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40 years of Framework Programmes in 70 years of EU research: a brief history

By Nikos Kastrinos

This year marks the 40th anniversary of the EU's Framework Programme – what one former Commissioner declared as "the biggest public research programme in the world." But a common EU science and technology policy goes back further, to the founding of the postwar European community in 1951. Its development since then has been challenging, often frustrating. But it is now a very important pillar of Europe's polity, economy and society; and that in itself is no mean feat.

The creation of the FP itself owes a great deal to the development of close relations between the Commission and Europe's major industrialists, relations that catalysed the development of science and technology policy into one of the major fields of European policy. The policy really came "of age" when the European Union began to shift its attention towards a broad engagement with Europe's citizens. The broadening of politics that such an opening entails, brings the future of the FP deep into the politics of the "ever close union", and opens up a very wide space for future developments – towards FP 10 and beyond.

The beginnings

The idea of a common European science and technology policy goes back to 1951, and the first postwar commitment among France, Germany, Italy, the Netherlands, Belgium and Luxembourg to collaborate on a key sector: the Treaty Establishing the European Coal and Steel Community. It included provisions for research as a technical support for its purposes. Six years later, there were similar provisions in the Treaty of the European Economic Community, which included in its Common Agricultural Policy:

> "*une coordination efficace des efforts entrepris dans les domaines de la formation professionnelle, de la recherche et de la vulgarisation agronomique, pouvant comporter des projets ou institutions financés en commun….*" (Art. 41 Treaty of Rome)

Though historically interesting, in practical terms these were policy crumbs which got no attention from either scientists or industrialists. The aspirations of scientists were channelled to another 1957 agreement,

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the creation of Euratom to collaborate on peaceful uses of atomic power. Coming four years after the establishment of CERN – Europe's response to the famous US science policy manifesto, "Science: the endless frontier" (Bush 1945) – Euratom would capitalise on the post-Manhattan project rise in the importance of science. Yet integration was not easy. As soon as Euratom came into effect, Germany and France launched important national programmes in nuclear energy competing against the European programme for budget, infrastructures, prestige and scientific discoveries. The political environment of co-existing national, international and European Community endeavours posed challenges for Euratom and its research arm, the Joint Nuclear Research Centre.

> "Because of the Member States' widely differing attitudes and interests regarding the nuclear sector, no common policy was possible. One of the main bones of contention was the choice of reactor type. Keen to preserve its military and energy independence, France had opted for natural uranium reactors and wanted Euratom to do the same. The other Member States preferred to build enriched uranium reactors using technology and fuel supplied by the Americans. In 1967, the Council failed to approve the 5-year plan for the Joint Nuclear Research Centre (JNRC) because of a lack of consensus on what it should be doing. So the JNRC had to operate with monthly provisional budgets and under the constant threat of widespread redundancies or even complete abolition. The JNRC's staff came out on strike and some even went on hunger strike." (Brouwer et al 2014 p279)

In the meantime, intergovernmental cooperation in science was expanding with the creation of the European Southern Observatory (ESO) in 1962 and the European Molecular Biology Organisation (EMBO) in 1963. In April 1964, the Council of Ministers set up a "Committee for Medium-term Economic Policy" (CPEMT) to examine the possibility of coordinating the economic strategies of the Member States. In March 1965, a subcommittee on scientific research and technology policy (PREST) was set up to study the prospects for a coordinated policy for science and technology and to propose measures, taking into account the scope for cooperation with other countries. In 1967 the Council instructed a working party chaired by French physicist Pierre Aigrain and focused on scientific and technological policy, to examine the possibilities for European technological cooperation in seven areas: Informatics, telecommunications, transport, oceanography, materials, environmental protection and meteorology. The Aigrain Report[1] with detailed proposals was sent to several countries outside the European Communities, including the UK, along with an invitation to participate. Following discussions in a committee of senior national officials drawn from 19 interested countries, agreements initiating seven research projects in informatics, materials and environment were signed by the ministers responsible for science in 1971[2] (Aked and Gummett, 1976).

[1] Aigrain Report "Scientific and Technological Cooperation between European Countries; Possibilities in 7 Sectors" (1969)

[2] This was the beginning of COST (Cooperation in Science and Technology) – the longest standing funding scheme for research collaborations in Europe

Underpinning this desire for cooperation was fear of a growing technology gap with the United States which endangered Europe's economic prospects. In 1966, British Prime Minister Harold Wilson called for a European Technological Community. In November 1967 he declared that

> "the British government was prepared to harmonise company and patent laws with Europe, to back the formation of European Companies and to initiate, together with industry, discussions in key sectors, like atomic energy and computers" (Layton 1969 p 263).

The technology gap was central to the Commission's Memorandum to the Council (COM(70) 100), "The Community's industrial policy", known as the Colonna Report after then-Commissioner Guido Colonna di Paliano:

> *«Au lendemain de la seconde guerre mondiale, les pays de la Communauté, arrêtés pendant plusieurs années dans leur "progression économique et technologique, coupés durant la même période du reste du monde et en particulier des Etats-Unis qui constituaient le foyer le plus intense d' innovation, ravagés enfin par plus de quatre années de guerre, durent consacrer de longues années à reconstituer leur appareil de production et à rattraper leur retard technologique» (COM (1970) 100 part 2 p. iii/58).*

According to the memorandum:

> "The Commission intends to take immediate steps to analyse, for each of the main technologically advanced industries (nuclear power, aviation and space, electronics, data processing), the development of the industrial structure and solutions most likely to reconcile the requirements of efficiency with those of competition. It will submit its conclusions to the Member States and the firms concerned" (COM(1970) 100 part 1 p 19 - EC Bulletin Supplement 4 1970).

