Explaining changes and continuity in EU technology policy: The politics of ideas

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Abstract

By looking at the role of ideas in EU policy-making, this article partly contests other explanations on the evolution of EU RTD policy. Our claim is that the cognitive dimension of policy framing should also be considered in the explanation, alongside the roles of institutional dynamics and of material conditions. Bringing ideas back in, we provide a new account of the historical evolution of EU RTD policy, which has been moving from a frame of science policy to technology policy, and lately to innovation policy. Special emphasis will be placed on explaining this latest move, as the current 'innovation turn' brings about a re-interpretation of the boundaries between RTD policy and other policies. The conclusion will sum up the arguments, focusing especially on the current transformations of this EU policy.

Introduction

The RTD policy of the European Union has expanded notably from the limited research actions envisaged in the three Treaties of the 1950s. The introduction of an "overall RTD policy" in the EC agenda in the late 1970s was associated to the idea of addressing the technological gap conceived as the major problem for European competitiveness in world markets. Since the mid-1990s, RTD policy has been gaining saliency within EU policies, through a re-positioning and incorporation into the basic European policy frames about sustainable economic growth, employment and social cohesion.

Conventional explanations concerning the development of the EU RTD policy have mainly focused on the role of interests, through the perspective of national governments, as a result of the mobilization of private interest (Peterson, 1992; Sandholtz, 1992; Sharp 1989; Sharp and Shearman, 1987), or on the entrepreneurial role of the European Commission (Cram, 1997; Pollack, 1994). One major shortcoming of these explanations is the lack of attention given to the transformations in the cognitive dimension of policy formulation. The ideas and arguments about the role of science and technology in economy and society and the dominant RTD policy frames have changed significantly. The boundaries of the policy and considerations about the way in which innovation and technology relate to competitiveness, job-creation, economic growth and social progress have also changed.

There has been an important transformation in the conceptualization of RTD policy, which is now articulated into a broader *innovation policy* (Caracostas and Muldur, 1998

or Peterson and Sharp, 1998). This is much more than a new label, in such that innovation entails a different view on the role of public action in the process of technological development and its links with economic growth. The 1993 White Paper on "Employment, Competitiveness and Growth" (EC, 1993) includes some elements of the new policy frame, although people have identified the turning point for these changes in the 1995 Commission's "Green Paper on Innovation"(EC, 1995).Indeed, this re-framing seems to have taken place in the absence of direct involvement of major corporate or national interests. How, then, can we explain the new trajectory of EU RTD policy? And to what extent have the new policy frames reshaped the EU technology policy set up in the 1980s?

We suggest that an overall explanation of the changes and continuity of the EU RTD policy since its inception should integrate this cognitive dimension. Therefore, the role of ideas and policy frames needs to be considered as an additional explanatory factor, side-by-side with the institutional dynamics, economic constraints or actors' strategies. Research on the general role of ideas in shaping preferences or as an explanation of policy outcomes has developed at a slower pace. Building on analytical traditions from international relations, policy analysis and political economy we argue that new ideas, especially those arranged on policy frames, can orient actors' preferences in new directions and contribute to political change. Determining in which institutional conditions those impacts could be effective is also important.

This article first raises some conceptual and analytical issues about how ideas shape policy-making processes. The second section re-examines some aspects of EU technology policy, stressing the cognitive dimension of policy development. In this context, we will analyze the interaction between the evolution of socio-economic conditions, the way in which decision makers define their policy preferences and how new ideas and policy frames contribute to the solutions adopted in changing EU institutional conditions. The third section will look at recent transformations in EU RTD policy and its links to innovation policy.

1. The role of ideas in policy change

Public action primarily depends on the preferences of decision makers, but constrained within institutions. However, preferences are not the simple expression of actors' interests, because policy preferences are formed in a political context in which ideas and cognitive models are of relevance[1]. RTD policy change can be characterised as being an adaptive reaction (not necessary incremental) to the socio-economic environment in science, technology and innovation. And changes in policy could be studied through the transformation of the ideas and models that actors use to construct their specific policy preferences. Our main purpose is to document the cognitive turns of European S&T policy and how ideas have shaped policy development in RTD.

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[1] Interests represent fundamental goals (even if ambiguous) of actors, while preferences refers to the specific policy choices that actors believe will maximize or satisfy their income, welfare or chances of re-election (see for example Milner, 1997). Then, policy preferences are shaped by political and economic situations, institutional environments and dominant ideas.

