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EU Innovation Policy – Part I

Building the EU innovation policy mix

IN-DEPTH ANALYSIS

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This publication aims at providing an overview of the evolution of European Union innovation policy. The paper focuses on the progressive integration of a wide range of policies and instruments into the EU innovation policy mix and reflects on some barriers limiting the development of a EU innovation policy.

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EXECUTIVE SUMMARY

The European Commission first identified innovation as a process which needs to be supported at the European level in the 1960s. During the 1970s, innovation was initially considered primarily a policy topic related to the development of a Community policy on research, before also being linked with industrial policies. The policy was based on a common model describing innovation as a linear process that translates knowledge into products. However, innovation has progressively come to be understood as a more complex process that requires interaction between various actors exchanging funds, knowledge and skills. This new framework to describe innovation has been described in the last decade as the 'open innovation model'.

This evolution in understanding of the innovation process resulted in the acknowledgement that innovation policy is an umbrella policy, rather than a single policy. The innovation policy mix encompasses key policies targeting the actors of the innovation ecosystem (research, industrial and education policies) as well as policies and instruments providing key framework conditions for the innovation process (funding, taxation, regulation, standards, intellectual property rights, etc.). At the European level, regional and cohesion policy and the single market and competition policies are also part of the innovation policy mix.

The first action plan that broadly supported innovation at European level was adopted by the Commission in 1996. This plan was designed to address the 'European paradox', defined as the limited capacity in Europe to convert scientific breakthroughs into industrial and commercial successes. In 2000, the adoption of the Lisbon Strategy provided a new stimulus for EU innovation policy, with the objective to turn Europe into a leading knowledge-based economy.

The European strategy for innovation launched in 2006 proposed a roadmap of 10 actions addressing the full spectrum of the innovation policy mix at European level. In 2010, the Europe 2020 strategy placed innovation at the heart of Europe's quest for smart, sustainable and inclusive growth. The Innovation Union flagship initiative adopted in October 2010 provided clear goals in order to address the bottlenecks in the innovation process. The State of the Innovation Union reports have monitored progress in reaching these objectives annually between 2011 and 2015.

Despite these evolutions in conceptualising and supporting the innovation process, the concept of 'open innovation' is still not fully embraced by policy-makers at the European level. The influence of the outdated linear model of innovation is still evident. The fact that innovation remains part of the portfolio of the Commissioner for Research illustrates that a position reflecting the overarching nature of innovation remains elusive. Adopting 'open innovation' as a clear framework to discuss, define and assess EU innovation policy also implies moving beyond the 'European paradox' with its over-narrow concept of innovation.

While the Innovation Union concept is slowly dismantled, however, the adoption of a new framework to address these limitations and provide a fresh impetus for EU innovation policy is still pending.

TABLE OF CONTENTS

List of main acronyms used

CIP:	Competitiveness and Innovation Framework Programme
EIB:	European Investment Bank
EIP:	European Innovation Partnership
ERA:	European Research Area
ETP:	European technology platforms
ICT:	Information and communications technologies
IPR:	Intellectual property rights
IPTS:	Institute for Prospective Technological Studies
JTI:	Joint Technology Initiative
R&D:	Research and development
SME:	Small and medium-sized enterprise

1. The scope of EU innovation policy

1.1. A policy for innovation

1.1.1. The innovation ecosystem

Innovation can be defined as **the adoption of new products, processes, marketing or organisational approaches that create a valuable outcome in terms of financial benefit, wellbeing or efficiency**, for example. Innovation is not per se an activity, but rather a process that requires interaction and cooperation between different actors. Innovation is not a goal in itself but a means to achieving economic, environmental or social political goals (growth, defence, security, health, etc.).

Key innovation process actors include public research centres; universities; private firms; funding institutions; governmental bodies and agencies. These players interact by exchanging funds, knowledge and skills, creating a complex innovation ecosystem.

Since the 1960s, various models have been developed to understand the innovation process. The first model used is known as the 'linear model', which describes the innovation process as a succession of steps from the production of knowledge to the introduction of a new product on the market. However, it is now understood that the process is more complex and requires numerous feedback loops and interactions between actors. The current model (known as 'open innovation'), focuses on the fluidity of interactions between actors, where the flow of knowledge and skills should allow swift adaptation to take advantage of all opportunities.[1]

1.1.2. Defining innovation policy

Based on this understanding of the innovation process, innovation policy encompasses all the policies and instruments that **may influence the innovation process** in order to increase its **performance**. Innovation policy seeks to identify and address bottlenecks and limitations in the innovation process. It does not directly address the above-mentioned broader political goals, but contributes indirectly to their achievement.

This understanding of the innovation process led to a widening and deepening of innovation policy scope.[2] It is now acknowledged that actions and policies which do not directly target the innovation process may nevertheless have unintentional effects on the process.[3] **Innovation seems to permeate all policies**; setting the boundaries of what 'innovation policy' covers is increasingly difficult. 'Innovation policy' today is a concept overarching a large range of policies, targeting the different actors of the innovation ecosystem and of policy instruments that structure interaction.

1.2. Building blocks of an innovation policy mix

'**Innovation policy mix**' is currently used to describe the set of policies influencing the 'messy and complex, multi-level, multi-actor reality' of the innovation process.[4]

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1 More information on innovation, the innovation ecosystem and the models of innovation can be found in 'Understanding innovation', V. Reillon, EPRS, European Parliament, February 2016.

2 Until the 1990s, innovation policy was mainly considered a component of or complement to research and/or industrial policies.

3 The choice of innovation policy instruments, S. Borras and C. Edquist, Circle Paper 2013/04, Lund University, February 2013.

4 Reconceptualising the 'policy mix' for innovation, K. Flanagan et al., Research Policy Vol. 40, 5, pp. 702-713, 2011.

1.2.1. Key policies targeting actors

A first block of policies in the innovation policy mix targets the actors of the innovation process by defining how they operate and/or how they are organised. Three policy areas are essential in that respect:

- Research and development (R&D) policy, defining the framework for the public, and private institutions conducting research activities and producing knowledge;
- Industrial policy and entrepreneurship policy, including the policies targeting small and medium-sized enterprises (SMEs);
- Education policy, covering all actors of the education system up to higher education and including policies for work force skills development.

1.2.2. Key framework conditions

The framework conditions constitute the second set of policies in a modern innovation policy mix. They cover policies and instruments shaping interactions and organising the flows of knowledge, skills and funds between the actors of the innovation process. The key framework conditions include:

- Direct financial support for the actors under various forms;
- State aid and tax policy;
- Public procurement;
- Regulation framework;
- Definition of standards;
- Intellectual property rights (IPR);
- Partnerships and coordination initiatives; and
- Culture of innovation.

Other policies have an indirect impact on interactions within the innovation ecosystem, employment policies or consumer policies, for example. However, these policies are not usually seen as key elements of framework conditions.

1.2.3. Sectoral policies

In addition to the two blocks of policies and instruments developed specifically in order to shape and improve the innovation process, a wide range of sectoral policies can have an impact on innovation. By introducing new regulations or standards for example, policies developed in the health, environment, energy or transport sectors will stimulate or hamper the innovation process. These policies can also target the actors of the innovation process in a given sector. Hence, sectoral policies can have an impact on both dimensions of the innovation policy mix – actors and framework conditions – and indirectly influence the innovation process.

1.3. Key aspects of the innovation policy mix

1.3.1. Supply-side and demand-side policies

Some elements of the innovation policy mix mainly support the process of innovation by fostering the creation of knowledge, training activities or stimulating the manufacturing of goods, for example. These elements are referred to as supply-side policies. Conversely, some policies and instruments will create a demand for innovation, for example, new regulations implying the improvement of existing goods, or intellectual property rights favouring the production and commercialisation of knowledge. These are referred to as demand-side policies.

Supply-side policies have been widely used since the 1960s to foster the innovation process. They include policies targeting the actors of the innovation process and the

policies and tools related to the funding of various activities through grants and loans for research activities, state aid, venture capital, adapted taxation, etc.

In the last 20 years, the role of demand-side policies to address limitations of supply-side policies has been subject to stronger focus. The set of instruments and policies on the demand-side has been enlarged, with more emphasis on the role of regulation, standards, intellectual property rights (IPR) and public procurement, for example. Sectoral policies often create a demand for innovation, by setting new standards or introducing new regulations.

1.3.2. Categories of instruments

The policies and instruments identified in the key framework conditions vary in nature (as shown in Table 1). Three categories can be identified:[5]

- **Regulatory** tools setting rules for social and market interactions;
- **Financial** tools providing specific pecuniary incentives (or disincentives); and
- **Soft** tools characterised as voluntary and non-coercive (recommendations, voluntary agreements, etc.).

Table 1 – Key components and aspects of an innovation policy mix

	Policy or instrument	Regulatory	Financial	Soft
Supply-side	R&D policy	✓✓✓	✓✓	✓
	Industrial policy	✓✓✓	✓	✓
	Education policy	✓✓✓	✓	✓
	Direct financial support		✓✓✓	
	State aid and tax policy		✓✓✓	
Demand-side	Public procurement		✓✓✓	
	Regulation framework	✓✓✓		
	Standards	✓✓✓		✓
	IPR	✓✓✓		
	Partnerships and initiatives			✓✓✓
	Culture of innovation			✓✓✓
	Sectoral policies	✓✓✓	✓	✓

Source: EPRS ✓: Potential feature ✓✓: Important feature ✓✓✓: Main feature

1.4. Getting it right

The efficiency of each instrument of the mix depends greatly on the socio-economic and cultural context in which it is introduced.[6] Once selected, each instrument has to be designed and/or customised for the context in which it is supposed to operate. The same type of instrument can be implemented in different ways and for different purposes, depending on the moment and context in which it is used.

The introduction of a new component in the mix is a challenge, as all these aspects have to be taken into account. There is a need to ensure that the new instrument will have the expected impact within a given timeframe, without disrupting the effects of other policies and instruments in the mix. The indirect and unintentional effects of new policies (especially sectoral policies) on the innovation process need to be assessed.

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[5] The choice of innovation policy instruments, S. Borras and C. Edquist, Circle Paper 2013/04, Lund University, February 2013.

[6] Lessons from a Decade of Innovation Policy, European Commission, June 2013.

The key objective of innovation policy is to design the best policy mix to support innovation at a given moment in time and at a given level of governance. However, getting it right is a very complex task – even an unrealistic one[7] – as many dimensions and aspects need to be taken into account.

Each policy and instrument in the mix needs to be well-designed in order to address an identified issue in the innovation process. The potential interactions and interdependences of the different elements of the mix also have to be considered. Furthermore, innovation policy mixes are developed at different levels of governance (local, regional, national, European). The overall interactions of these different policy mixes need to be well assessed in order to guarantee the overall coherence and effectiveness of all the initiatives. Hence, **designing an efficient innovation policy mix is a continuous and dynamic process** requiring permanent trade-offs between policies and instruments.