Industry policy did not take off either. Despite numerous Council declarations about the importance of catching up and bridging the technology gap with the US, progress was very slow. Divisions between France and Germany over whether sectoral interventions were compatible with the Common Market played an important role. But things had started to change. In 1970 Commissioner Colonna was succeeded by Altiero Spinelli,

> "a passionate federalist who soon merged the old Directorates-General III (Industrial Affairs), XII (Research and Technology) and XV (Joint Research Centre) into a single DG III (Industrial, Technological and Scientific Affairs)….: 'A DG with imagination which needs to acquire power', as Spinelli wrote in his diary[3]" (Bitsch et al 2014a p503)

The early history: towards a Community policy in science and technology

In November 1970 the Commission presented its first proposals for a Community policy in science and technology that would comprise and coordinate national, community and international projects, spanning the fields of pure or oriented fundamental research, applied research, public services, industrial development and environment. A European Research and Development Committee (CERD) would prepare European projects,

[3] Spinelli, A. (1992), Diario europeo, II, 1970–1976, ed. E. Paolini, Il Mulino, Bologna, p. 229.

which would be implemented making "maximum use … of the public and private centres existing in the Community"[4]. They would be financed by a European Research and Development Agency (ERDA) which would also supervise the Joint Research Centre.

Little progress was made by the Council, partly because the proposals were seen as too federalist and partly because of the focus on the accession negotiations with the UK, Ireland and Denmark (Brouwer et al 2014). In June 1972 the Commission submitted a new communication to the Council calling on it to recognise that the Community's remit covered all areas of research and development and including more developed versions of its 1970 proposals (COM(72)700 final). In the Paris Summit on 19 and 21 October 1972 the Heads of State or Government of the enlarged Community, with British support, called upon the Commission to draw up an action plan in the field of science and technology and to submit it to the Council during 1973. At the beginning of 1973 the Council approved a four-year plan for the Joint Research Centre. However, the institutional proposals of Spinelli did not find agreement in the Council.

In the meantime, with new countries in the Union, in 1973 the Commission's portfolios were reshuffled. Commissioner Spinelli retained industry and technology whilst research, science and education were given to Commissioner Ralf Dahrendorf, whose programme, presented in May 1973 (SEC(73)2000/2) included three major subjects: a) Europe in 30 years' time as the subject of research into research b) contributions to the Community's sectoral policies and c) scientific service tasks and infrastructures. His approach included coordination of national policies and community actions, which would include direct actions by the JRC and indirect actions through which the Community would finance institutions in the Member States. Crucially, it did not mention ERDA and placed the European Science Foundation in a broader European context outside the Community.

In July 1973 the Community adopted[5] the first indirect action programmes in the fields of standards and reference substances, reference substances and methods (Community Bureau of Reference), and protection of the environment. These programmes, adopted on the basis of Article 235[6] of the Treaty of the European Economic Community, were amongst the most important early steps in EU R&I policy. They established the principle that European research endeavours can go beyond nuclear energy and carbon and steel, and opened the way to the eventual inclusion years later of a research chapter in the Single European Act.

On 14 January 1974 the Council produced four resolutions concerning:

1. The coordination of national science and technology policies and the definition of projects of Community interest
2. The participation of the Community in the European Science Foundation
3. An Action Programme in the field of science and technology
4. An Action programme in forecasting and assessment methodology

The results of these resolutions include the establishment of CREST, the Scientific and

[4] European Commission (1970) Information note of the Porte Parole P 45, November

[5] OJ L 189, Vol 16, 11/7/1973

[6] This article allowed the Community to carry out activities that were necessary for the implementation of the Common Market even if they were not explicitly provided for in the Treaty.

Technological Research Committee of senior officials to assist the development of European policy in science and technology (now called the European Research Area and Innovation Committee, or ERAC[7]); the gradual expansion of indirect research programmes to include, by mid-1975, technological research in textiles, new sources of energy, agricultural research, and social studies and research[8]; and "Europe +30", a programme of forecasting Europe's socio-economic conditions 30 years later in view of forecasts of scientific and technological developments.

Some of the decisions concerned multiannual projects and programmes; others concerned relatively small projects. Overall, the expansion of European research programmes in different fields was slow and on occasion frustrating. Jean-Pierre Contzen, Director General of DG XII, recalled in an interview with Brouwer et al (2014) having to argue in meetings of Council representatives (COREPER[9]) in the early 1980s about the need for medical research on grounds that the objective was economic, to help the Member States reduce the cost of their social security systems. However, the expansion of European programmes was seeing far more progress than the coordination of national policies where, "the Commission continued trying to establish this kind of coordination, but with no success, and officials gradually lost faith in this approach." (Brouwer et al 2014 p 282)

The Framework Programme: the formative years

In the beginning of 1977 a new Commission included Germany's Guido Brunner in charge of science and research, and Étienne Davignon of Belgium in charge of industrial affairs, the internal market and the customs union. On 30 June 1977 Brunner presented a communication on "Common policy in the field of science and technology" (COM(77)283) which argued that the three different legal bases and the "esoteric science policy" that results from them is not up to the challenges of the times. A framework was needed,

> "…based on the coordination of national research policies and the definition and implementation of common research programmes. (The Framework) sets itself certain limits: only programmes that satisfy a specific set of criteria can be embodied in a common research policy. This set of criteria must be regularly applied to assess existing programmes, and serves as a filter for future programmes and projects." (COM 77 283 p 10, EC Bull Sup 3 77)

Raising the level of ambition to form a scientific and technological basis of any European policy, the proposal also recognised the primacy of national research decisions. It accepted that the justification for Community intervention lies in the need to complement and be additional to national policy efforts[10].

> "The general objectives of the Community research and technology

[7] European Research Area and Innovation Committee – see European Research Area and Innovation Committee (ERAC) - Consilium (europa.eu)

[8] Source is COM(75)535 final 29/10/1975

[9] Committee of the Permanent Representatives of the Governments of the Member States to the European Union – See https://www.consilium.europa.eu/en/council-eu/preparatory-bodies/coreper-i/

[10] The additionality of EU funds was very dear to the UK Prime Minister Margaret Thatcher. See EC: Chancellor of the Exchequer minute to MT ("Additionality and the Use of Community Funds") [MT: "No 'additional' spending"] [declassified 2010] | Margaret Thatcher Foundation

> policy correspond to the political aims of the Community. There are four main objectives: (i) the long-term supply of resources (raw materials, energy, agriculture and water); (ii) promotion of internationally competitive economic development; (iii) improvement of the living and working conditions; (iv) protection of the environment and nature. Of course, these general objectives cannot be achieved by the common research and technology policy alone. The common policy should contribute to the achievement of these objectives where necessary and where the Member States are unable to do it alone" (COM 77 283 p 11, EC Bull Sup 3 77).