Although classical arguments on the relevance of cognitive dimensions come from Weber and Keynes,[2] the conceptual framework is underdeveloped. The traditional debates about EU politics and policy-making either have disregarded the role of ideas or have considered them as mere argumentative instruments of actors' interests. However, ideas are more than argumentative instruments. Ideas also entail cognitive and normative processes, which provide world views and new understandings from which policy action might be developed. Traditional arguments that have disregarded ideas have forgotten the essentially deliberative nature of politics and policy-making (Majone, 1989).

Institutional approaches from political economy and international relations have contributed significantly to clarifying the conceptual issues associated with the effects of ideas on policy making. For example, Judith Goldstein and Robert Kehoane (Goldstein, 1993; Goldstein and Kehoane, 1993) develop three basic situations in which ideas could have an independent effect of on policy: when there is a world vision, a causal model or a focal point in an equilibrium situation. In the same vein, Peter Hall (1993) explains policy changes in economic policy using the case of paradigmatic change in economic theory from Keynesian to monetarist strategies.

Campbell (1998) made an attempt to set up a typology of ideas, based on two intertwined dimensions of ideas: the normative (ideas consist of values and attitudes) and the cognitive levels (ideas structuring our knowledge and used as arguments), and secondly the analytical distinction between the 'foreground' and the 'background' of policy deliberation. Paradigms constitute the ultimate abstract base of human and policy action; they "generally reside in (policy makers' and experts') cognitive backgrounds as underlying theoretical and ontological assumptions about how the world works" (Campbell, 1998). In this sense, paradigms define the political and policy discourse and eventually limit the number of solutions available for actors. Campbell uses the term paradigm in rather Kuhnian terms (Kuhn, 1962): "Some paradigms are more dominant than others. Important here is the degree to which they are institutionalised within the leading universities, think tanks, and professional organisations that provide policy makers with a particular world view" (Campbell, 1998). It is the institutionalisation that renders a theoretical framework a paradigm in this policy-oriented sense. Problems and solutions are socially and politically constructed within a framework of coherent understanding, which constitutes the paradigm.

However, beyond this understanding of paradigmatic change, the typology says little about the conditions and processes by which ideas become adopted. Public policies are a product of the relationship between ideas, interests and the forms in which issues are 'framed'. There is a reciprocal but non-deterministic relationship between actors' interests and the ideas and frames they use to cope with them. In this context, frames and interests are logically independent concepts, however, "it is the frames held by the actors that determine what they see as being in their interests and, therefore, what interests they perceive as conflicting. Their problem formulations and preferred solutions are grounded in different problem-setting stories rooted in different frames" (Schön and Rein, 1994). Action frames operate at different levels of specificity, namely,

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[2] "Not ideas, but material and ideal interests, (this) directly govern men's conduct. Yet very frequently the 'world images' that have been created by 'ideas' have, like switchmen, determined the tracks along which action has been pushed by the dynamic of interest" (Weber, 1915: 280). "I am sure that the power of vested interest is vastly exaggerated compared with the gradual encroachment of ideas" (Keynes, 1935: 383-4).

policy frame, institutional action frame and metacultural frame[3]. A policy frame is a social construction of reality which provides a perspective from which an amorphous, ill-defined and problematic situation can be made sense of and acted upon (Rein and Schön, 1991). Frames are rooted in the organisations and institutions that promote them[4] and policy conflicts might give rise to disputes between institutional actors who defend and sponsor conflicting frames. But institutions also provide 'policy forums' which serve as vehicles for a more general debate.

The notion 'policy frame' puts its emphasis on the competitive dynamism of ideas. In some circumstances, competition between policy frames could produce the substitution of the previous one by a new one. In other circumstances, what we observe is a process of redefinition of the policy frame or institutional frame as a result of the transformation of the policy boundaries.

Some actors take the responsibility of producing ideas. When actors are predominantly allocated in the field of interest, we observe 'advocacy coalitions'(Sabatier and Jenkins, 1993); when there is a group of actors mobilised around cognitive elements, this is what has been called 'epistemic communities', a "network of professionals with recognised expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area" (Haas, 1992).