1.5. The EU innovation policy mix

Measures taken by the EU to support innovation aim to complement those implemented at national and regional level. The EU innovation policy mix includes the policies and instruments mentioned above, however, two aspects are specific to the European level:

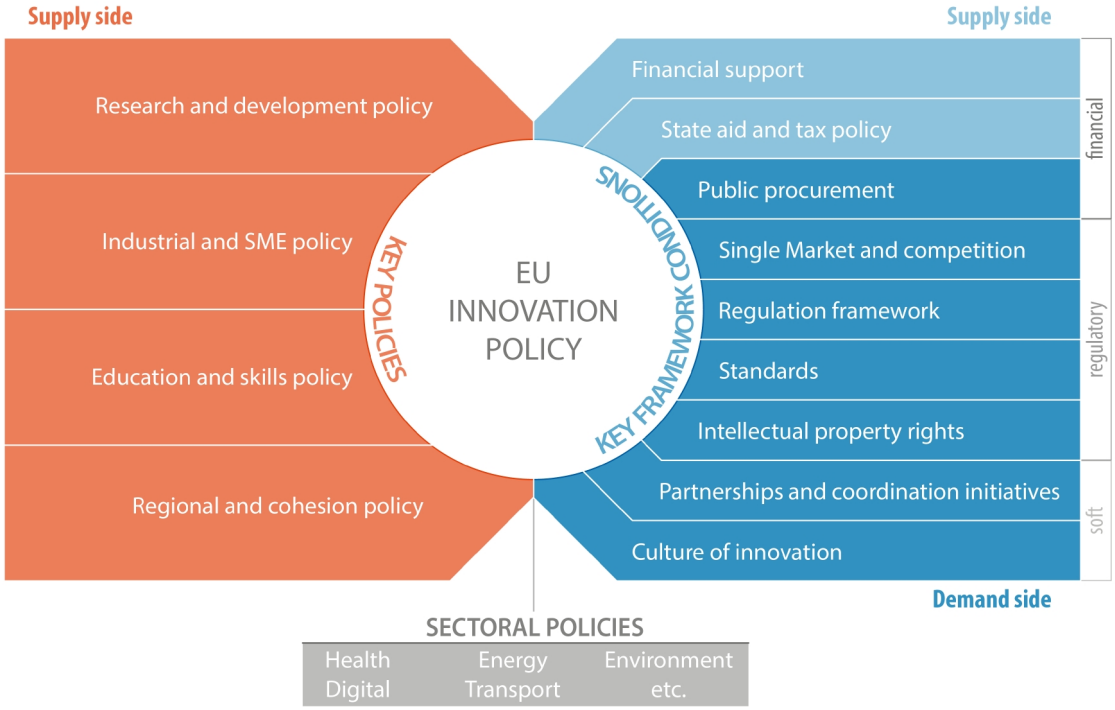
- **Regional and cohesion policy**: these European policies and instruments specifically target and support the actors of the innovation process at the regional level and influence the shaping of regional innovation policy mixes. A large share of the European Structural and Investment Fund for the regions has to be dedicated to the support to the innovation process; and
- **Single Market and competition policy**: the creation of a single market, a key policy of the European Union, has a strong influence in shaping the innovation ecosystem at the European level. Providing a unified regulatory environment and ensuring that the free movement of goods, skills and knowledge in the Union is seen as beneficial for the innovation process.

However, the European Union has a different level of responsibility for each component of the mix. For some aspects, the EU has significant competence, whereas for others it can only complement and/or support the measures taken at the national or regional level.

For example, the EU has full competence regarding competition policy, and the setting of some regulations and standards. The EU enjoys shared responsibility with the Member States when dealing with R&D policy, regional policy, tax policy or IPR. Finally, it has limited influence on industrial policy or education policy. For a wide range of aspects of the innovation policy mix, the EU takes a soft approach, based on making recommendations to the Member States, setting monitoring and benchmarking activities, encouraging exchange of best practices and proposing voluntary partnerships or coordination initiatives. In other words, one of the key aims of the EU innovation policy mix is to support the Member States and the regions in their development and implementation of an up-to-date and efficient innovation policy mix.

[7] Reconceptualising the 'policy mix' for innovation, K. Flanagan et al., Research Policy Vol. 40, 5, pp. 702-713, 2011.

Figure 1 – The EU innovation policy mix



Source: EPRS.

2. Evolution of EU innovation policy

Building the current EU innovation policy mix was a long process which began in the 1960s, when the first measures for research and innovation at European level were adopted by the European institutions.

2.1. Between research and industry

2.1.1. European Community innovation policy: the first steps

In March 1965, the Short-term Economic Policy Committee (*Comité de politique économique à moyen terme*) established the Working Party on Scientific and Technical Research Policy (*'Politique de la recherche scientifique et technique'* – PREST). In October 1967 the PREST working group published a report[8] on a Community policy for research and innovation. It noted that innovation was becoming increasingly important. Competition through innovation had boosted support for research worldwide and had become a key aspect of the interaction between countries. The situation in Europe was worrying as 'our countries have not yet acceded to all the demands of an innovation-based economy', and since the Member States were limited by their individual capacities.

The PREST working group identified the lack of an environment conducive to research and innovation, low dynamism in universities, the lack of suitable human resources, and the diffusion of knowledge, as issues that needed to be addressed. It also suggested creating a European patent. The working group argued that 'a systematic effort to support innovation should be ensured both at Member States and Community level. Economic policies guidelines should reflect that imperative'. A Council resolution[9] of

[8] *Pour une politique de recherche et d'innovation dans la Communauté*, PREST, 9 October 1967.

[9] *Résolution concernant les problèmes de la recherche scientifique et technique dans la Communauté*, Council of the European Union, 31 October 1967.

31 October 1967 confirmed Member States' will to 'pursue the activities that are likely to improve and harmonise the conditions for the promotion of research and innovation'.

2.1.2. The influence of the linear model on Community policies

In June 1972, a Commission communication[10] presented by the Commissioner for Industry and Research, Altiero Spinelli, marked the birth of the Community policy for research. The objective of this policy was to strengthen Europe's position in international 'competition through innovation'. The Commission noted that 'the first task for the Community is to create conditions favourable to innovation'. The communication introduced the link between innovation and industrial policy and suggested creating 'Community industrial innovation and development contracts'.

When presenting his working programme[11] on research in June 1973, Spinelli's successor, Ralf Dahrendorf, suggested that R&D should focus on 'innovation satisfying social needs' and 'innovation of industries'. Progressively, the linear model of innovation developed in the 1960s-influenced Community policies, as reflected in the communication[12] on the priorities for common policy in research of October 1975:

> *The definition and implementation of a common research and development policy might well run into trouble in various industrial sectors unless **it covers the whole of the innovation process**, from the laboratory, through industrial application, to the marketing of the products resulting from the research.*

2.1.3. A shift towards industrial policy

The common policy in the field of science and technology[13] published in June 1977 noted that the development of a Community policy for innovation is a key measure that should help to promote industrial research. Originally linked to research policy, innovation was progressively attached to industrial and economic policies. This evolution is clear in the communication[14] on structural aspects of growth of June 1978, which stated that 'innovation must be encouraged in order to satisfy new needs emerging in our home market, increase the Community's share in world trade, and retain a substantial role in the development of new technologies'. Innovation was described as the 'principal source of growth' and defined as 'the exploitation of new products, services or processes usually, but by no means invariably, derived from research and technological development'. This marked a widening of the scope of innovation beyond its technological component.

The 1978 communication noted that **'Europe has too often failed to complete the innovative process successfully and rapidly through economic and commercial application and exploitation'**. This constitutes a first formulation of the **European paradox**, based on the linear model of innovation, stating that Europe is not successful in turning knowledge into products. The reasons for this failure are numerous: lack of

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[10] Objectives and instruments of a common policy for scientific research and technological development, Commission of the European Communities, COM(72) 700, 14 June 1972.

[11] Working programme in the field of Research, Science and Education, Commission of the European Communities, SEC(73) 2000, 23 May 1973.

[12] Objectives, priorities and resources for a common research and development policy, Commission of the European Communities, COM(75) 535, 29 October 1975.

[13] The common policy in the field of science and technology, Commission of the European Communities, COM(77) 283, 30 June 1977.

[14] Report on some structural aspects of growth, Commission of the European Communities, COM(78) 255, 22 June 1978.

favourable climate for SMEs; reluctance to invest in the riskier ventures; a tax and cultural environment unfavourable to risk-taking; the slowness of establishing a large homogeneous market; and the resistance of employees to innovation because of the social hardships that could ensue. As a conclusion on this aspect, the Commission noted that '**the vital part which innovation plays in the growth process demands that the Community attempts to find out what action it can and should take**'.

2.1.4. Innovation policy as a focal point

The Commission communication[15] on industrial development and innovation in November 1980 set a new dynamic. In the context of the energy crisis and competition with the USA and Japan, the 'need for successful innovation is far more pressing'. A sound Community innovation policy 'should **act as a bridge between industrial strategies ... and scientific and technological policies**'.

In October 1981, a Commission communication[16] presented by Etienne Davignon, Commissioner for Industrial Affairs, Energy, Research and Science, established a first Community policy for innovation, strongly linked with industrial policy. It stated that 'reinforcing innovation and the technological strength of the Community should be one of the cornerstones of a longer-term oriented economic and social policy' and that 'European economic recovery will quite clearly depend on our capacity for innovation and creativity'. However, it recognised that 'what has been done so far is insufficient'.

The communication identified key bottlenecks (R&D, interactions between actors, funding, taxation, skilled workforce) and suggested solutions focusing on the economic framework and the various aspects of a Community-wide internal market (norms, standards, public markets, IPR). Industrial innovation strategy should combine market pull and technology push factors taking into account evolutions in the linear model. The Commission suggested that Community lending instruments and **the Regional and Social Fund should give priority to innovation**. The European Council conclusions[17] on innovation of March 1982 stressed the importance of developing the internal market to facilitate the implementation of a technology and innovation policy. Various programmes supporting innovation were implemented in the 1980s (see text box).

SPRINT programme

The Commission proposed a strategic programme for innovation and technology transfer (SPRINT)[18] in 1982 to improve the coherence of innovation support at European, national and regional levels, and transnational development of structures and networks in the Community. The programme aimed at a better understanding of the innovation process to improve the innovation environment and ran from 1983 to December 1994.[19] The European Innovation Monitoring System (EIMS)[20] established in 1990 provided innovation system actors with information, analysis and research.

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15 Industrial development and innovation, Commission of the European Communities, COM(80) 755, 18 November 1980.

16 A policy for industrial innovation – Strategic lines of a community approach, Commission of the European Communities, COM(81) 620, 20 October 1981.

17 European Council Conclusions, June 1982.

18 Proposal for a plan for the transnational development of the supporting infrastructure for innovation and technology transfer (1983-1985), Commission of the European Communities, COM(82) 251, 15 June 1982.

19 First adopted for two years in November 1983, the programme was renewed in 1987 for two years, in 1989 for another five years and extended for an extra year in 1993. It was then replaced by the INNOVATION programme included in the 4th framework programme for research.