The Communication went on to define criteria for development and selection of community actions[11] and to apply those criteria to all areas in which there were running research actions, direct or indirect, as well as to new areas in which such actions were developed and proposed, including budgetary provisions for the period 1977-1980.

The Communication proposed a Council Resolution on the guidelines for the common policy and two Council decisions: one on industrial research projects and one on a programme for Forecasting and Assessment in Science and Technology (FAST). The Council did not adopt the resolution on the guidelines nor the decision on industrial research projects. It adopted the decision on FAST (1978-82) as well as some 25 other decisions over the period 1977-1980 on research policy initiatives that had been included in COM(77)283. In fact about half of those Council Decisions were on individual concerted action projects, many in the context of COST.

In the meantime, Davignon was more and more preoccupied with information technology. The launch of Japan's Very Large Scale Integration, or VLSI[12], semiconductor programme in 1978 reverberated around Europe with worries of new technology gaps appearing (Hiraoka 1984, Sandholtz 1992). Davignon frequently cited the Colonna report, and was an important champion of FAST, acutely aware of the importance of information and communication technology for the future of Europe[13]. In fact, Davignon used a group of FAST officials to form an Information Technology Task Force, that developed the telematics strategy and eventually the first truly European IT research programme, ESPRIT: The European Strategic Programme of Research in Information Technology.

But for progress, broader political support was needed. In the early 1980s Davignon invited senior officials of the 10 largest computer and telecommunications manufacturers to a series of meetings to discuss a European Telematics Strategy. The idea found support amongst the group, which called attention to the importance of microelectronics technology. When in 1981, in the Thorn Commission, Davignon became responsible for research, he held a series of roundtable meetings with the heads of the 12 largest European IT companies, exploring their willingness to work together to face off against American and Japanese competition.

The outcome of the meetings was the Commission's proposal for the pilot phase of ESPRIT in August 1982. The proposal was

[11] The criteria were broad and actions had to comply with at least one of them

[12] VLSI refers to Very Large Scale Integration circuits – important microelectronics programmes launched in the US and Japan in the 1970s.

[13] Godet and Ruyssen (1981)

approved by the Council in December. ESPRIT adopted the model of pre-competitive research from Japan's VLSI programme, in which companies agreed to collaborate in research but to continue to compete in development and commercial exploitation of results. For some, this was a way to bypass competition rules, while for others this was a condition the companies themselves set in order to work together.

In the meantime the Commission brought to the Council a series of multi-annual indirect action programmes that were building on previously established ones, in environment, medical research, raw materials and metrology, as well as in new areas like biomolecular engineering. Each Council decision covered a different time period, and overall budgetary planning was becoming more and more challenging. On 21 December 1982 it brought to the Council its "Proposals for a European Scientific and Technical Strategy Framework Programme 1984-1987" (COM(82)865). Once again it argued the importance of a coordinated approach and the need for Community R&D activities complementing those of the Member States, to jointly address important socio-economic challenges, including the technology gap:

> "One should recall the extent to which European cooperation efforts during the last few decades have been a determining factor for the Member States in keeping them up with competition through innovation (nuclear fission, thermonuclear fusion, space, etc.). It should also be noted that, conversely, in those fields where European cooperation has not or has not yet been developed, significant gaps are appearing between the Community, the USA and Japan (already apparent so far as computer science and biotechnology are concerned, weaknesses are beginning to emerge in more traditional sectors such as motor vehicles, chemicals and materials)". (COM(82)865 final, p 12)

An FP would set out objectives, priorities and criteria for Community activities and allow the Council to decide orientations and longer term budgetary envelopes.

> "The framework programme will thus not only be a Community programming tool but also one for medium term financial forecasting likely to render it considerably easier to make sectoral programme or budgetary decisions. (COM(82)865 final, p 2)

FP1: financial indications by objectives (1984 to 1987)

1. Promoting agricultural competitiveness: 130 MECU (agriculture 115, Fisheries 15)
2. Promoting industrial competitiveness: 1,060 MECU (removing and reducing barriers 30 MECU, new techniques and products for the traditional industries 350 MECU, new technologies 680 MECU)
3. Improving the management of raw materials: 80 MECU
4. Improving the management of energy resources: 1,770 MECU (developing nuclear fission energy 460 MECU, controlled thermonuclear fusion 480 MECU, developing renewable energy sources 310 MECU, rational use of energy 520 MECU)
5. Stepping up development aid: 150 MECU
6. Improving living and working conditions: 385 MECU (improving safety and protecting health 190 MECU, protecting the environment 195 MECU)
7. Improving the effectiveness of the community's scientific and technical potentiall: 85 MECU
8. Horizon Action: 90 MECU

***Total*: 3,750 MECU at 1982 constant values**

Following a debate at the Council the Commission proposed a Council Resolution for a Framework Programme of Community Research on 17 May 1983, (COM (83) 260 final), which was adopted on 25 July 1983.

The resolution covered all the programmes that had already been launched, and included space for the promotion of industrial competitiveness, for which the Commission was preparing new proposals. The overall financial allocation to the programme was 3.75 billion ECU, three orders of magnitude greater than the sums allocated to research programmes and projects during the period 1977-1981.

On 24 June 1983 the Commission proposed two multiannual programmes on industrial technologies with budgets of 135 MECU and 35 MECU respectively; and in November 1983 it proposed the full phase of ESPRIT, which was approved early in 1984. The speed in the adoption of ESPRIT was a testament to the Davignon method of getting "industry to sell the programme to the National Governments" (Sandholtz 1992 p 173). In contrast, the Basic Research for Industrial Technologies, or BRITE, programme was not adopted by the Council until March 1985. Then two months later it adopted "a definition phase for a Community action in the field of telecommunications technologies — R&D programme in advanced communications technologies for Europe (RACE)". Its preparation started with the same industrial Roundtable of Twelve as had ESPRIT, and added the public telecoms operators and their supervising Ministries.