It is in conditions of uncertainty where knowledge becomes a key resource (Radaelli, 1995). It is the knowledge-based nature of epistemic communities that provides these networks of actors with the potential to influence the policy process (Richardson, 1996). This actor-based approach relates to the role of networks as forums for communicating, exchanging and producing ideas and influence. Epistemic communities can be seen as the space where the cognitive process takes place and where ideas (mainly as paradigms, programs and frames) are formulated.

The notion of epistemic community relates to the role of expertise in policy-making[5]. It does so by a rather broad interpretation of who are the experts. From the definition above it seems that experts are those professionals from different disciplines and academic backgrounds, who at a certain point get together and constitute an informal network around a given policy issue.

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[3] A *policy frame* refers to the frame that a policy actor uses to construct a specific policy situation. An *institutional action frame* is a more general frame which embodies the institution's prevailing belief system, images, practices and norms which inform the policy frames of institutional actors. Beyond this level, there are *metacultural frames* (Schön and Rein, 1994: 33) which are organised around generative metaphors and symbols (such as 'nature', and 'equality').

[4] An example: within the European Commission in relation to science, technology and industrial policy three DGs [XII (Science, Research and Development), XIII (Information Technologies and Telecommunications) and III (Industry)] have promoted policy frames which are generally consistent with those associated with the interests of academics scientists or "high tech" firms.

[5] Some explanations (Dehousse, 1997) have stated the importance of expertise in the EU policy-making and they related it with some characteristics of the EU institutional structure, such as: First, the Commission's weakness in terms of internal resources, which makes it dependent on information and knowledge from external sources. Second, the subsidiarity principle that puts further pressure on the Commission along these terms; as initiator of the legislative procedure, it has to argue and convincingly justify new EU initiatives: that is, in order to justify in rational terms any single new policy move, it is pressured to come up with theoretically-rich frameworks to sustain its initiatives. And thirdly, experts and epistemic communities are also used by the Commission as exploratory fields for the acceptance and reaction to early drafts of EU action.

Indeed, ideas, frames, institutions and actors are not immune to the material world. Changes in economic conditions and in the political order might trigger policy development, the 'inexorable match of problems' as Kingdon (1984) mentions. However, the ability for new material conditions to become a factor for policy change depends entirely on the interpretative ability of the existent policy frame to provide convincing solutions to the 'new' problems, and on the way in which individual and collective (material) interests are re-defined accordingly. For example, the creation of the EU RTD framework program in the early 1980s can be seen as a response to the uncertainties about the technological competitive position of Europe in the aftermath of the oil crises. Similarly, the uncertainty about economic growth in an enlarged Europe with notorious structural disparities and the problematization of high unemployment rates in the 1990s have induced the search for new solutions in the 'innovative turn'.

2. The cognitive dimension in the evolution of EU RTD Policy.

The support and promotion of research and technological development became an European business quite early in the process of Community construction and European integration. However, the actual RTD policy forms are a contingent result of a complex evolutionary process; different variables and driving forces have been identified to account for these changes.

The conventional explanations of the early European involvement in S&T in the sixties agree that national governments (and industrial champions) took the initiative in developing a multilateral RTD program in nuclear energy to cope with the problems of scale and of competition with the US. The explanation of the new directions and developments that European RTD policies took in the seventies attributes a significant role to key individuals in the European Commission and to the mobilization of interest groups in support of these developments (see: Guzetti, 1995; Mytelka and Delapierre, 1987; Peterson, 1991; Peterson, 1992; Peterson and Sharp, 1998; Sharp and Shearman, 1987; Sharp, 1989)[6].

However, the conventional model of explanation does not help to understand the present policy turn. How to explain, given the relative stability of the actors in the S&T environment, first the rhetorical changes and then the redirection of the EU RTD policy in the nineties? We consider that the new directions of EU policy suggest that *ideas* and policy frames, rather than *interests*, have had a powerful influence in policy reformulation. To account for both the changes in the rhetoric of EU technology policy, labeled the 'innovation policy turn', and the redirection of European RTD policies that the 5th Framework Programme represents, consideration is given to the new ideas and policy frames that have emerged as a result of the activity of expert communities in S&T policy domain.

In this section we will describe the onset of the RTD activities and the setting up of the technology policy in the eighties, including its later institutionalisation; we will apply to the argument the relevance of ideas and policy frames in order to complement the explanation of the evolution of European RTD policies. For each stage we will describe

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[6] Other papers explaining the features and evolution of the S&T policy (Dickson's (1984) analysis of "the politics of science" and Elzinga and Jamison (1995) studies of "the changes of agendas in S&T policy") are also examples of the use of interest group models.

actors, contexts, ideas on the relevant problems, policy frames and models of intervention.