20 This system was replaced by the European Innovation Scoreboard. More information on the EIMS on the CORDIS archives.

Framework Programme for research and development

The first framework programme was adopted[21] in 1983 as an overall programme to finance research and development activities at European level. The fourth framework programme adopted in 1994 was the first to integrate a specific programme for innovation. The current framework programme[22] for research and innovation, Horizon 2020, was adopted in 2013.

Eureka

The Eureka initiative was proposed by France, and supported by Germany and the European institutions, as both an answer to the Star Wars initiative in the US and a pan-European science diplomacy tool to establish stronger links with the central and eastern European countries. Eureka[23] was established by the 'Paris declaration' in July 1985 as an intergovernmental organisation supporting networking activities between public and private partners and industry cluster projects. Forty-six European countries are members of Eureka and some non-European countries are associate members. Under Horizon 2020, Eureka manages the Eurostars programme[24] that supports companies in the final stages of putting new products on the market.

Programme for SMEs

The first programme on the improvement of the business environment and the promotion of enterprises, especially SMEs, was adopted[25] in July 1989. The programme focussed on the regulatory and administrative framework for the creation of enterprises, on the information and assistance on Community policies and regulations and on the cooperation and partnerships between enterprises. The programme was renewed[26] several times, increasing progressively its emphasis on access to research and innovation. In 2006 it was included as one component of the Competitiveness and Innovation Framework Programme.

2.2. First action plan for innovation

2.2.1. Moving away from the linear model

The Commission White Paper[27] on Growth, Competitiveness and Employment of December 1993 marked an evolution in the conception of innovation. It recognised that 'the linear model of innovation, with the innovative act being isolated, has in today's world been replaced by complex mechanisms: innovation requires constant and organised interdependence between the upstream phases linked to technology, and the downstream phases linked to the market'. As a conclusion 'careful consideration needs to be given to taking better account of the importance of incremental research industrial realities and the interactive nature of the innovation process.'

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[21] Council resolution on framework programmes for Community research, development and demonstration activities and a first framework programme 1984 to 1987, OJ C 208, 25 July 1983, pp. 1-4.

[22] More information the framework programmes can be found in 'Horizon 2020 budget and implementation', V. Reillon, EPRS, European Parliament, November 2015.

[23] More information on Eureka can be found on the website of the organisation.

[24] Eurostars is an 'Article 185' public-public partnership between the Member States and the European Commission funded under Horizon 2020.

[25] Council Decision of 28 July 1989 on the improvement of the business environment and the promotion of the development of enterprises, and in particular small and medium-sized enterprises, in the Community, OJ L 239, 16 August 1989, pp. 33-35.

[26] Adopted in 1989 for three years, the programme was renewed in 1993 for three years, in 1996 for another four years, in 2000 for five years and extended in 2005 until December 2006.

[27] Growth, competitiveness, employment – The challenges and ways forward into the 21st century, Commission of the European Communities, COM(93) 700, 5 December 1993.

In 1994, the Fourth Framework Programme for research was adopted with a specific Innovation programme, the Regional Innovation Strategy pilot was launched and the Institute for Prospective Technological Studies (IPTS) of the Joint Research Centre was established.

Innovation Programme

The third activity of the fourth framework programme for research relating to the dissemination and optimisation of research results was implemented through the specific Innovation programme. This programme encompassed[28] various actions and instruments aiming at promoting an environment favourable to innovation and the absorption of new technologies by enterprises focusing on SMEs; stimulating the diffusion of technologies and knowledge; and providing assistance to these activities.

RIS and RITTS

In 1994, the Commission introduced the Regional Technology Plan (later renamed Regional Innovation Strategy – RIS) to support the definition and implementation of an innovation policy at regional level. The objective was to involve all the regional actors of innovation in the definition of common priorities at the local level. The scheme was complemented by the Regional Innovation and Technology Transfer Infrastructures and Strategies (RITTS) programme under the Innovation programme. The RIS was attached to regional funds and promoted a regional development based on innovation, whereas RITTS focussed on improving the efficiency of the innovation infrastructures and policy.[29]

IPTS

The Institute for Prospective Technological Studies (IPTS)[30] is a research institute of the Joint Research Centre established in 1994 that focusses on knowledge for growth; information society; agriculture and global food security; sustainable production, consumption and economics of climate change; energy; and transport. The IPTS supports regions and EU Member States in their research and innovation strategies and contributes to the understanding of industrial innovation and growth. It hosts the Smart Specialisation Strategy platform helping regions to develop their innovation strategy, and the Research and Innovation Observatory monitoring research and innovation policies in Europe.

2.2.2. The Green Paper on innovation

In January 1995, the Santer Commission took office, with Edith Cresson as Commissioner for Research, Science and Technology. In December 1995, the Commission published a Green Paper[31] on innovation stating that 'strengthening the capacity for innovation involves various policies: industrial policy, RTD policy, education and training, tax policy, competition policy, regional policy and policy on support for SMEs, environment policy, etc.' The Green Paper marked the birth of a EU innovation policy distinct from research and industrial policies and encompassing a wide range of policies and instruments. The Commission recognised that 'innovation is above all a social phenomenon' and 'a collective process'. Nevertheless, the formulation of the

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[28] Council Decision of 15 December 1994 adopting a specific programme for the dissemination and optimisation of the results of activities in the field of research and technological development, including demonstration (1994 to 1998), OJ L 361, 31 December 1994, pp. 101-113.

[29] Assessment of the regional innovation and technology transfer strategies and infrastructures (RITTS) scheme, Final evaluation report, D. Charles et al., August 2000.

[30] For more information, see the website of the IPTS.

[31] Green Paper on Innovation, Commission of the European Communities, COM(95) 688, 20 December 1995.

European paradox reflected a view on innovation still derived from a linear model perspective:

> *The greatest weakness is the comparatively limited capacity to convert scientific breakthroughs and technological achievements into industrial and commercial successes.*

The Commission acknowledged that 'the performance in terms of innovation varies greatly amongst the countries, regions, firms and sectors' and that the fragmentation of the activities, programmes and strategies in Europe is a major weakness. In order to address these issues, and develop 'a genuine European strategy for the promotion of innovation', the Commission proposed 13 routes of actions by improving, inter alia, R&D efforts, initial and further training, mobility, IPR, the fiscal regime, administrative procedures, regional policies and public action for innovation.

The European Parliament welcomed these routes of actions in a resolution[32] adopted in June 1996. It stressed the need to harmonise the administrative procedures and the regulation of the 15 Member States. It also called on the Commission to measure the suitability for promotion of innovations against social and ecological criteria, as all innovations might not be desirable. In June 1996, the European Council asked[33] the Commission to draw up an action plan concerning the measures to be taken with regard to innovation following the proposals of the Green Paper.

Community Task Forces

The Green Paper on innovation promoted the creation of Community task forces on specific areas in order to strengthen the cooperation between research centres and industry. The task forces were expected to define the research priorities, identify the obstacles to innovation, improve the coordination and implementation of the work to be done and encourage the emergence of a favourable environment for innovation. The eight topics selected focused on transport (aircraft, cars, trains, ships, and intermodality), health (vaccines), education (multimedia software) and water (environment-friendly technologies). These task forces can be seen as the precursors of the public-private partnerships established since 2003.

2.2.3. A first European action plan for innovation

The First Action Plan for Innovation in Europe was published[34] by the Commission in November 1996. The Commission stated that 'action at Community level, while respecting the rules of subsidiarity, is necessary to draw up and enforce the rules of the game, particularly those on competition, intellectual property rights and the internal market'. Fragmentation should be addressed as 'efforts to rationalise structures and coordinate initiatives need to be accentuated so as to maximise their added value and their effectiveness. Similarly, local or regional networks of one-stop shops for SMEs for innovation support need to be generalised'.

The concept of 'knowledge-based economy' introduced in the 1995 green paper was presented as the frame in which innovation policy should be developed:

> *In knowledge-based economies, the efficient systems are those which combine the ability to produce knowledge, the mechanisms for disseminating it as widely as possible and the aptitude of the individuals, companies and organisations concerned to absorb and use it. The crucial factor for innovation is thus the link between research (the production of*

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[32] Resolution on the Green Paper on Innovation, European Parliament, OJ C 181, 24 June 1996, pp. 35-41.

[33] European Council Conclusions, 22 June 1996.

[34] The First Action Plan for Innovation in Europe – Innovation for growth and employment, Commission of the European Communities, COM(96) 589, 20 November 1996.

knowledge), training, mobility, interaction (the dissemination of knowledge) and the ability of firms, particularly SMEs, to absorb new technologies and know-how.

The action plan suggested three areas for action:

- **Foster an innovation culture**: improve education and training, facilitate researcher mobility between the private and public sectors, involve all actors in the innovation process, propagate best management and organisational methods and stimulate innovation in the public sector and in government;
- **Establish a framework conducive to innovation**: adapt and simplify the legal and regulatory environment and ease innovation financing in Europe; and
- **Better articulate research and innovation**: at national level (actions targeting strategic foresight for research, industrial research, start-ups, cooperation between public and private sectors, capacities of SMEs) and at European level (coordination of European funding instruments: framework programme, regional funds, etc.).

The Commission engaged in monitoring innovation by drawing up a 'permanent management trend chart for innovation policy and performance in Europe'. Although the Commission could provide support and recommendations, it stated clearly that 'the main effort must nevertheless be made at local, regional or national level'. The Commission also announced the creation of an IPR Helpdesk. The 1999 reorganisation of the Commission saw innovation policy allocated to the new Directorate-General for Enterprise.

European Trend Chart on Innovation

Announced in 1996, the European Trend Chart on Innovation was operational in 2000 as a tool to pursue 'the collection, regular updating and analysis of information on innovation policies at national and Community level, with a focus on: innovation finance; setting up and development of innovative businesses; the protection of intellectual property rights and the transfer of technology between research and industry'.[35] It was used both as a support for policy-makers in the field of innovation policies and as a benchmarking tool supporting the exchange of good practices between the Member States.

IPR Helpdesk

The IPR Helpdesk was launched in 1998 in order to help all the actors of the innovation process manage their intellectual property and to support them throughout the patenting process.[36]

2.3. Innovation and the Lisbon strategy

2.3.1. The Lisbon strategy

The Prodi Commission took office in September 1999 with Philippe Busquin as Commissioner for Research. In March 2000, the European Council adopted[37] the Lisbon strategy aiming to make the European Union 'the most competitive and dynamic knowledge-based economy in the world'. This included the establishment of a 'European Area of Research and Innovation'.[38] The European Council asked the

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[35] European Trend Chart on Innovation, Country Report: Italy, European Commission, 2001.

[36] Edith Cresson inaugurates IPR Helpdesk – new EU service to boost innovation, CORDIS News, October 1998. The IPR Helpdesk is still active.

[37] Presidency Conclusions, Lisbon European Council, 23 and 24 March 2000.

[38] The European Research Area (ERA) concept was launched in January 2000, and has been the key concept in European research policy ever since. If the term innovation is sometimes added to the name in Council documents, however, innovation has never been formally included in the concept. More information on ERA can be found in 'The European Research Area', V. Reillon, EPRS, European Parliament, March 2016.