The adoption of the Single European Act in 1986 provided a new legal basis for EU policy in R&D beyond the recognition of its usefulness in the pursuit of the Common Market. Encouraging the industrial competitiveness of the European Community was set as the purpose of the policy, and the FP was set as the key instrument for pursuing this purpose. The decision-making procedures required for the adoption of the FP and its constituent parts changed, although they kept being treated as separate decisions. The Commission proposed a Regulation for a second Framework Programme, FP2, in August 1986; and the Council adopted it in September 1987. The negotiations were tough. The budget adopted by the Council was 5.4 billion ECU, 30% down from the Commission proposal. The difficult fiscal climate for R&D in the Member States was blamed. Alain Devaquet, the French research minister, summarised his country's position: "The Commission's approach is enthusiastic, but what we want is rigour"[14].

The negotiations for FP2 coincided with the launch of EUREKA, a new European scheme supporting cooperation in science and technology - outside the European Community framework. During that period, adoption of individual programme decisions with different time horizons continued, creating a complex web of future commitments in all the areas in which programmes had been launched. International agreements with the European Free Trade Area countries and the expansion of cooperation with countries of central and eastern Europe in the late 1980s was creating a feeling of optimism about the EU generally, and its policy for science and technology to help build Europe further.

Amidst this enthusiasm, the Commission on 29 June 1989 published "a Framework for Community RTD Actions for the 1990s" (SEC(89)675), aiming to test the waters in the Council about a re-orientation of FP2, but also to launch a debate on the longer-term orientations of the Common Policy for Science

[14] Scotto, M., 'La CEE compte ses ECU', Le Monde, 23 October 1986, cited in Bussière et al 2019 p 323

and Technology. The paper emphasised the important opportunity that the completion of the Single Market in 1992 offered Europe's industry, as well as the continuing challenges that the technology gap entailed. Three key ideas were put forward: the goals and means of the Treaty as objectives of S&T policy, subsidiarity as the principal method, and Community cohesion as a top political priority. Two months later, the Commission brought to the Council its proposal for FP3 (1990-1994). With a proposed budget of 7.7 billion ECU, it covered all the ground of the previous programme in five thematic areas plus a transversal priority on human capital mobility. The decision establishing FP3 was adopted by the Council in April 1990 with a budget of 5.7 billion ECU. In the process an important rift emerged between the Council and the European Parliament, which had proposed an increase in the budget from the Commission's proposal to 8.2 billion ECU. Overall, the budget of FP3 was considered too low. The Commission proposed an extension to the budget of 1.6 billion ECU to avoid a drastic fall in the annual Community R&D effort in 1993-1994. The Council approved an increase of 900 million ECU in March 1993, leading to an overall budget for FP3 of 6.6 billion ECU.

It was in FP3 that planning finally lined up the Framework Programme and its constituent programmes. The 15 specific programmes adopted between June 1991 and April 1992 all were to end in December 1994. It also signalled the beginning of the end for some iconic endeavours of the past. FP3 was the first proposal for a Community policy in science and technology since 1970 that had no place for forward looking analyses. FAST and RACE disappeared, the latter to be replaced by communications technologies. The acronym ESPRIT could be found inside the programme on information technologies and in its implementation literature, where it was often called ESPRIT III.

In 1992 the Treaty of Maastricht adopted a small change in the phrasing on the legal basis of EU research policy, which linked research to EU needs beyond industrial competitiveness; this kick-started discussion about the possibility that the EU could also support basic research. On 9 April 1992 the Commission published "Research after Maastricht: an assessment, a strategy" (SEC(92)682 final), in which the Commission embarked on an in-depth reflection about the types of research that the Community could support:

> "The reference to 'scientific basis' fully justifies support for fundamental research. With the exception of 'curiosity-oriented' research, no fundamental research sector can, a priori, be excluded from Community intervention" (SEC(92)682 final p 29)

Not surprisingly, the European science community was a fan. Over the coming year, for instance, Germany's Max Planck Society organised three conferences on European research structures, the first of which focused squarely on the possibilities opened up by the Maastricht Treaty to reconnect the Framework Programme with the aspirations of the scientific community for substantial European support for basic research[15].

The Commission presented its first discussion document for the preparation of FP4 (1994-1998) in September 1992 with a planned budget of 14.7 billion ECU (COM(92)406). More than doubling the resources of the rather modest FP3, this was to include:

> "…all the RTD activities covered by the Treaty…. basic research, basic

[15] See Max Planck Gesellschaft (1994

> industrial research, applied research and technological development…. (and) all research, technological development and demonstration activities carried out within the framework of the major common policies, such as agriculture, fisheries, energy or transport" (COM (93) 276 final pp 8-9).

Whilst including all those activities in its scope, FP4 was to be selective and focus on the areas where its activities would most add value. The programme was structured in four activities: R&D programmes, international cooperation, dissemination of results, and training and mobility of researchers. The bulk of the budget was dedicated to the R&D programmes that were proposed in seven areas: Information and communication technologies, Industrial technologies, environment, life sciences and technologies, non-nuclear energy, transport and targeted socio-economic research. Following the Maastricht Treaty procedures, in addition to decisions on the FP and each specific programme, rules for the participation of undertakings also needed to be decided upon. In a "streamlined" procedure, FP4 was adopted in 1994 by a flurry of Council Decisions (adopting the FP and the EURATOM programme, 20 specific programmes for the two Frameworks and three sets of rules for participation). The associated budget was 12.5 billion ECU (11.625 billion ECU excluding EURATOM).