2.1. The early models of European RTD policy.

The firsts steps for the construction and development of an active policy in research and technological development were the result of a multilateral initiative[7]. The main players were the governments constructing the European Communities, either motivated by their strategic interest around nuclear energy or by industrial pressure in favor of these developments. In the 1950s there was a deep seated belief that nuclear energy was the source of an industrial revolution on its way. European governments and companies were lagging behind the US. The inception of the European RTD policy has been interpreted as result of the inter-governmental dynamics motivated by the apparent needs of scale and technology standards in, at the time, a promising technology. The basis of European co-operation in the initial years of EURATOM was to do what the countries could not do by themselves.

The perceived problem was demanding action, but at the time the repertoire of solutions was quite limited. In those years, the dominant model of public action in S&T was direct State intervention. The policy frame adopted in the Communities was quite similar to the models followed by the member states: the establishment of a big research center, but in this case a multinational one. Governments delegated the mission of designing a set of nuclear standards to a group of scientists and a research institution. The instrument chosen for enforcing these political goals was direct action through the Joint Research Center (JRC): this model followed the existing frames of public action in this terrain, the prevailing 'science policy' paradigm of the time, based on big science. The first two EURATOM five-year research programmes emphasised direct research in JRC facilities.

However, there was some ambiguity regarding EURATOM's objectives, which moved from being an instrument of industrial policy to one of energy policy, and finally to become a nuclear research organisation (see Guzzetti, 1995, ch. 1). The tension between the different countries on the missions and activities of JRC, the lack of agreement on the standards for nuclear technologies and the re-nationalisation pressures in favour of national activities and industrial champions pushed the JRC into an institutional crisis.

The nuclear research policy could hardly be considered successful in terms of accomplishment of S&T objectives, but with the direct involvement of European bureaucracy in RTD a new (non-national) actor that would play a role in the next stages of RTD policy development was born. A large European public research-performing institution with more than 2500 people was consolidated. Later, this large group of scientists became a source of science administrators for the European Commission.

Nonetheless, with the crisis of direct implementation of research by the European institutions as a background, new pressures for developing research collaboration and

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[7] RTD activities within the three treaties which established the European Communities covered only very limited areas: coal and steel (through the European Coal and Steel Community -ECSC, 1951, art 55), agriculture (through the EEC, 1957, art 41), and the most important, nuclear energy (EURATOM, 1957, art 2, 4-11).

setting up an European RTD policy emerged at the end of the sixties and the beginning of the seventies.

2.2 Setting up an overall European technology policy.

At the end of sixties, an increased concern in European society about its economic dependence on the US, and the need to develop a 'European strategy' emerged (see, for example, Servan-Schreiber, 1967 or Straus, 1968). The issue of the low level of the European R&D expenditure in comparison with the US, and the problem of the technology gap started to dominate the discourse that eventually framed policy-making in RTD. A transition to a 'technology policy' was taking place: no longer was the focus exclusively on research implementation and big science, but was given to the industrial collaborative dimension of technological development at European scale[8].

In the seventies, the overall concern of the European Communities was to design a common trade policy. But at the 1972 Paris Summit many of the new common policies were born, and specifically, a commitment was made for a gradual implementation of a common policy with respect to scientific research and technological development[9].

In 1973, three more countries joined the EEC and a new Commission was appointed. The Commission created a specific Directorate-General for "Research, Science and Education" setting up the organisational basis for new S&T policy. However, there was a bureaucratic separation of industrial technology affairs from research and science. This has produced long term effects of consolidating diverse policy frames, that in fact has even diversified policy boundaries. We can describe them as: 'science policy' (that is linked to the traditional academic interest which insists on the basic issue of scientific collaboration), 'technology-industrial policy' (as the new form of policy for promoting industrial development) and 'information technologies frame' (a kind of specific type of frame linked to the critical relevance for the future of competitiveness of IT industries).

In 1974 the Council adopted a resolution "authorising the planning for a medium-term Community programme to promote research, industrial development and the application of information technology", thus an EU RTD policy[10]. The focus of the Community action started to change from in-house research activities to Community 'indirect

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[8] European scientific collaboration has been a background idea in EC S&T policy and it could be an objective in itself.