Commission to introduce, by June 2001, a European Innovation Scoreboard to benchmark national policies. In May 2000, the European Parliament welcomed[39] the creation of 'a real European research and innovation community'.

In this context, in August 2000, the European Science Foundation, representing the main research-performing organisations in Europe, recognised[40] the need for better training to develop researchers' entrepreneurial potential. It also called for a 'single unified approach' for patenting.

2.3.2. Innovation in a knowledge-driven society

After renewed policies for research[41] and enterprise,[42] the Commission published, in September 2000, a communication[43] on 'Innovation in a knowledge-driven society'. While innovation is seen as 'a major component of enterprise policy, as well as one of the main objectives of research policy' that 'must permeate our economy and be embraced by society', **innovation policy is described as 'a new horizontal policy linking traditional areas such as economic, industrial and research policies'**.

The Commission recognised that 'an "**innovation divide**", separating regions according to whether or not they are able to benefit from and thrive in the new economy, **is an emerging danger**'. The fragmentation of the European innovation system needed to be addressed. The Commission set five objectives in order to support the Member States and to go beyond the unsuitable linear model that had led to unsuccessful measures.

- **Ensuring the coherence of innovation policies**: coordination and benchmarking of national policies, spreading good practices, European Innovation Scoreboard;
- **Establishing a regulatory framework conducive to innovation**: regulation is necessary, over-regulation hinders the development of innovative enterprises;
- **Encouraging the creation and growth of innovative enterprises**: legal, fiscal and financial environment favourable to the creation and development of start-ups; entrepreneurship as a discipline taught in higher education institutions;
- **Improving key interfaces in the innovation system**: improve interactions and interfaces between the actors of the innovation process, right environment for a strong regional innovation capacity; and
- **Creating a society open to innovation**: a well-informed European society, capable of mature debates on innovative developments.

New initiatives were launched following the communications of 2000, including the European Investment Bank (EIB) Innovation 2000 Initiative.

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[39] Resolution on the communication 'Towards a European Research Area', European Parliament, 18 May 2000, OJ C 59, 23 February 2001, pp. 250-258.

[40] Research and Innovation – developing the partnership between research and risk finance, European Science Foundation, August 2000.

[41] Towards a European Research Area, Commission of the European Communities, COM(2000) 6, 18 January 2000.

[42] Challenges for enterprise policy in the knowledge-driven economy, Commission of the European Communities, COM(2000) 256, 11 May 2000.

[43] Innovation in a knowledge-driven economy, Commission of the European Communities, COM(2000) 567, 20 September 2000.

EIB Innovation 2000 Initiative

Following the introduction of the Lisbon Strategy, the EIB launched in June 2000 the 'Innovation 2000 Initiative'.[44] The initiative focused on five areas: human capital formation to finance IT equipment; research and development by co-financing research programmes and infrastructure; ICT networks by financing trans-European broadband networks; diffusion of innovation supporting SMEs' equipment in IT; and development of SMEs and entrepreneurship by strengthening venture capital support. A total envelop of €12 to 15 billion of loans was planned for three years. The initiative was renewed in 2003 for three additional years with an envelope of €20 billion as the 'Innovation 2010 Initiative'.[45] These supporting instrument were included in the seventh framework programme in 2006.

European Innovation Scoreboard

In order to support benchmarking activities, it was decided in 2000 to establish a tool to assess European innovation performance. The European Innovation Scoreboard presented in September 2000[46] consisted of 16 indicators focusing on four areas: human resources; knowledge creation; transmission and application of new knowledge; and innovation finance, output and markets. It was 'designed to capture the main drivers of a knowledge-based economy plus several measures of innovation outputs'. The EIS is still published annually.[47]

The first European Innovation Scoreboard[48] published in September 2001 concluded that 'all Member States have improved their innovation performance' and stressed two major weaknesses at EU level: patenting and business R&D. It also reaffirmed the strong regional dimension of innovation. This last aspect was developed in a Commission communication[49] in October 2001, affirming that 'geographical proximity remains one of the most powerful factors in favour of intellectual, commercial and financial exchanges, heavily influencing the innovation process'.

In January 2002, the concept of innovation policy mix appeared in a Commission document[50] on 'Benchmarking national RTD policies':

> *The complexity of RTD and innovation systems is such that individual policy instruments, applied in isolation, are unlikely to have a substantial impact on overall performance.* ***Attempts by policy-makers to improve the performance of complex innovation systems are more likely to be successful if they consist in the application of a broad portfolio of policy instrument****'.*

This aspect was reaffirmed in the Commission communication[51] on industrial policy in December 2002, that also defined innovation as 'the result of a complex and interactive

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[44] The EIB's Board of Governors: the Bank launches its "Innovation 2000 Initiative" and steps up its preparation for enlargement of the Union, EIB, 5 June 2000.

[45] Innovation 2010 Initiative, European Investment Bank, February 2004.

[46] As an annex to the communication 'Innovation in a knowledge-driven economy', Commission of the European Communities, COM(2000) 567, 20 September 2000.

[47] In 2015, the EIS included data on 25 indicators in three categories: enablers (human resources; open, excellent and attractive research systems; finance and support), firm activities (firm investments; linkages and entrepreneurship; intellectual access) and outputs (innovators; economic effects).

[48] First European Innovation Scoreboard, Commission of the European Communities, September 2001.

[49] The Regional Dimension of the European Research Area, Commission of the European Communities, COM(2001) 549, 3 October 2001.

[50] Benchmarking national RTD policies: first results, Commission of the European Communities, SEC(2002) 129, 31 January 2002.

[51] Industrial Policy in an Enlarged Europe, Commission of the European Communities, COM(2002) 714, 11 December 2002.

process'. A Commission communication 'Choosing to grow',[52] of January 2003, reiterated 'establishing bridges between knowledge and the market place and putting in place the right environment for innovation is the new competitiveness challenge'.

European Technology Platforms

In 2003, the Commission began promoting European Technology Platforms (ETP) as an industry-led stakeholder forum, to establish a common vision and develop a strategic research agenda in a given area. These voluntary public-private partnerships aim to improve innovation, knowledge transfer and European competitiveness in areas presenting 'significant economic impact and high societal relevance' and 'where there is high public interest and scope for genuine value added through a European level response'.[53] Forty-one ETPs are active in energy, environment, ICT, transport, production and processes, and bio-based economy.[54]

2.3.3. Innovation policy in the context of the Lisbon strategy

In March 2003, the Commission published[55] an update of its policy for innovation in the context of the Lisbon strategy. It identified innovation as 'a cornerstone of the Lisbon strategy' and aimed 'to turn European diversity into a strength' to promote innovation. Based on a broad view of the innovation process as 'complex interactions between individuals, organisations and their operating environment', the Commission considered that 'innovation policies must extend their focus beyond the link with research' and 'the Union must recognise the full scope of the innovation phenomenon'.

The communication confirmed the **'ubiquitous nature of innovation policy'** by covering almost all the policy areas that are now included in the EU innovation policy mix: Single Market and competition, regional policy, taxation policy, labour market, education and training, standards, IPR and sectoral policies like environmental policy. It introduced **the importance of a policy in support of clusters at the regional level**. It also warned that **'enlargement will significantly change the Union's innovation profile'**, increasing the innovation divide and the challenges for a Union innovation policy.

The Commission expected a strong commitment from the Member States as 'coordination should take place at a high political level'. As a conclusion, the Commission considered that 'Europe must find its own way to balance conflicting interests and priorities'. In order to do that, 'the Member States and the Commission should define a common framework, and a set of priorities and objectives, for both European and national innovation policy, respecting the characteristics of national innovation systems and the diversity within the European Union'. In October 2003, the European Parliament also urged[56] 'Member States to make greater effort in their areas of responsibility (education policy, rules and regulations, cost and time to establish new businesses, risk capital and start-up finance, innovation and technology transfer and tax relief, providing for risks through establishment of reserves) to give greater encouragement to entrepreneurship'.

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[52] Choosing to grow: Knowledge, innovation and jobs in a cohesive society, Commission of the European Communities, COM(2003) 5, 31 March 2003.

[53] Report on European Technology Platforms and Joint Technology Initiatives, Commission of the European Communities, SEC(2005) 800, 10 June 2005.

[54] The list of active ETPs can be found on the website of the Commission.

[55] Innovation policy: updating the Union's approach in the context of the Lisbon strategy, Commission of the European Communities, COM(2003) 112, 11 March 2003.

[56] Resolution on entrepreneurship in Europe, European Parliament, P5_TA(2003)0463, 23 October 2003.

2.4. The Aho report and the Innovation strategy

2.4.1. New start for the Lisbon strategy

In February 2005 the Barroso Commission, which took office in November 2004 with Janez Potočnik as Commissioner for Science and Research, presented a 'new start' for the Lisbon strategy.[57] The Commission wanted to 'ensure that knowledge and innovation are the beating heart of European growth'. It proposed the creation of a 'European Institute of Technology', of 'Innovation poles' at regional level and of 'European Technology Initiatives' as public-private partnerships.

In March 2005, the European Council encouraged[58] the Member States to 'develop their innovation policies in the light of their specific characteristics', whilst following common objectives. In April 2005 the Commission published[59] the proposal for a 'Competitiveness and Innovation framework Programme' (CIP), complementing the proposal for the seventh framework programme for research presented at the same time.[60]

In the light of the Lisbon strategy, the Council published economic policy guidelines in July 2005,[61] reaffirming 'the dynamism of the European economy is crucially dependent on its innovative capacity', and inviting **Member States to introduce innovation as a topic in their National Reform Programmes**. Guideline No 8 provided a framework:

> Guideline No 8. To facilitate all forms of innovation, Member States should focus on: 1. improvements in innovation support services, in particular for dissemination and technology transfer; 2. the creation and development of innovation poles, networks and incubators bringing together universities, research institutions and enterprises, including at regional and local level, helping to bridge the technology gap between regions; 3. the encouragement of cross-border knowledge transfer, including from foreign direct investment; 4. encouraging public procurement of innovative products and services; 5. better access to domestic and international finance, and 6. efficient and affordable means to enforce intellectual property rights.

The Commission published a communication[62] in October 2005, presenting EU initiatives in support of research and innovation. The Commission again stressed the key role of the Member States 'to reform and strengthen their public research and innovation systems'. China, India and Brazil were seen as new competitors, in addition to the USA and Japan. From the governance viewpoint, the Commission stressed 'the development of coherent and mutually supportive policies by the regions, Member States and European institutions is essential for strengthening the European Research and Innovation Area'.

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[57] Working together for growth and jobs A new start for the Lisbon Strategy, Commission of the European Communities, COM(2005) 24, 2 February 2005.

[58] European Council conclusions, ST 7619 2005, 23 March 2005.

[59] Proposal for a Decision of the European Parliament and of the Council establishing a Competitiveness and Innovation Framework Programme (2007-2013), Commission of the European Communities, COM(2005) 121, 6 April 2005.