The period of preparing FP4 was a golden age in evaluation studies. FP2 had included a specific programme called MONITOR that included FAST, SAST (Strategic Analysis in Science and Technology) and SPEAR (Support Programme for Evaluation Activities in Research). These programmes generated a community of analysts and researchers in Europe who were preoccupied with EU policy and how to improve it, a community that contributed greatly to addressing the demands of the Council for evaluation. In the activities of this community one finds early methodological debates on the value of econometrics for estimating the economic importance of R&D,[16] and considerations of impact, additionality and added-value (Kastrinos 1994, Buisseret at al 1995, Laredo 1995). Through the work of that Community, by the mid-1990s it was obvious that the FP was reaching far and wide across Europe's scientific and technological community and was shaping it in networks that were having important and heterogeneous effects. It mattered to different people, organisations and nations, from powerful public and corporate actors in wealthy member states down to struggling SMEs and research groups in countries where funding is scarce. The newer EU members were not countries with strong national science funding structures, and the increase in the budget from FP3 to FP4 was easily absorbed by the programme without leading to a fall in success rates. In fact, over the course of the first four FPs, the average grant size remained stable, but the number of participants per project increased (from three to seven). Thus the funding per participant decreased from 250,000 ECU in FP2 to about 165,000 ECU in FP4 (EC 1977 p 544).

Coming of Age: an important European policy

In April 1996 the Commission issued a communication titled, "Inventing Tomorrow: Europe's research at the service of its people" (COM(96)332 final). In that, it argued that research is essential for the future and that, in order to improve the impact of its research on society and the economy, the Union needed to shift the balance between its activities to

[16] Bach et al (1995) measured that the EU investment in BRITE returned more than 10fold

support basic research, to better align with market developments and to put more emphasis in exploiting the results. The Communication was a prelude to the forthcoming proposal for FP5, which included three thematic programmes ("unlocking the resources of the living world and the ecosystem"; "creating a user-friendly information society"; and "promoting competitive and sustainable growth") and three horizontal programmes: ("confirming the international role of European research"; "innovation and participation of SMEs"; and "improving human potential"). The Commission's proposal included no figures but only a percentage breakdown between the actions and a minimum threshold of 0.048% of gross national product. In August 1997 the Commission proposed a budget of 14.833 billion ECU. The Council Decision, in December 1998, allocated FP5 a maximum 13.7 billion ECU for the period 1998-2002. The Specific Programmes were adopted in January 1999. FP5 was the last Framework to be adopted with unanimity in the Council. The Treaty of Amsterdam, which entered into force in May 1999, modified the adoption procedure to one requiring qualified majority.

FP5 aimed at strengthening the link between the research agenda and societal challenges. The thematic parts were organised in Key Actions, each focusing on a specific societal concern. Its coverage was widened by the inclusion of Key Actions on "Strengthening the Socioeconomic Knowledge Base", space and security. An important part in the development of the idea of Key Actions was played by a "five-year assessment" report by a panel chaired by Davignon, which argued that "the Framework Programme is not fulfilling its promise. It lacks focus and is underachieving" (COM(97)151 final p7). As a result, more focus was advocated to solve the big challenges that Europe was facing.

Towards the European Research Area

On 15 March 1999, a few weeks before the entry into force of the Treaty of Amsterdam, the Santer Commission resigned in scandal – most notably, a controversy over then-research commissioner Edith Cresson's hiring practices. The Prodi Commission that succeeded it embarked on a process of reform that saw the Commissioners sharing offices with the services. Commissioner Philippe Busquin, responsible for the research portfolio, occupied an office in the Square de Meeus building, and made a point of his personal interest in science. He embarked on a project of creating a European Research Area (ERA), the equivalent of the Single Market for the world of research, science and technology. The Commission published the Communication, "Towards a European Research Area" (COM(2000)0006 final), in which it argued that the Community effort must help structure European research:

> "Decompartmentalisation and better integration of Europe's scientific and technological area is an indispensable condition for invigorating research in Europe. We need to go beyond the current static structure of "15+1" towards a more dynamic configuration". (p 7)

> "Without concerted action …. the current trend could lead to a loss of growth and competitiveness in an increasingly global economy. The leeway to be made up on the other technological powers in the world will grow still further. And Europe might not successfully achieve the transition to a knowledge-based economy". (p 4)

Later that year the Commission published guidelines for EU research activities (2002-

2006) (COM(2000)612 final), in which it provided some detail on its plans for structuring European research. In this it was supported by another "five year assessment" report by a panel, chaired by Joan Mayo, which argued that:

> "The Framework Programme alone will not be enough to serve the goals set at Lisbon. Although there is much to commend in past and current Framework Programmes, the challenges we face as we move towards the new economy call not only for the Framework Programme itself to become a much more flexible policy instrument, but also for additional instruments and actions" (Mayo et al 2001 p i).

The plans included a change in the policy instruments – with larger R&D projects and a new scheme called Networks of Excellence – as well as calls for joint programmes between Member States and joint initiatives between stakeholders (variable geometry instruments mentioned in the Treaty but not yet used). Some of these ideas would be piloted during FP5, but they would be fully implemented in FP6. The Commission's proposal for FP6 had a budget of €16.27 billion and was structured into three programmes: integrating research (€12.77 billion); structuring the ERA (€3.05 billion); and strengthening the foundations of ERA (€450 million). The Commission's proposal on the budget was accepted as it was by the Council – a first in the history of the Community, and an indication that the Member States were coming to the same understanding as the Commission about the need for a European policy in science and technology[17]. In March 2002, the European Council set the objective of achieving a research effort of 3% of EU gross domestic product by 2010.

FP6 left some important legacies. One was the idea of Networks of Excellence as an instrument to shape the durable integration of research capacities between institutions. The instrument captured the imagination of many researchers, and 167 Networks of Excellence were financed with €1.6 billion involving some 5,000 partners. However, it was quickly realised that durable integration of research capacities cannot be expected to take place through a time-limited contract. The instrument was criticised by the Court of Auditors and abandoned in FP7.

Other important legacies were instruments that promoted collaboration between agencies that launch and manage research programmes, such as the ERA-NETs and between sectoral industrial bodies and associations such as the technology platforms. These have formed a growing part of EU research and innovation policy ever since. FP6 also launched the Risk Sharing Finance Facility and the programme on New and Emerging Science and Technology, which was partly a precursor to the European Research Council and gave rise to the programme on Future and Emerging Technologies in Horizon 2020 and the Pathfinder programme of Horizon Europe.