[9] The development was based on tactics such as: "Jointly selecting and drawing up of a coherent set of long-, medium- and short-term objectives and the priorities (...); ensuring the co-ordination of national policies; determining those projects of Community interest (...); setting up permanent consultative machinery, through which the Member States can (...) decide on the common (... issues ..); and determining the resources required (...) and choosing the administrative or technical structures (...)" (*Bulletin of the European Communities*, sup 14/73).

[10] The Commission Plan was proposed by the new Directorate and the Cabinet of Commissioner Darhendorf and was a substitute for an earlier proposal prepared by Commissioner Altiero Spinelli, which was not taken up by the Council (see Haas, Williams and Babai, 1977). In opposition to Spinielli proposal, Darhendorf adopted the principle of Community action just aiming to supplement by collective means what they could do less well nationally. In fact, the big countries (France, Germany and UK) imposed quite early the model of "subsidiarity" in European RTD policy, a feature that still is part of the policy frame today.

actions'. Initiatives in support of 'joint R&D' or 'research collaboration' were demanded to solve the problem of 'small scale of European firms'[11].

A new European RTD policy frame was emerging. The new policy frame was based on the development of "incentives" (mainly funding) for RTD actors (especially firms) in key technologies and was consistent with general changes in OECD countries. The new forms of action were indirect measures in support of RTD. The European policy frame started to evolve from direct RTD implementation to incentive RTD implemented by other actors and it was directly managed and administered by Brussels bureaucracy through an "internal policy".

This process of maturation of the initiatives took some years and the EC RTD policy was characterised by a weak legal basis. The first decisions to experiment with further R&D collaboration by Community action were taken by unanimity. The emerging frame developed a new concept of European RTD policy as programs aimed to develop new technologies, thus to overcome the handicap of European technologies vis-a-vis the Americans and the Japanese. The main emphasis was helping firms in the production of new technologies. However, in those years the main form of action was still research through the JRC.

These actions did not add up to any sort of coherent policy and were incidental to overriding economic objective. There was little institutionalisation, and action was not based on an established set of rules for RTD policy-making. The process seemed to have been a perfect example of the 'purposeful opportunism' style of policy making. The basic movement into the new direction has been characterized as a result of "policy entrepreneurs in the EC" combined with the mobilization of the interests of the twelve big European information technology companies (see Pollack 1994)[12]. However, it is reasonable to characterise it as an amalgam of Commission entrepreneurship, a long tradition of industrial policies for promoting national champions in member states and a sympathetic scientific community supporting European research policy.

From the beginning, the new RTD policy was not a coherent set of actions, but rather an aggregation of initiatives taken by different (even competing) directorates. But the principles for a coherent policy in RTD started to develop, and these were the political outcomes of interaction between different actors' interest, intergovernmental negotiations, and ideas to tackle the problems identified. The need for unanimous agreement created the context for 'stop and go' development of RTD policy (Sharp, 1989). The co-operation between European countries to meet the challenges was accepted, but there was still tension between the rhetoric of international scientific co-operation and the *de facto* construction of national champions. It was in those years of

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[11] In 1968, the European Commission made explicit a position on "joint research agreements by firms", saying that they did not restrain competition. It was an explicit authorisation to enter into "indirect action" for RTD collaboration.

[12] Scharpf (1988) provides an alternative explanation to the expansion of the EU agenda, which describes the basic policy dynamics as a result of the emergence of a transnational "constituency" of policy specialists in favor of joint spending programmes, ranged against policy generalists in the Finance Ministries of the member states, who can be expected to oppose greater expenditures of any sort.

experimentation when the EC defined a set of criteria and operating procedures for evaluating existing programmes and selecting future ones for Community support[13].

Even when policy action in RTD was limited, a systematic strategy of getting ideas and policy analysis for the long run was defined. First there was the project "Europe + 30" and then since 1977 the pilot phase and the different rounds of FAST, which created the conditions for the development of a "RTD policy analysis community" that was able to supply new data, studies and ideas for S&T issues in Europe. The bureaucracy created and sponsored the development of systematic knowledge and policy analysis on the RTD situation, analysis of the RTD environment (monitoring changes and requesting new initiatives) and increasing concern about the effects or impacts of the policy actions already taken (the promotion of RTD evaluation in the early nineties).