[60] Proposal for a Decision of the European Parliament and of the Council concerning the seventh framework programme of the European Community for research, technological development and demonstration activities (2007 to 2013), Commission of the European Communities, COM(2005) 119, 6 April 2005.

[61] Council Recommendation of 12 July 2005 on the broad guidelines for the economic policies of the Member States and the Community (2005 to 2008), OJ L 205, 6 August 2005, pp. 28-37.

[62] More Research and Innovation – Investing for Growth and Employment – A Common Approach, Commission of the European Communities, COM(2005) 488, 12 October 2005.

European Institute of Innovation and Technology

The idea to establish a European Institute of Innovation and Technology (EIT) was proposed by the Commission President Barroso in February 2005.[63] First thought of as a European institute encompassing the three dimensions of the 'knowledge triangle (higher education, research and innovation),[64] it was established in March 2008 as an incubator of 'Knowledge and Innovation Communities' (KICs).[65] The KICs are large public-private partnerships of higher education institutions, research organisations, companies and other stakeholders in the innovation process in the form of a strategic network in a defined domain. Five KICs are currently active on climate, ICT, energy, health and raw materials. Calls for two new KICs on food and manufacturing were launched in January 2016.

Joint Technology Initiatives

The possibility to create public-private joint undertakings at European level was introduced in the European Treaties in 1986.[66] In November 1996, the 'First action plan for innovation in Europe' proposed to study the feasibility of creating a joint undertaking statute in order to improve the innovation environment. 'Joint Technology Initiatives' (JTI) were proposed in June 2004 by the Prodi Commission[67] and taken up in February 2005 by the Barroso Commission. JTIs built up on existing ETPs offering a stronger support (including financing support from the framework programme for research) to existing public-private partnerships. The first JTIs were established in December 2007.[68] Six JTIs are funded under Horizon 2020.[69]

Competitiveness and Innovation Framework Programme

In April 2005 the Commission proposed to 'bring together into a common framework specific Community support programmes and relevant parts of other Community programmes in fields critical to boosting European productivity, innovation capacity and sustainable growth'. The Competitiveness and Innovation Framework Programme (CIP) was adopted[70] in October 2006 including the Entrepreneurship and Innovation; ICT Policy Support; and Intelligent Energy Europe Programmes. The first component brought together 'activities on entrepreneurship, SMEs, industrial competitiveness and innovation', supported since 1989 by the programme for SMEs. Energy Europe was integrated in Horizon 2020 in 2014; the CIP became the COSME programme[71] for the Competitiveness of Enterprises and Small and Medium-sized Enterprises.

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63 Working together for growth and jobs A new start for the Lisbon Strategy, Commission of the European Communities, COM(2005) 24, 2 February 2005.

64 Implementing the renewed partnership for growth and jobs – Developing a knowledge flagship: the European Institute of Technology, Commission of the European Communities, COM(2006) 77, 22 February 2006.

65 Regulation (EC) No 294/2008 of the European Parliament and of the Council of 11 March 2008 establishing the European Institute of Innovation and Technology, OJ L 97, 9 April 2008, pp. 1-12.

66 Article 130o introduced in the European Economic Community Treaty by the Single European Act. It was renumbered Article 171 by the Amsterdam Treaty in 1997 and is now known as Article 187 of the Treaty on the Functioning of the European Union. Research in the European Treaties, V. Reillon, EPRS, European Parliament, March 2016.

67 Science and technology, the key to Europe's future, Commission of the European Communities, COM(2004) 353, 16 June 2004.

68 Council Regulations of 20 December 2007 setting up the JTIs, OJ L 30, 4 February 2007, pp. 1-68.

69 Horizon 2020 budget and implementation, V. Reillon, EPRS, European Parliament, November 2015.

70 Decision No 1639/2006/EC of the European Parliament and of the Council of 24 October 2006 establishing a Competitiveness and Innovation Framework Programme (2007 to 2013), OJ L 310, 9.11.2006, pp. 15-40.

71 More information on the COSME programme can be found on the website of the executive agency for SMEs.

2.4.2. The Aho report

Following the informal European Council meeting on 27 October 2005 under the United Kingdom presidency, the European Commission mandated an expert group to present a report on ways to accelerate the implementation of initiatives reinforcing EU research and innovation performance. The 'Creating an Innovative Europe' report,[72] published in January 2006, is known as the 'Aho report' after the group's chair. The key recommendation of the report is that 'a **Pact for Research and Innovation is needed** to drive the agenda for an innovative Europe. This requires a **huge act of will and commitment from political, business and social leaders**.'

The expert group suggested acting 'on regulation, standards, public procurement, intellectual property and fostering a culture which celebrates innovation', taking measures 'to increase resources for excellent science, industrial R&D and the science-industry nexus', to treble the proportion of structural funds spent on research and to foster mobility of human resources, finance and knowledge. It concluded that 'a paradigm change is needed in which European values are preserved but in a new social structure'. The group stressed that the 'open innovation system' is a reality. The report also identified e-health, pharmaceuticals, energy, environment, transport and logistics, security, and digital content as areas with a great potential for innovation.

In its July 2006 resolution[73] on 'More research and innovation', the European Parliament supported the adoption of an 'open innovation approach' to boost R&D capacity in Europe. It also proposed the 'Europeanisation of national clusters, conglomerates, co-operatives and consortia to increase competitive power and critical mass' and supported the 'Aho report' recommendation for a trebling of the amount of structural funds to be spent on research and innovation.

2.4.3. An innovation strategy for the EU

As an answer to the 'Aho report', the Commission published[74] 'A broad-based innovation strategy for the EU' in September 2006. The Commission saw that the EU 'has an extraordinary innovation potential' and stated that 'Europe has to become a truly knowledge-based and innovation-friendly society', which requires 'political leadership and decisive action'. To create 'a true European innovation space', the Commission proposed a roadmap of 10 actions regarding education, the internal market, the regulatory environment, the IPR framework, the cooperation between stakeholders, the financial instruments and the role of government in supporting innovation. The Commission also proposed to launch 'a new lead-market initiative aiming at facilitating the creation and marketing of new innovative products and services in promising areas'.

The Commission concluded that it is 'necessary to manage a structural change' that requires 'an improved governance structure for innovation'. **'The priority must be to establish strong innovation systems in all Member States'**, while recognising that 'the main competence to foster innovation often lies at regional level'.

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[72] Creating an Innovative Europe, Report of the Independent Expert Group on R&D and Innovation appointed following the Hampton Court Summit and chaired by Esko Aho, January 2006.

[73] Resolution on implementing the Community Lisbon Programme: more research and innovation – investing for growth and employment: A common approach, European Parliament, P6_TA(2006)0301, 5 July 2006.

[74] Putting knowledge into practice: A broad-based innovation strategy for the EU, Commission of the European Communities, COM(2006) 502, 13 September 2006.

The Council confirmed[75] 'innovation policy should be best understood as a set of instruments', validating the wide policy mix approach. In a speech at the European Technology Platforms seminar in December 2006, the Commission President reaffirmed[76] 'we can solve the European paradox'. The European Council of March 2007 concluded[77] that 'Member States are determined to improve the framework conditions for innovation such as competitive markets and to mobilise additional resources for research, development and innovation activities' and 'invited the Commission and the Member States to push forward implementation of the innovation policy strategy'. A European Parliament resolution[78] of May 2007 recognised innovation support requires 'promotion of favourable market conditions to create a regulatory environment that is conducive to innovation', stressing that innovation is a means for quality of life improvements and the need for 'monitoring and consumer protection provisions'.

Deeper integration of the concept of 'open innovation' in European policies began in 2007. In April, the Commission published a communication[79] on knowledge transfer recognising that '**many companies are developing open innovation** approaches to R&D, combining in-house and external resources, and aiming to maximise economic value from their intellectual property'. In November, the Council considered[80] 'faster progress is more than ever necessary to respond to the need of business to operate in an environment of open innovation'. The Parliament supported this with a resolution[81] of January 2008 proposing the creation of a 'European Innovation Area'.

Lead Market Initiative

Following the 'Aho report' recommendations, the Commission launched the Lead Market Initiative (LMI)[82] in December 2007 to stimulate innovation by making Europe a pioneer region in producing and adopting innovative goods and services. The objective of the initiative was first to identify promising emerging markets to support, then to design streamlined legal and regulatory environments. Based on an analysis of the existing ETPs, the Commission identified eHealth, protective textiles, sustainable construction, recycling, bio-based products and renewable energies as candidate markets for the initiative, and specific action plans were established for each area. The final evaluation report of the initiative concluded[83] that the LMI 'fell short of the ambition of the Aho report' and that 'varying degrees of success were achieved in relation to the different Action Plans'. However, 'a coordinated approach to the demand-side stimulation of innovation ought to continue to have an important place in innovation policy, while the links with supply-side measures should continue to be strengthened'.

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75 Council Conclusions: Strategic priorities for innovation action at EU level, Council of the European Union, ST 15995 2006 INIT, 29 November 2006.

76 An innovation-friendly, modern Europe, Speech by José Manuel Barroso, President of the European Commission at the European Technology Platforms seminar, Brussels, 6 December 2006.

77 European Council Conclusions, ST 7224 2007 INIT, 9 March 2007.

78 Resolution on putting knowledge into practice: a broad-based innovation strategy for Europe, European Parliament, P6_TA(2007)0212, 24 May 2007.

79 Improving knowledge transfer between research institutions and industry across Europe: embracing open innovation, Commission of the European Communities, COM(2007) 182, 4 April 2007.

80 Conclusions on the Future of Science and Technology in Europe, Council of the European Union, ST 14693 2007 INIT, 29 November 2007.

81 Resolution on the European Research Area: New Perspectives, European Parliament, P6_TA(2008)0029, 31 January 2008.

82 A lead market initiative for Europe, Commission of the European Communities, COM(2007) 860, 21 December 2007.

83 Final Evaluation of the Lead Market Initiative, CSES and Oxford research, July 2011.

Risk Sharing Financial Facility

On 5 June 2007 the Commission and the European Investment Bank signed a cooperation agreement[84] creating the Risk Sharing Financial Facility (RSFF) as a new instrument to support innovation funding in Europe. This instrument allowed the EIB to use EU funds as a guarantee to back loans for investments in risky research and innovation projects. Under Horizon 2020, the RSFF has been replaced by the InnovFin initiative[85] providing different options of financial support depending on the size of the enterprise, from SMEs to large companies.

2.4.4. Shaping the next step

In December 2008, the European Council called '**for the launch of a European plan for Innovation**'[86] in the context of the post-Lisbon strategy. In September 2009, in answer to the European Council, the Commission[87] took stock of the initiatives taken so far and proposed to the Member States to launch a European Innovation Act before spring 2010.