Overall, FP6 signalled a brief period of consensus between the Commission and the Member States on the appropriate level of European Union support to R&D. It started an important discussion about the structures and the institutions for research in Europe, and about the possibilities for coordination between the policies of Member States and the EU that was over and above anything that the Commission had achieved since the 1970s (Kastrinos 2010).

[17] With the enlargement of the Union the budget of FP6 was increased to 17.9 bn EUR in April 2004.

In November 2004 Janez Potočnik succeeded Busquin as Commissioner for Research. Potočnik was less concerned with the instruments of the EU and their structuring effects, and more with the need to convince Ministers of Finance about the value of EU research efforts. Having come from the negotiations for accession of Slovenia to the EU, he was very aware of the importance of the EU Multiannual Financial Framework that the Barroso Commission was embarking on. While he believed that a functioning knowledge triangle linking education, research and innovation is key, his policy proposals for FP7 (COM(2005) 118 final) were titled "Building the ERA of knowledge for growth". It made no mention of a European Institute of Technology that President Barroso saw as key to growth and jobs (COM(2005) 24 final). The proposal for FP7 placed "the emphasis on research themes rather than on "instruments"" (p 7), included substantial support for the European Research Council, new themes on space and security, and asked for a doubling of the research budget over a period of seven years (2007-2013). FP7 was to be implemented by four specific programmes titled "cooperation", "ideas", "people" and "capacities". The management of its implementation was to be entrusted to Commission agencies that would be set up specifically for this purpose.

In December 2006 the Council and Parliament agreed on a programme of €51 billion, a 30% reduction from the Commission's proposal. Still, it represented a significant increase over the previous programme. For the first time the EU research budget was higher than the appropriations of the US National Science Foundation for the same period[18]. In the end FP7 spent €44.6 billion on approximately 25,000 projects involving approximately 29,000 organizations.[19] About 21,000 of them were participating in the FP for the first time. At the same time the 500 organisations with most participations got 60% of the EU contributions[20].

ERA unfolding: towards a steady state?

In February 2010 Máire Geoghegan-Quinn became the Commissioner responsible for research, and she was immediately involved in a review of FP7 – "the biggest public research programme in the world", as she put it.[21] The interim evaluation of FP7, an exemplary evaluation effort, recognised the wide reach of the programme and its importance for high quality research in Europe, both through competition for excellence and through promoting collaboration amongst research teams, as its key strengths. At the same time, it identified good programme management as a key area for improvement and it pointed out that "considerable effort is needed to achieve effective coordination of research between the Member State and EU levels" (Annerberg et al 2011 p vii). It also noted that the launch of Joint Technology Initiatives had been ridden with problems and that coordination of funding streams from the Commission, the Member States and industry entailed important challenges. The report suggested a shift towards "Grand Challenges", as well as a focus on the need to strengthen inter-institutional links and to strengthen the functioning of the "knowledge-triangle" in Europe (ibid p 9).

In February 2011 the Commission launched a "Green Paper Towards a Common Strategic

[18] Adding up the annual appropriations of NSF for the years of FP 7 amounts to $ 48.6 Bn

[19] A total of 131590 "participations" in projects.

[20] For an in depth analysis see Fresco et al (2018)

[21] Towards an 'i-conomy' - Commissioner Máire Geoghegan-Quinn delivers the 2010 Guglielmo Marconi lecture at the Lisbon Council's innovation summit, Brussels, 5th March 2010

Framework for EU Research and Innovation funding" (COM(2011)48 final), in which it consulted the Member States on "the key issues to be taken into account for future EU research and innovation funding programmes" (p 2). The emphasis was on coordination between different EU level initiatives and on simplification – clarifying objectives, reducing complexity, avoiding duplication, simplifying and broadening participation, and increasing impact. The centre of attention shifted from the governance and structures of research and innovation to the administration of EU funding, in order to effectively address the grand challenges that the Lisbon Strategy was taking on. Member States were asked questions such as, "how can EU funding become more attractive and easy to access for participants", and, "how should a stronger focus on societal challenges affect the balance between curiosity-driven research and agenda-driven activities"? (ibid pp 8-9).

Member States also launched their own consultations, on the basis of which the Commission presented its proposals for Horizon 2020, the Framework Programme for 2014-2020, in November 2011. The proposal involved a tripartite structure: "excellent science"; "industrial leadership"; and "societal challenges"; but it was proposed and negotiated as one specific programme. The proposed budget was €87.74 billion. The proposal aimed at radical simplification of structures and procedures, especially around the funding model; and the negotiation of the rules for participation was especially challenging. The proposal of a societal challenge on "inclusive, innovative and secure societies" was also controversial, as it was widely seen as lumping together security, IT applications, social sciences and humanities, as well as items such as structural support for scientific capacities and the COST programme.

The decision of the Council adopted a budget of €77 billion that included separate sections on "spreading excellence and widening participation", "science with and for society", and a new division in societal challenges between "secure societies" and "inclusive, innovative and reflective societies". The budget allocations in those parts were largely corresponding to the proposed budget for the controversial societal challenge.

In November 2014 Jean-Claude Juncker became President of the Commission. His mandate was shaped by the experience of the Eurozone crisis and by the fact that it started soon after the Multiannual Financial Framework and its policy programmes had been agreed. The Juncker Commission, "the last chance Commission" as he called it, made a priority of bringing the EU closer to Europe's citizens. Carlos Moedas, Commissioner for Research, put forward a vision of openness[22], oversaw the functioning of scientific advice to policy and the European Group on Ethics, and developed the idea of EU Missions[23], a means to bring EU science and research closer to EU citizens.