The cornerstone of the new orientation to cope with the competitiveness problem of the European industry was the initiative taken by the Commissioner Davignon, approved in December 1982 for a pilot phase, the European Strategic Programme for Research and Development in Information Technology (ESPRIT). This programme was prompted by the weakness of European IT industry compared with those in the USA and Japan[14]. The experience marked the beginning of the new policy form. It contributed to setting the principles, objectives and priorities for RTD action in the following years. The approval of ESPRIT programme is considered especially important for anchoring European RTD policy to the EC's economic objectives. In those years there was also scientific activism in favour of higher involvement by Europe in R&D. However, the advocacy coalition in favour of expanding the EC's RTD funding competencies was able to recognise that there was a competing policy frame (economic development and competitiveness) which had to be accommodated if the RTD advocacy coalition's entrepreneurship was not to be stalled.

Many (industry-dominated) initiatives were launched, but an internal organizational commitment was emerging in DGXII to control or "coordinate" the activism of the industry-oriented units. In this vein, the 1981 Communication from the Commission to the Council on the Community's research and development strategy for the 1980s included the proposal that all research activities should be included in an overall framework programme.[15] In fact the emergent proposal of a coherent policy associated to a framework program could be partially seen as part of Brussels bureaucratic politics, to guarantee legitimization by the Council. In 1983, during this very active period of growth in EC's RTD policy competence, the Council adopted the *First Framework*

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[13] E.g. Community involvement should: avoid duplication and promote rationalisation of efforts. Promote trans-national research, involving issues crossing national boundaries. To focus on project where R&D costs were high and potential markets were international. Drive to common requirements and international standards. These principle were later institutionalised as Reisehuber criteria.

[14] The ESPRIT action included some features that were novel to Community programmes at the time, such as: a) the participation of industry in all stages; b) an emphasis on 'pre-competitive' research, involving generic research of which results were expected to be of widespread applicability; c) at least two companies (from different Member States) were required to collaborate in each project, with universities and other research organisations also participating; and d) a contribution by the Community of 50% of total research costs.

[15] However, it took many years to finally incorporate into the Framework Programme almost all EU RTD activities.

Programme for Research and Development (1984-1987)[16]. On the operative side of the new policy frame the **'Reisenhuber criteria'**[17] were established to provide guidelines on the type of projects appropriate for Community activity.

2.3 The institutional consolidation of the policy domain

In the mid-eighties a significant change occurred in RTD policy, because of new institutional arrangements. The Single European Act[18] provided the first specific legal basis for Community action in RTD. SEA's main political objective was the completion of the internal market that became the target of the Delors Presidency, but it also included some other procedural issues, such as reforms of decision making procedures and the increasing role of the European Parliament. The Community RTD policy was be developed through the R&D Framework Programme and specific programmes. The main purpose of RTD policy for the SEA was "strengthening the science and technology bases of industry in the Community".

Technology policy consolidated in the Community policies as one of several 'distributive' policies associated with the emerging issues of the internal market. However, it must be mentioned that the SEA also set up the principles for some of the new generation 'redistributive' policy actions such as the structural funds (European Regional Development Fund, etc.) concerning issues of socio-economic cohesion.[19]

With the new institutional arrangements, the *Second R&D Framework Programme (1987-1991)*[20] was designed with much stress on research related to the needs of industry and the realisation of the Single Market; but the 2nd FP gave also the first signals of change in S&T policy boundaries and first attempts to upgrade RTD policy competence by demanding its integration with environmental, social, industrial, agricultural and economic policies. In a sense, it might be seen as an attempt by the RTD advocacy coalition to break out of its traditional closed circuit in DGXII and

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[16] The new First Framework R&D Programme consolidated the trends for change: the proportion of funding devoted to energy research declined, while research to improve industrial competitiveness rose from 17% to 32% in three years, and more than half of the total funding was for indirect action rather than being undertaken by the JRC.

[17] These led to a preference for: a) research conducted on so vast a scale that single Member States either could not provide the necessary financial means and personnel; b) research which would obviously benefit financially from by being carried out jointly; c) research which complemented work carried out at a national level; d) research which contributed to the cohesion of the common market, and which promoted the unification of European science and technology; as well as research that led to the establishment of uniform laws and standards. (Guzzetti, 1995).

[18] Signed in February 1986 and entering into force on 1 July 1987.