The Commission noted that there is still a need 'to foster a policy and regulatory framework that promotes globally competitive EU industries and rewards investment in research and innovation'.[88] The multi-layer structure of innovation policies between European, national and regional level requires improved coordination, fostering synergies and better governance. 'As such, however, **there is no lack of innovation support programmes in the EU** in terms of numbers. The **problem is a lack of critical mass and coherence**'.[89] The Council[90] expressed that 'a limited set of ambitious quantitative and qualitative targets should be considered in the context of the post-2010 EU strategy' and supported the call for a European Plan for Innovation.

The Commission launched an open consultation on Community innovation policy in September 2009. BusinessEurope[91] pointed out the need to increase public and private investment, to address the skills mismatch, and to stimulate demand and markets for innovation. It also mentioned as key issues the fragmentation at EU level in terms of funding opportunities or IPR, and insufficient coordination at policy level.[92] The

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84 European Commission and EIB launch new instrument to finance research and innovation, European Commission, 5 June 2007.

85 More information on InnovFin can be found on the website of the EIB.

86 European Council Conclusions, ST 17271 2008 INIT, 12 December 2008.

87 Reviewing Community innovation policy in a changing world, Commission of the European Communities, COM(2009) 442, 2 September 2009.

88 'The single market needs to be completed in a number of areas, the legal framework for the protection of intellectual property remains incomplete, the venture capital market is fragmented and the level of equity funding low, the standardisation process is not yet sufficiently synchronised with research results and market needs, the knowledge triangle between business, education and research needs to be further strengthened, and the EU still lacks critical infrastructure to enable innovation.'

89 'Indeed, the complexity of Community funding programmes adds to the multitude of schemes existing at national and regional level and makes access to relevant funding difficult. This calls for clear structures and substantial simplification of participation rules for all innovation funding, regardless of its origin'.

90 Guidance on future priorities for European research and research-based innovation in post-2010 Lisbon strategy, Council of the European Union, ST 17189 2009 INIT, 8 December 2009.

91 Innovation – Building a successful future for Europe, BusinessEurope, October 2009.

92 Response to the public consultation on Community innovation policy, BusinessEurope, November 2009.

European trade association of the research and technology organisations (EARTO)[93] pointed out the necessity to develop more demand-side policies. It stressed 'the need to transform the current system and instruments more radically ... by truly integrating existing instruments and by driving innovation through strategic policies to improve the existing framework, remove extra burden for innovative players and encourage strategic alliances and joint thinking between all relevant actors'. The results of the consultation showed the need to simplify and streamline EU funding programmes, to improve coordination between the different governance levels (EU, national, regional), to better align research, education and innovation policies, to focus more strongly on SMEs and to orientate innovation efforts to address major societal challenges.[94]

2.5. The Innovation Union

2.5.1. Europe 2020

In March 2010, the newly appointed Barroso II Commission, with Máire Geoghegan-Quinn as Commissioner for Research, Innovation and Science, presented the Europe 2020 strategy for smart, sustainable and inclusive growth.[95] The 'smart' aspect of the strategy was grounded on developing an economy based on knowledge and innovation. The 'Innovation Union' was introduced as one of the seven flagship initiatives of the strategy aiming 'to improve framework conditions and access to finance for research and innovation so as to ensure that innovative ideas can be turned into products and services that create growth and jobs'. Despite past calls to shift to open innovation, the Commission still aimed to solve the 'European paradox' and presented a linear view of 'the innovation chain, from "blue sky" research to commercialisation'.

The launch of 'European Innovation Partnerships' was announced in order to 'speed up the development and deployment of the technologies needed' to meet grand societal challenges such as energy security, transport, climate change, or health and ageing. Another key objective of the Innovation Union flagship was to 'strengthen and further develop the role of EU instruments to support innovation'. The flagship initiatives on the 'Digital Agenda for Europe'[96] and the 'Industrial Policy for the globalisation Era' proposed at the same time also presented potential impacts on innovation at European level.

In two resolutions[97] adopted in June 2010, the European Parliament welcomed the new strategy and the 'Innovation Union' initiative calling on the Commission 'to work towards a more coherent innovation strategy' and 'to increase the total financial envelope earmarked for research and innovation in the Community budget'. It advised the Commission that 'future EU innovation policy must be broad in scope, fundamentally embracing innovation in every form'. It also called 'on the Commission and the Member States to strengthen innovation convergence policies in order to reduce the differences between Member States'.

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93 EARTO Response to the public consultation on Community innovation policy, EARTO, November 2009.

94 Summary of the responses to the public consultation on Community innovation policy, DG Enterprise and Industry, 18 December 2009.

95 EUROPE 2020 A strategy for smart, sustainable and inclusive growth, European Commission, COM(2010) 2020, 3 March 2010.

96 A Digital Agenda for Europe, European Commission, COM(2010) 245, 19 May 2010.

97 Resolution on Community innovation policy in a changing world, European Parliament, P7_TA(2010)0209, 15 June 2010 and Resolution on EU 2020, European Parliament, P7_TA(2010)0223, 16 June 2010.

2.5.2. Innovation Union Flagship initiative

The Innovation Union flagship initiative was presented by the Commission in October 2010. This communication[98] marked a clear shift by considering that **'innovation is the overarching policy objective'** and that the EU and the Member States have **'to adopt a much more strategic approach to innovation'**.

The Innovation Union tried to address six priority areas:

- **Strengthening the knowledge base and reducing fragmentation**: create an excellent modern education system in all Member States; deliver the European Research Area; streamline EU research and innovation funding instruments; base regulatory frameworks on scientific evidence; establish the EIT as a model for innovation governance.
- **Getting good ideas to the market**: make Europe an attractive place to invest in innovation; create a Single Innovative Market regarding IPR, standards, and public procurement; promote openness and capitalise on Europe's creative potential; promote the mobility of people, knowledge and ideas.
- **Maximising social and territorial cohesion**: spread the benefits of innovation across the Union; support the emergence of world-class clusters; increase social benefits of innovation and promote social innovation.
- **European Innovation Partnerships**: promote a new approach to innovation through challenge-driven partnerships; integrate relevant existing tools and actions into a single coherent policy framework; ensure efficient governance and implementation.
- **Leveraging EU policies externally**: attract leading talent; deepen European international scientific and technological cooperation; promote openness; treat scientific cooperation with thirds countries as a common issue at EU level.
- **Making it happen**: reform research and innovation systems; measure and monitor progress; ensure a strong political commitment by all EU institutions and Member States.

Based on these six priority areas, the Commission extracted 10 targets to be achieved in the following years, including: increasing investments in education, research and innovation; reforming national research and innovation systems; completing the ERA within four years; simplifying the access to EU programmes; removing barriers for entrepreneurs; and successfully launching the European Innovation Partnerships (EIP).

In October 2010, two Commission communications completed the vision and objectives defined under the Innovation Union. A communication[99] on regional policy focused entirely on regional innovation policy as 'a key mean of turning the priorities of the Innovation Union into practical action on the ground'. The Commission stressed the importance of **developing smart specialisation strategies** to maximise the impact of regional policy in combination with other Union policies'. A communication[100] on 'An integrated industrial policy' stressed that 'a new industrial innovation policy is needed to encourage the much faster development and commercialisation of goods and services and to ensure that EU firms are first onto the market'.

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[98] Europe 2020 Flagship Initiative Innovation Union, European Commission, COM(2010) 546, 6 October 2010.

[99] Regional Policy contributing to smart growth in Europe 2020, European Commission, COM(2010) 553, 6 October 2010.

[100] An Integrated Industrial Policy for the Globalisation Era, European Commission, COM(2010) 614, 28 October 2010.

The Council[101] supported the Innovation Union proposal: 'the EU and its Member States should adopt a strategic and integrated approach to innovation whereby all relevant supply and demand policies and instruments are designed to contribute to innovation, in the short, medium and long term'; stressing the urgency of creating the right framework conditions and improving governance. The European Council[102] validated the Commission's targets, and requested a 'single integrated indicator to allow better monitoring of progress in innovation', and completion of the ERA by 2014.

Parliament[103] regarded the Innovation Union as 'the most significant and targeted community attempt so far to introduce a strategic, integrated and business-oriented EU innovation policy to supplement Member States efforts'. However it emphasised that policy success depended upon 'strategic orientation, development, design and implementation of all policies and measures' and 'coordination, coherence and synergy among the different policy areas, actions and instruments, so as to prevent fragmentation and duplication'. Parliament called on the Commission 'to set up a one-stop shop' and 'a single policy framework' for financial schemes supporting innovation, to '**avoid confusion due to the proliferation of instruments**'. It also noted 'it is essential to avoid creating an innovation divide' between the different countries and regions.

The League of European Research Universities (LERU)[104] recognised the role of research intensive universities in developing the Innovation Union but denounced the lack of financial support and the need for a more integrated European research area. BusinessEurope[105] supported the 'Innovation Union' initiative and identified focus areas for action, including strengthening financial mechanisms, revising the state aid framework for research and innovation, simplifying EU programmes, supporting public procurement, speeding up and modernising standards-setting and involving a broad set of stakeholders in the implementation phase.

European Innovation Partnerships

Under the Innovation Union Flagship initiative, the Commission proposed European Innovation Partnerships (EIP) as a 'new approach' to coordinate the activities of innovation process actors in a given area. As public-private partnerships, EIPs combine JTI features and Lead Market Initiative aspects. A pilot EIP was launched[106] in early 2011 on Active and Healthy Ageing. In 2012, the Commission proposed additional EIPs on Agricultural Productivity and Sustainability, Raw Materials, Water and Smart Cities and Communities.[107] Still active today,[108] an independent expert group evaluated these EIPs[109] in 2014 as the 'right approach to help enable future European economic growth and welfare' but suffered from inconsistent implementation.

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[101] Conclusions on the Europe 2020 Flagship initiative 'Innovation Union', Council of the European Union, ST 17165 2010 INIT, 29 November 2010.

[102] European Council Conclusions, EUCO 2/11, 4 February 2011.

[103] Resolution on Innovation Union: transforming Europe for a post-crisis world, European Parliament, P7_TA(2011)0236, 12 May 2011.

[104] Universities, research and the 'Innovation Union', LERU, October 2010.

[105] Innovation Union – Focus areas for implementation, BusinessEurope, 24 January 2011.

[106] The Pilot European Innovation Partnership on Active and Healthy Ageing, European Commission, SEC(2011) 1028, 1 September 2011.

[107] State of the Innovation Union 2012 – Accelerating change, European Commission, COM(2013) 149, 21 March 2013.

[108] More information on the EIPs can be found on the website of the Innovation Union.

[109] Outriders for European Competitiveness – European Innovation Partnerships (EIPs) as a Tool for Systemic Change, Report of the Independent Expert Group, 2014.