In 2016 the Commission published the ex-post evaluation of FP7, which marked an important change in evaluation practice. It made the most extensive use of administrative data on all aspects of the programme and had the most extensive and thorough description of the administrative and political context in the history of FP evaluations. At the same time, the experts made extensive use of self-evaluation material from the Commission services, which they displayed as empirical

[22] European Commission (2016) Open Innovation, Open Science, Open to the World - a vision for Europe, OPOCE, Luxembourg

[23] Commission launches work on major research and innovation missions for cancer, climate, oceans and soil - European Commission (europa.eu)

findings. Characteristically, the report has a section with myth-busting facts about FP7, and uses econometric models used by the Commission services to conclude that "each euro spent by the European Commission on FP7 generated approximately 11 euro of estimated direct and indirect economic effects through innovations, new technologies and products" (Fresco et al 2018 p 5).

The trend was continued in the interim evaluation of Horizon 2020, which was very detailed in its data presentation and was entirely based on self-evaluation material from programme management. The midterm evaluation assures that Horizon 2020 does what it says it does, and this includes assessing impact on the EU economy, its social fabric and its research and innovation systems. As in many previous instances, the Commission thinks improvement can come from more and better focus; from "an impact-focussed mission-oriented approach to continue to deliver on global challenges at a scale, speed and scope that adds value compared to what can be done at national or regional level" (ibid p 193). The teething problems found by the mid-term evaluation of FP7 in partnerships and co-funding arrangements with industry and Member States disappeared, and the mid-term evaluation of Horizon 2020 found openness, transparency and effectiveness (ibid pp 103-107).

Horizon 2020 expanded the use of public-private partnerships. Seven Joint Undertakings had their own legal personality and managed their own agenda (Clean Sky, Fuel Cells and Hydrogen, Innovative Medicines Initiative, Electronic Components and Systems for European Leadership, Bio-based Industries (BBI), Single European Sky Air Traffic Management Research (SESAR) and Shift2Rail. In all, €7.158 billion of Horizon 2020 went to these partnerships. In addition, another ten "contractual public-private partnerships" were set up in Horizon 2020, devising research agendas that were implemented through calls by the programme. Reillon (2017 a) estimated that public-private partnerships used 21.5% of the budget of Horizon 2020. The use of partnership agreements has continued to expand in Horizon Europe.

An "impact focussed-mission oriented approach" was a central recommendation of the "Lamy Group", an independent expert groups that was set up by the Commission to advise it on how to maximise the impact of future EU research and innovation programmes.

> "The post-2020 EU R&I programme should thus translate global societal challenges (social, economic, environmental) into a limited number of large-scale research and innovation 'missions'. These would define expected impacts across an entire portfolio of activities, rather than at the level of individual call topics. The UN Sustainable Development Goals should serve as a global reference framework for defining Europe's R&I missions". (Lamy et al 2017 p 15)

The proposal for "Horizon Europe[24]" (2021-2027) – was published in June 2018. For the first time, a single legislative proposal covered the programme and the rules for participation in 56 pages[25]. The proposed structure involved three pillars - open science; open innovation; and global challenges and industrial competitiveness - and a horizontal part on strengthening the European Research Area. The overall budget proposed was €94.1

[24] The 9th Framework Programme

[25] For comparison the proposal for H2020 was 118 pages long without including the rules for participation.

billion. The proposal included a European Innovation Council to take on the task of improving the contribution of the programme to innovation in Europe, the European Institute of Innovation and Technology was brought into the FP; the use of partnerships was proposed to expand while also rationalised; strategic programming was to be a major process whereby research priorities were set in the implementation of the programme; and a limited number of important EU missions were to be created. A very schematic thematic structure was proposed for the global challenges and industrial competitiveness pillar that comprised: ' Health'; 'Inclusive and Secure Society'; 'Digital and Industry'; 'Climate, Energy and Mobility'; and 'Food and Natural Resources'.

The Council Regulation on Horizon Europe came almost three years later in April 2021. The change in the Commission and the Parliament in 2019, when Ursula von der Leyen succeeded Juncker as President of the Commission and Mariya Gabriel became Commissioner for Research, Education and Youth, was certainly an important factor. But the flexibility left by the proposal probably played a role too. The text proposed by the Commission included specific definitions for 25 terms, a practice typically associated with the rules for participation. The Council Regulation defined 48 terms, including such expressions as "innovation ecosystem", "recognition prize", and "training and mobility action". Simplification remained an important policy goal.

The regulation provided €86.5 billion for the Framework Programme and €7.9 billion for a specific programme on defence research, outside the FP. The word "open" disappeared from the pillars, which became "Excellent Science", "Global Challenges and European Industrial Competitiveness", and "Innovative Europe". The structure of the global challenges pillar was reshuffled to 'Health'; 'Culture, Creativity and Inclusive Society'; 'Civil Security for Society'; 'Digital, Industry and Space'; 'Climate, Energy and Mobility'; 'Food, Bioeconomy, Natural Resources, Agriculture and Environment', and a new part on "European innovation ecosystems" was added to the Innovative Europe pillar.

During the first three years of Horizon Europe more than 10,000 grants were signed with more than 21,000 organisations in some 72,000 participations. The FP, despite Brexit, is still spreading its influence across the European continent and beyond. It is now more varied and complex than ever. Repeating past experiences, the new elements – the EU missions – seem slow to take off.[26] In contrast, the partnerships, now in their fourth FP, are expanding fast. The Biennial Monitoring Report on Partnerships in Horizon Europe[27] (2022) reported that by the time of its publication there had been 37 European Partnerships officially launched. The total number of partnerships expected to be launched under the first Strategic Plan under Horizon Europe (2021-2024) is 49, covering a commitment of €23.9 billion from Horizon Europe. And just as Horizon Europe entered its fourth year of operation, the Commission published the final evaluation of Horizon 2020, (COM(2024) 49 final) an exercise carried out by the Commission and published as a Staff Working Document (SWD/2024/29 final). Preparations have started for the European elections and the new Commission as well as for the negotiations that will unfold over the EU budget and the next phase in R&I policy.

[26] See EU Missions assessment reports and mission areas review report - European Commission (europa.eu)

[27] Performance of European partnerships | Research and Innovation (europa.eu)

What does the future hold? What does the long view bring?