[19] Even the 2nd FP introduced the new theme ('social cohesion') which was encapsulated as a fifth criterion for Community funding; the criterion referred to 'research which contributes to the strengthening of the Community's economic and social cohesion, as well as to the promotion of its harmonious and widespread development, while maintaining its consistency with the objective of technical and scientific quality.'

[20] Sixty percent of programme funding was for industrial research; where information and communication technologies were the biggest recipients, while the importance of energy declined. More R&D activities were integrated. A further development during this Framework Programme was a radical reform of the JRC.

DGXIII. But also it was a recognition that in the implementation process, RTD policy frames were seriously challenged by competing frames which were equally embedded and institutionalised in other parts of the Commission. One example was DG XVI, responsible for regional policy, which at the end of the eighties started to experiment with regional innovation policies through STRIDE.

This strong association of RTD with industrial orientation (and big companies) produced a reaction from scientific and academic actors. With Ruberti, a former university professor, as Research Commissioner, the 1989 Aigrain Report of the Framework Review Board formulated criticisms on the existing FP and suggested more orientation to the scientific bases of the Community. The report was mainly a reaction against the dominance of big firms' interests. This evaluation produced a significant effect in the new approaches, with the intensification of the general S&T training and mobility activities as core issues. The *Third R&D Framework Programme (1990-1994)* included much more EC R&D activities than the previous FP, with a significant reduction in the total number of programs.[21]

The Maastricht Treaty[22] also introduced new reforms. One of the main objectives of the Treaty was the completion of the Economic and Monetary Union, but it also included environmental and quality of life objectives to "compensate" the economic growth ethos of the Community. The Treaty defined EU RTD policy as falling within the EU's priority actions (article 3) and marked another major increase in the degree of institutionalisation of RTD policy at the European level, expanding it from "industrial competitiveness" to support other objectives defined in the Treaties. Additionally, the European Parliament, with increased powers, had played an active role in favour of more RTD policy, with favourable modifications of the EC budget, an area in which the Parliament has significant powers.

However, policy creates it own politics (Lowi, 1968) and this could be seen as a side effect of the new forms of RTD policy. The RTD policy programs approved (such as IT), adopted the typical form of a 'distributive policy' (Lowi, 1972), creating very rapidly a political game associated with pressure politics (either by national governments expecting more benefits or from the different clients of the programs) with different interests producing diverse demands. The vested interest of actors in very stable institutional environments creates the conditions for very limited policy innovation. Here is when ideas, policy frames and epistemic communities contribute to the explanation of the emerging innovation policy turn.

3. The emergent innovation policy frame.

The cumulative impact of the SEA and Maastricht institutional reforms further deepened the 'governance structure' for EU RTD policy-making. The concerns for co-ordination and further integration with other EU policies contributed to the emergence of a new policy frame: innovation. Over time, the innovation frame has enabled the RTD policy coalition to engage in 'policy conversation' (Schön and Rein, 1994) with

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[21] The share of information and communications technologies actually fell slightly, although it continued to receive more than half of the funding. Energy research continued to fall, while there was a significant rise in funding for the area of 'human capital and mobility' concerned mainly with training initiatives.

[22] Signed in February 1992 and entered into force on 1 January 1993.

other policy sectors. Thus the RTD coalition has, therefore, developed a frame which has a capacity to create synergy with other policy sectors, but at the same time it has the internal contradiction of interest with some of its members, that have become critical players in the RTD Framework Programmes.

After the institutionalisation of EU RTD policy, the Commission initiated a process of policy change in the mid 1990s. Why has the EC Science, Research and Technology Directorate suggested a reorientation? The most probable reasons are that the gap in RTD with the US has not changed significantly as a result of European RTD policy, the fact that the competitive position of the EU economy and firms has not correlated with European RTD policy, and the need to reinforce the links of the S&T policy with the more central European policies such as monetary union, competitiveness, employment and social and cohesion.

This policy shift appeared not as a result of the mobilisation of special interest, but as the by product of a new policy frame in relation to a gradual but remarkable transformation of the policy paradigm. The forces that pressure the evolution of the policy are linked to both the emergence of a set of epistemic actors (EC bureaucrats, academics, policy analysts, consultants, etc.) and to the redefinition of the normative models of policy intervention. The new policy frames, new ideas or causal models developed by the policy actors became the dynamic element in the discourse and the orientation of EU action in S&T.