Contractual Public Private Partnership

In the context of the 2008 European Economic Recovery Plan, the concept of contractual public-private partnerships (cPPP) emerged to increase the level of private sector investment in research and innovation. A cPPP consists in a contractual arrangement between the Commission and an association representing the interests of the private sector in a field. Both parties commit to a long term investment in research and innovation. The partnership agreement ring-fences a part of the Horizon 2020 budget for the cPPP research topics. Eight cPPPs have been implemented so far.[110]

Smart Specialisation Strategies

The Smart Specialisation Strategies (S3) is a concept that extends the concept of Regional Innovation Strategy launched in 1994. It was developed by the expert group 'Knowledge for growth' set up by Commissioner Potočnik in 2005.[111] The S3 defines a set of priority areas at the regional level in order to concentrate resources and efforts and avoid spreading investment across a wide range of topics. It is to be developed and agreed by the local actors of the innovation ecosystem. The Common Provisions Regulation of the European Structural and Investment Funds made the adoption of an S3 a condition for the attribution and use of European Regional and Development Funds in research and innovation.[112] The IPTS manages a platform to support the regions in developing their S3.[113]

Innovation Output Indicator

In February 2011, the European Council asked the Commission to develop a 'single integrated indicator' for innovation. This request was renewed in March 2012.[114] In September 2013, the Commission presented[115] the innovation output indicator as an indicator reflecting the outputs of the innovation process. It combined a subset of four indicators of the European Innovation Scoreboard with a new measure of employment in fast-growing firms of innovative sectors. The Commission noted that further development would be needed to refine the indicator and ensure the quality of the data used for its computation. An update of the methodology to calculate the indicator was published[116] in November 2014. The Innovation Output Indicator is published on the Research and Innovation Observatory website.[117]

2.5.3. State of the Innovation Union

The progress in the implementation of the Innovation Union strategy has been monitored and presented on a yearly basis in the European Commission 'State of the Innovation Union' reports.

The first report,[118] published in December 2011, reviewed the activities conducted for the 34 commitments extracted from the Innovation Union flagship six priority areas.

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[110] More information on the cPPPs can be found in Horizon 2020 budget and implementation, V. Reillon, EPRS, European Parliament, November 2015.

[111] Smart specialisation: The concept and its application to EU cohesion policy, V. Halleux, EPRS, European Parliament, January 2016.

[112] Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Structural and Investment Funds, OJ L 347, 20 December 2013, pp. 320-469.

[113] More information on S3 can be found on the Smart Specialisation Platform.

[114] European Council Conclusions, ST 4 2012 INIT, 2 March 2012.

[115] Measuring innovation output in Europe: towards a new indicator, European Commission, COM(2013) 624, 13 September 2013.

[116] The Innovation Output Indicator 2014, JRC Technical Reports, 26 November 2014.

[117] The Innovation Output Indicator on the Research and Innovation Observatory website.

[118] State of the Innovation Union 2011, European Commission, COM(2011) 849, 2 December 2011.

Firstly, the report concluded that 30 commitments were on track, two were not taken up, and two were delayed. Secondly, it recognised the strong endorsement from the EU institutions and noted that 'the challenge for the next implementation phase will therefore be that all actors take collective responsibility for Innovation Union delivery'. Finally, it stressed that 'the success of Innovation Union will depend on the extent to which it can mobilise action at national and regional level', noting also 'clearly a risk of widening the innovation divide between the Member States'.

The State of the Innovation Union 2012 report[119] noted that 'overall, progress towards setting up the policy framework for an Innovation Union has been very positive: more than 80% of the initiatives are on track. ... Many Member States have launched ambitious policy reforms' and focused 'on creating an innovation-friendly business environment'. A new standardisation package became effective in January 2013 and an agreement was reached on the unitary patent in December 2012. However, 'the conditions are still not in place for achieving the ERA' and 'regional divergences persist and risk growing with the crisis'. In this context, 'the immediate challenge is the extent to which the Innovation Union will foster the emergence of truly 'specialised' regional innovation profiles'. The Commission also stressed that 'to bring about real change, **Europe has to step up its commitment to deliver innovation-based growth. It is time for European institutions, Member States, regions and all stakeholders to pitch in'**.

In June 2014, the Commission communication[120] on research and innovation as sources of renewed growth was based on a State of the Innovation Union report[121] that took stock of all developments since 2010. The report concluded that 'excellent progress has been made in delivering on each of the Innovation Union blocks'. Nevertheless, 'some important gaps remain and need to be filled in order to turn Europe into a more innovative society'.

The communication noted that '**research and innovation affect many policy areas** and involve a large number of actors and **should therefore be driven by an overarching strategy and be steered at a sufficiently high political level'**. The Commission recognised that 'it is a major challenge for all Member States to identify, design and implement those reforms needed to improve the quality of their R&I investments'. It stressed that further efforts are needed to address the 'fragmentation and inefficiencies in the Single Market. It suggested that 'the public sector needs to become more entrepreneurial' and that there is a need for 'a human resource base with the necessary skills'. Finally, it noted that 'Europe's citizens need to see that R&I is improving the quality of their lives and is responsive to their concerns'.

In September 2014, the European Council of Academies of Applied Sciences, Technologies and Engineering (Euro-CASE) saw 'a change in the innovation culture and the way entrepreneurial activities are valued in Europe as prerequisites to make Europe the most innovative region in the world'.[122] It stressed the need for stronger innovation procurement, strengthening public-private partnerships, increasing financial support

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[119] State of the Innovation Union 2012 – Accelerating change, European Commission, COM(2013) 149, 21 March 2013.

[120] Research and innovation as sources of renewed growth, European Commission, COM(2014) 339, 10 June 2014.

[121] State of the Innovation Union – Taking Stock 2010-2014, European Commission, SWD(2014) 181, 10 June 2014.

[122] Euro-CASE policy paper on European innovation policy, Euro-CASE, September 2014.

and transforming manufacturing. EARTO[123] also advocated public-private cooperation in October 2014, by reinforcing value-chains and innovation ecosystems. BusinessEurope[124] insisted in December 2014 on the need to create an open and common market place of ideas, to set an investment-friendly environment and to build a true culture of innovation.

2.6. Open Innovation

2.6.1. An investment plan for Europe

The Juncker Commission took office in November 2014, with Carlos Moedas as Commissioner for Research, Innovation and Science. In November 2014, the Commission presented an 'investment plan for Europe',[125] based on three strands:

- **Mobilising finance for investment**: the key action was the adoption of the European Fund for Strategic Investments (EFSI) in June 2015.[126] Research and innovation are listed as the key areas for which the fund should be used.[127]
- **Making finance reach the real economy**: the objective is 'to channel extra public and private money to viable projects with a real added value for the European social market economy'.
- **Improve the investment environment**: this initiative concentrates on 'providing greater regulatory predictability, removing barriers to investment across Europe and further reinforcing the Single Market by creating the optimal framework conditions for investment in Europe.

The third strand is the main one with an impact on the key framework conditions for innovation. It includes actions to lower 'barriers to knowledge transfer, open access to scientific research and greater mobility of researchers' in particular.

2.6.2. An innovation principle in regulation

The May 2015 Commission communication on 'Better regulation for better results'[128] provides a new framework to evaluate and design regulation. It set up the Regulatory Fitness Programme (REFIT) platform to collect suggestions on 'regulatory and administrative burden reduction' following the work started in 2012.[129] The 'Better Regulation Guidelines' adopted by the Commission with the communication include a 'research and innovation tool' to assess the impact of the new or existing regulation on innovation.

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[123] Recommendations for future EU innovation policy, EARTO, October 2014.

[124] A Breath of Innovation: BusinessEurope recommendations on future of EU research and innovation policy, BusinessEurope, December 2014.

[125] An Investment Plan for Europe, European Commission, COM(2014) 903, 26 November 2014.

[126] Regulation (EU) 2015/1017 of the European Parliament and of the Council of 25 June 2015 on the European Fund for Strategic Investments, the European Investment Advisory Hub and the European Investment Project Portal and amending Regulations (EU) No 1291/2013 and (EU) No 1316/2013 — the European Fund for Strategic Investments, OJ L 169, 1 July 2015, pp. 1-38.

[127] EFSI was partially financed using funds previously attributed to research and innovation under Horizon 2020. This triggered a strong reaction from the scientific community. The European Parliament proposed to ring-fence the Horizon 2020 budget. However, the final agreement saw a reduction of the budget of €2.2 billion attributed to EFSI. See 'Horizon 2020 budget and implementation', V. Reillon, EPRS, European Parliament, November 2015.

[128] Better regulation for better results – An EU agenda, European Commission, COM(2015) 215, 19 May 2015.

[129] Regulatory Fitness, European Commission, COM(2012) 746, 12 December 2012.

BusinessEurope[130] advocated the introduction of an 'Innovation Principle' as an integral component of the policy-making process in June 2015. This principle implies 'to routinely evaluate and address potential impact of EU legislation and policies on innovation, during policy formulation, co-decision, implementation and when reviewing or reforming established legislation'. The Commission document on 'Better regulation for innovation'[131] published in December 2015, stressed that the inclusion of this principle is in line with the measures announced in May 2015 on regulation that help promote an innovation-friendly regulatory framework.[132]

The Commission also suggested creating 'Innovation Deals' to 'address regulatory uncertainties identified by innovators, which can hinder innovation within the existing legal framework. In cases where a regulatory obstacle can only be addressed at EU level, the European Commission could help national, regional or local authorities to identify and make use of existing flexibility in the EU legislative framework or to implement specific legal provisions appropriately by providing clarification'.

2.6.3. The end of the Innovation Union

The 2015 State of the Innovation Union[133] was published in December 2015. It drew mixed conclusions on the overall Innovation Union process and its outcomes:

> *The **Innovation Union introduced a more strategic and broad approach to innovation** by including actions that aimed to tackle both the supply and demand-side elements of the innovation ecosystem. Decisive actions have been taken on all commitments, but the **response has been uneven throughout the Member States**. It is not certain that all legislative actions will be implemented or that they will deliver the intended impact.*

The issues and barriers identified are the same as in the previous report: inconsistencies of rules and practices regarding the single market; a need for closer investment by society to create an innovation culture; improving the inclusiveness of innovation; and addressing the skills shortage.

The March 2016 Commission communication on 'Science, Research and Innovation performance'[134] establishes the 'three O's agenda', presented[135] by Commissioner Moedas in June 2015 as a new framework to develop research and innovation policies. This reintroduced the concept of Open Innovation, already included in EU policies since 2005. The Commission reaffirms that 'to capitalise on the results of European research and innovation, Europe needs to create the right ecosystems, increase investments, and bring more companies and regions into the knowledge economy'. Bottlenecks are identified 'in important framework conditions such as product market regulation, barriers to entrepreneurship, ease of doing business or intellectual property rights

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[130] Better Framework for Innovation – Fuelling EU policies with an Innovation Principle, BusinessEurope, June 2015.

[131] Better regulations for innovation-driven investment at EU level, European Commission, 2016.

[132] Commissioner Moedas announced that he supported the idea of the 'innovation principle' in a speech given in Brussels on 26 January 2016.

[133] State of the Innovation Union 2015, European Commission, December 2015.

[134] Science, research and innovation performance of the EU – A contribution to the open innovation, open science, open to the world agenda: 2016, European Commission, March 2016.

[135] 'Open Innovation, Open Science, Open to the World', Speech of Carlos Moedas – Commissioner for Research, Science and Innovation, 'A new start for Europe: Opening up to an ERA of Innovation' Conference, Brussels, 22 June 2015.

protection'. The lack of venture capital is also mentioned. Finally the Commission notes 'the persistence of an innovation divide across the EU'.

