecology, Sustainable Development Transport and Housing
MEFI	Ministry for Economy, Finance and Industry
MINEFI	Ministry for Economy, Finance and Industry
MESR	Ministry for Higher Education and Research
MIRES	Inter-Ministerial Mission of Research and Higher Education
PTF	Technology Platforms
PRES	Research and Higher education
PRO	Public Research Organisations
OECD	Organisation for Economic Co-operation and Development
R&D	Research and development
R&D&I	Research and Development and Innovation
RDI	Research Development and Innovation
RI	Research Infrastructures
RTDI	Research Technological Development and Innovation
RTRA	Thematic Advanced Research Networks
S&T	Science and technology
SATT	Technology transfer acceleration companies / sociétés d'accélération de transfert de technologie
SF	Structural Funds
SME	Small and Medium Sized Enterprise
SNRI	National Strategy for Research and Innovation
SRESR	Regional Research and Higher Education Scheme
SRI	Regional Innovation Strategy
SRR	Regional Research Scheme
SSH	Social Sciences and Humanities
USA	United States of America
VC	Venture Capital

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Abstract

This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). The main objective of the ERAWATCH Annual Country Reports is to characterise and assess the performance of national research systems and related policies in a structured manner that is comparable across countries.

The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context. They further analyse and assess the ability of the policy mix in place to consistently and efficiently tackle these challenges. These reports were originally produced in December 2012, focusing on policy developments over the previous twelve months.

The reports were produced by independent experts under direct contract with IPTS. The analytical framework and the structure of the reports have been developed by the Institute for Prospective Technological Studies of the Joint Research Centre (JRC-IPTS) and Directorate General for Research and Innovation with contributions from external experts.

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.