The first thing I would like to mention is the appreciation of successes and failures. The science and technology and innovation policy of the European Community and later Union has been a huge success in its existence and growth. What started with the trauma of the early days of Euratom has become not only a fully fledged EU policy but also a very important pillar of Europe's polity, economy and society, and that in itself is no mean feat.

At the same time, the technology gap with the US, the most important justification for the policy, did not disappear and has been joined by a new technology gap emerging with China. Can this be considered a failure? Two points need to be made here. The first point is about means and ends. The technology gap is primarily due to a differential in investment. Making it disappear would require bridging the gap in investment and compensating for the effects of historical lags. However, even when the Commission declared willingness to address the gap, it was, with the exception of FP6, not given the level of resources it asked for. And even in FP6, the EU was very far from bridging the technology gap with the US. This brings the second point which is about the logic of addressing challenges that are not overcome, and about the ways in which the value of EU R&I policy is argued for. A key word in this has been "focus". Since the traumatic launch of Euratom, the Commission has been trying to use "focus" as the way to justify the Community – and later Union - effort as different from what the Member States do. Invaluable though it is, focus does not compensate for lack of scale, in the same way that addressing a problem does not compensate for not solving it.

The FP came about because of a felt need to coordinate between disparate focussed efforts and create scale and relative budgetary stability in time. After more than a decade of very focussed Community efforts, it was felt that a framework was needed. The Commission first proposed it in 1977, but convincing the Member States took some doing. In 1983 the EU agreed on the first framework, which was what it said on the tin: a frame placed around programmes. It took another decade before the box started to constrain the programmes, and to define political objectives of its own.

During that decade the European effort had to be additional to that of the Member States – to not overlap but to add. Yet this was impossible to define without political agreement on the overall objectives. What if the national and European objectives did not align? Could it be that instead of adding, the common effort could deduct from the effectiveness of national efforts or derail them?

The technology gap with the USA played the key role as the target against which all efforts in Europe aligned, later to be joined by the fear of the prospect of a technology gap with Japan. Closing the technology gap is not the kind of objective that can be fulfilled with focus. After all it is primarily a problem of scale. And the efforts of the FP, with all their focus and leveraging effects, have for the most part been similar in scale to the efforts of the US National Science Foundation – by US standards, not a large agency, and one focused mainly on fundamental science rather than the enormous breadth of topics that FP funds.

Coming of age for the FP was the effort to address the challenges and needs of European citizens and to impress upon them the importance of the FP, over and beyond anything that had to do with the technology gap. This signalled a period in which the FP

had gone beyond the need to be additional. Its programmes had become recognisable and important parts of every national research scene in Europe. The European Research Area and its political success were proof of that. It also signalled a period in which the narrative of the FP has become much more tangled with the politics of the narrative of the EU. An era in which citizens are called upon to form expectations from the FP to not only address challenges but also to resolve them.

In the 21st century the FP grew a lot and so did its ambitions and instruments. It grew as a framework around increasingly diverse efforts and endeavours, and it grew as a programme with all kinds of interactions and interdependencies with other programmes and policies. It became a space of increasing complexity inhabited by a host of contractual arrangements between funders and performers of research and innovation in multiple roles, be they government ministries, funding agencies, companies, research institutions, NGOs, lobby groups, government research centres, institutes, foundations and any other form of legal entity one can imagine.

Is this complex ecosystem a healthy and productive governance system for the European Research Area? Can it convince Europe's citizens that it will triumph over their worries and the challenges they face? Again, the question of scale looms large. As just mentioned, in contrast to the NSF the FP is driven towards an increasingly coordinating programmatic role, leveraging investments towards specific goals through missions and partnerships. In this role it finds itself in a familiar position of lack of scale. Companies like Amazon and Alphabet have annual R&D budgets many multiple the size of EU FP. In fact, the five largest corporate R&D performers in the US spend more on R&D than the whole of Europe's public sectors put together.

For Europe to fit the action to its ambitious words requires much more investment, and even with much more investment the fulfilment of its ambitions cannot be guaranteed. The risk needs to be shared, and the rise of partnership arrangements in the FP would seem an important means of collectivising the risks and benefits from any investments. But it is increasingly understood that the investments need to be substantial.

So, there is a future in which the next FP fits the action to the words and signals an important increase in the budget, supported by a strong alignment of the R&I priorities of the EU and its Member States, growth and further expansion of partnerships, leveraging funds from other EU policies towards missions and mostly drawing on an expansion of the EU Budget as a whole. For those who desire such a future the two main challenges are political feasibility in the budget negotiations, and agency or the lack thereof in implementing investments to deliver results.

An alternative future is one in which the FP fits the words to the action, continuing in a steady state in its institutional parts (ERC, EIC, EIT, MSC, and the partnerships), and its programming part abandons the ambition to change the world and focusses on making a difference in areas in which research is needed by EU policies - security, environment, social sciences and humanities.

Of course, the real future that will unfold is likely to be much more complex and multidimensional. Such is the project of building Europe.

ENDNOTE: Why this history of the Framework Programme?

There is a view that we learn history to avoid repeating the mistakes of the past. A different view is that we learn history so that, when we come to repeat the mistakes of the past, we know exactly what to do. Either way, there is no doubt that learning history is an exercise with strong moral and normative content.

I first wrote a history of the Framework Programme in the early 1990s when I was studying EU science and technology policy for my PhD (Kastrinos 1998). I later discovered Guzzetti (1995) and was pleased to see that the account I had constructed by archival research was not very different from his. The Guzzetti report remained seminal historical work, until the European Parliament published a wonderfully concise historical overview of EU R&I policy (Reillon 2017b). I set off to use the insights of Guzzetti and Reillon to annotate my history and bring it up-to-date. In the process, I ended up investigating deeply and widely small differences between the three accounts, seeking accuracy and better historical understanding.

While I hope that readers will appreciate my timelines, the future of the Framework Programme is not prescribed. If anything, it is subject to negotiation between different visions and different ideas rooted in different understandings of the past, the present and how they connect to the future. My revisiting of the history can recast the past and the present around new ways of seeing policy. Hopefully, this will highlight alternative visions of the future.

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