The unit in the Directorate-General for Research and Innovation in charge of the Innovation Union has been renamed 'Open Innovation', marking the shift towards the new policy. However, no clear framework has been promoted under the new wording of 'Open Innovation' to further develop EU innovation policy.

2.6.4. The European Innovation Council

In June 2015, at the 'Opening up to an ERA of Innovation' conference, Commissioner Moedas proposed the creation of a 'European Innovation Council' (EIC). The objective and shape of this new instrument to be included in the EU innovation policy mix are not yet defined. A call for ideas was organised[136] in April 2016 to provide some content of this yet undefined entity, planned for development under Horizon 2020 in the context of the mid-term evaluation of the programme.

2.6.5. A Commission Senior Adviser for innovation

On 1 September 2015, Robert Madelin was nominated 'Senior Adviser for Innovation' in the European Political Strategy Centre reporting directly to the President of the Commission. He received[137] as mandate from President Juncker to 'bring fresh thinking to the way in which the Commission develops and implements innovation policy'. He is also expected to report by June 2016 on 'how best to position Europe as a global pro-innovation actor'.

2.6.6. A pact for innovation

Knowledge4innovation (K4I) is an association acting as a stakeholder platform that aims at introducing innovation as a priority in European policy-making and at improving the framework conditions and the funding programmes for innovation. During the seventh European Innovation Summit, organised at the European Parliament in December 2015 K4I presented a 'Pact for innovation',[138] listing 14 priorities to improve the EU innovation policy mix; the European funding programmes for innovation; and European innovation culture. More than 25 Members of the European Parliament had signed the pact in April 2016.

3. Outlook

3.1. Innovation policy as an overarching policy

Innovation was first seen in the 1960s as a component of research policy and was linked with industrial policies in the 1970s. It was then described as a bridge between these two policies in the 1980s. This was in line with the linear model that described the innovation process as a succession of steps from research to industrial activities.

Since the 1990s, a deeper understanding of innovation as a complex interactive process between various actors pushed for the progressive integration of a large range of policies and instruments under the scope of innovation policy, to construct what is now referred to as the innovation policy mix.

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[136] More information on the EIC consultation on the website of DG Research and Innovation.

[137] More information can be found on the Innovation4EU website.

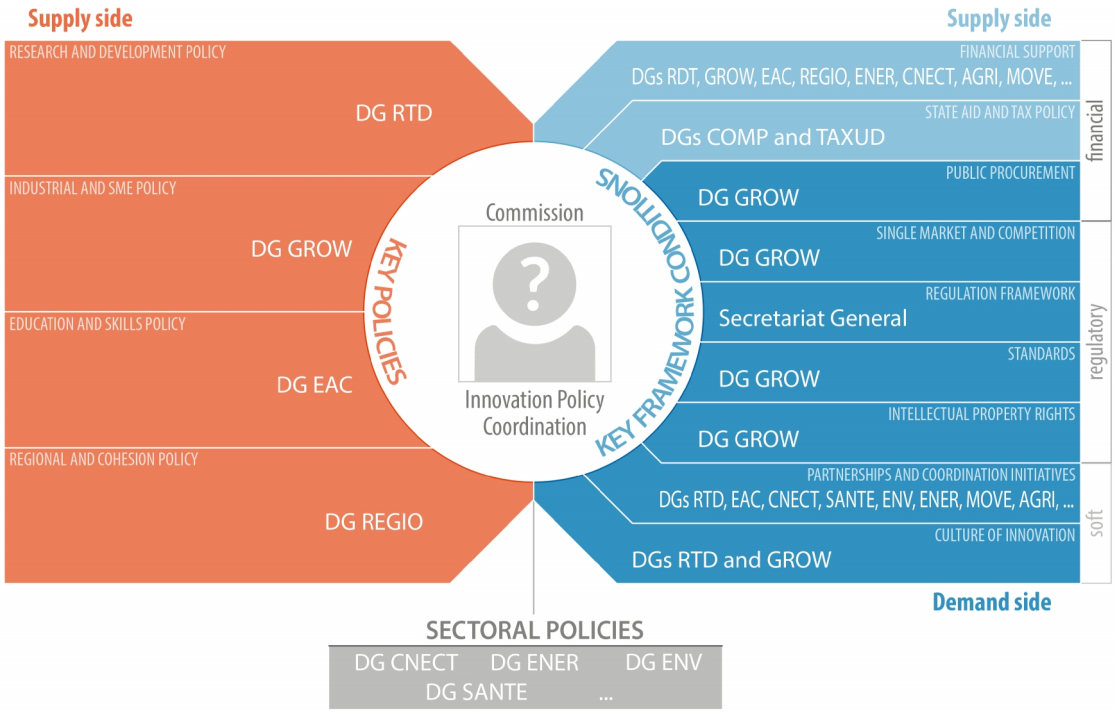
[138] A Pact for Innovation, Knowledge4Innovation, 7 December 2015. The term 'Pact for Innovation' was already used by the Aho high-level group in their report in 2006.

Therefore, in the last decade, innovation policy established itself not as an independent policy per se but rather as a portfolio of policies and instruments complementing each other, interacting with each other and also competing with each other. Each of these policies and instruments aims to address an issue or a bottleneck in the innovation process in order to improve its overall efficiency. The objective of policy-makers is to balance the policies and instruments in the innovation policy mix and to make sure that they are tailor-made to a given socio-economic, cultural and geographical context.

As a consequence, **EU innovation policy is not a single policy but an entire set of policies and instruments** at the European level that need to be considered, discussed and adopted in coherence with each other, as they are expected to support and improve the innovation process at European, national and regional levels.

Whereas innovation policy is recognised as an overarching policy, it is currently included in the European Commissioner for Research's portfolio, and various Directorates-General are managing the different components of the innovation policy mix (see Figure 2). This situation limits the capacity to adopt a more global framework for innovation policy that encompasses all the components of an up-to-date innovation policy mix. It also sets a focus on the direct link between research and innovation that sustains the linear model view. [139]

Figure 2 – The Commission Directorates-General involved in the development of the EU innovation policy mix



Directorates General

RTD (Research and Innovation), **GROW** (Internal Market, Industry, Entrepreneurship and SMEs), **EAC** (Education and Culture), **REGIO** (Regional and urban policy), **COMP** (Competition), **TAXUD** (Taxation), **CNECT** (Communications Networks, Content and Technology), **ENV** (Environment), **SANTE** (Health and food safety), **MOVE** (Mobility and transport), **ENER** (Energy), **AGRI** (Agriculture and rural development)

Source: EPRS.

The reorganisation of the portfolios of the European Commissioner, with the creation of project teams led by Vice-Presidents of the European Commission, by President Juncker in November 2014, can be seen as a missed opportunity to establish

[139] To the Commissioner for Research, Reinhilde Veugelers, Bruegel, 2015.

an all-embracing effort and corresponding coordination on innovation policy. The project team closest to innovation is that on 'Jobs, Growth, Investment and Competitiveness' led by Vice-President Jyrki Katainen. However, the Commissioner for Research and Innovation Carlos Moedas is not a full member of this team but only an associate member. The Directorate-General and Commissioner in charge of the overall coordination of innovation policy in the Commission cannot be clearly identified.

3.2. Moving away from old frameworks

3.2.1. Embracing the open innovation model

Even if the linear model has been considered outdated for over 20 years, it is still common to see innovation described in a simple way, as a step by step process, or to read about the 'innovation chain'.[140]

Innovation is a messy process, difficult to model. The concept of 'open innovation', where the actors of the innovation process are described as porous structures exchanging funds, knowledge, ideas and skills, provides a new paradigm to describe innovation. In order to efficiently identify and address bottlenecks and barriers in the innovation process, and design an effective innovation policy mix, it is necessary to adopt this framework.

3.2.2. Ending the European paradox

The European paradox formulated in the 1990s derived from the linear view of the innovation process: Europe is not good at turning knowledge into goods. This paradox has been reformulated over the years, but does not reflect the full scope of what innovation is, nor does it provide a proper description of the limitations to be addressed in the innovation process. It also tends to focus the attention of policy-makers on one side of the innovation policy mix, assuming that no major issues are to be considered in research activities.[141]

If some innovations can be developed based on new knowledge, others result from applying existing knowledge to new areas, or combining existing knowledge in a new way. Knowledge production is then an important component of the innovation process, but should not be seen as the only source for innovation. In order to efficiently address the shortcomings of the innovation process, **policy-makers need to keep in mind a broad view of innovation**. The '**European paradox' provides a framework that is too narrow and distorted** to efficiently discuss and assess the EU innovation policy mix.

3.3. A policy in need of a new framework

Each new Commission of the last 20 years has tried to provide a fresh framework to support the innovation process. After the first action plan in 1996, the Lisbon Strategy in 2000, and the Innovation Strategy for the EU in 2006, the Innovation Union Flagship in 2010 provided a comprehensive framework for the development of the EU innovation policy mix. The State of the Innovation Union reports ensured monitoring of progress on the different targets under the flagship initiative.

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[140] In a speech on 13 April 2016, Commissioner Moedas still reflected on 'turning research results into market-creating innovations'.

[141] The relationships between science, technologies and their industrial exploitation: An illustration through the myths and realities of the so-called 'European Paradox', G. Dosi et al., Research Policy, Volume 35, Issue 10, December 2006, pp. 1450-1464.

'Open Innovation', the framework announced in June 2015 by Commissioner Moedas to replace the Innovation Union, has still not been defined in terms of priorities or clear objectives. This implies that **there is no longer a clear framework at the European level to discuss support for innovation** and reflect on the EU innovation policy mix.

3.4. Fragmentation and distributed governance

Actions taken at EU level to support innovation aim at complementing measures taken by the Member States and the regions. At EU level, **the main objective is to address the fragmentation inherent to the European Union**, where most competencies on the policies and instruments of the innovation policy mix are in the hands of the Member States and/or their regions. Fragmentation at EU level is the key issue for regulations, standards, IPR, funding or research policy for example.

However, the EU enjoys limited competences, and EU actions are often restricted to the use of soft tools to address the barriers resulting from fragmentation. These aspects of fragmentation and governance are explored in more detail in the second part of this in-depth analysis.[142]

[142] EU innovation policy – Part II: EU policies and instruments supporting innovation, V. Reillon, EPRS, European Parliament, May 2016.

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Europe 2020 Flagship Initiative Innovation Union, European Commission, COM(2010) 546, 6 October 2010.

European Union innovation policy finds its roots in the development of Community policy for research. However the understanding that innovation is a complex process led to the establishment of a EU innovation policy mix including both key policies (research, industrial, education and regional policies) and key framework conditions (funding, taxation, single market and competition, regulation, standards, intellectual property rights, etc.).

Despite the actions already taken, numerous issues and bottlenecks still hamper the innovation process. It appears necessary to give innovation its full place as an overarching policy at the EU level and fully embrace the concept of open innovation.

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