Three parallel cognitive developments organisationally supported have been the basis for the policy turn: Firstly, the work with indicators and policy analysis developed early within the Commission by FAST, later by MONITOR, SPRINT or INNOVATION; secondly, the evaluation and monitoring exercises of the RTD Programmes and the attempts to measure the socio-economic effects of the FP; and thirdly, the analysis of RTD policy within the OCDE Technology and Economy Programme (TEP). The normative results of these analytical exercises have converged on the need that more effort should be put into the use and diffusion of technology and on the need to approach technology policies from a broader systemic approach based on innovation.

The impact of the normative statements from TEP had a special relevance, it represented a plea for moving beyond the supply-side RTD policy towards a demand-side oriented policy, which would also pay attention to the issue of diffusion. "There is today an implicit bias in most science and technology policies in favour of the supply and creation of scientific and technological knowledge and against demand and diffusion of technology" (OECDb, 1991); the point of departure of the OECD was the observation that the potentials of technology were under-utilised in economic as well in social terms, because the economic benefits emerging from the investment in the developments of new technologies depend more and more on the adequate embedding of technology in society.

Similar ideas were already stated in a 1992 Commission Communication to the Council and the Parliament (*Research After Maastricht*); issues such as the limits of EU-funded research, the need to construct linkages with other EU policies, and the arguments in favour of greater selectivity and concentration of activities. The convergence and the new combination of 'frames' (with other policies) set up the condition for reshaping the approaches to RTD policy. It should be reminded that within this context DG XII and

DG XIII produced an influential set of studies and analyses under the FAST/MONITOR and SPRINT/INNOVATION programs respectively[23].

Furthermore, of central importance in the policy learning process of the European Commission officers in charge of the initiatives of RTD policy was the systematic exercises of program monitoring and evaluation, and the attempts to measure the socio-economic impacts of the EU RTD promotion activities.

The process of re-drafting the discourse on the overall objectives of the Community RTD policy passed a landmark in 1993, with the *"White Paper on "Growth, Competitiveness and Employment"* (EC, 1993), that endorsed the research role to support competitiveness in favour of economic growth and employment, and the need to reinforce RTD efforts. In addition to the traditional mention of needs for improving the co-ordination between national policies, the White Paper insisted on the need for collaboration between users and producers in the context of defining research priorities, and for concentrating efforts. The *Fourth Framework Programme (1994-1998)* was approved, but its design did not capture the strategic discussions at the time, showing a clear continuation of the trends of previous framework programs. The minor changes it introduced were incremental allocations to particular research areas and limited attention was given to the emerging issues like technology diffusion, training, or research in areas of interest for quality of life.

The consolidation of the new policy frame advanced in the White Paper came with the *"Green Paper on Innovation"* (EC, 1995), a crucial document aiming to develop an overall and integrated strategy around the idea of innovation. Its major objective was to re-align scattered policy areas and develop a new regulatory framework around the issue of innovation. After a long process of debate all over Europe, the *"First Action Plan for Innovation in Europe"* (EC, 1997) was presented. The novelty of the new policy frame was that it did not consider additional funding to RTD, but it suggested the re-organisation of already existing policy areas and the development of new ones.

Thus the new policy frame was developed by units within the Commission and the OECD, involving bureaucrats and experts, but where did the normative ideas about innovation come from? The answer is that there was a significant set of S&T policy analysts accumulated in some research centres and consultancy companies, whom contributed significantly to the stock of empirical knowledge available on RTD policies. In a more disciplinary way, since the mid-1980s, there has been an emerging theoretical stream in economics studying technological change[24], with a new understanding of the innovation process.

Unlike the linear model of innovation process which characterises the translation of scientific production into industrial production as being almost automatic, new approaches have stressed the social and institutional embeddedness of innovation. Innovation entails complex forms of learning along codified and tacit forms of knowledge, and these take place within formal and informal institutional settings that constitute the complex social, political and economic environments for firms (Lundvall,

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[23] A significant example is *A Maastricht Memorandum*" (Soete and Arundel, eds., 1993), that was sponsored by the DGXIII under the Sprint program, that again suggests a reorientation of RTD policy towards a technology diffusion oriented policy.

[24] Different labels have been used to identify them, like neo-Schumpeterian, institutionalists or evolutionists.

1992). The 'learning' and 'institutional' dimensions in the new economic understanding of the innovation process have normative implications for policy design, which are different to the one provided earlier by neo-classic economics (Edquist and Hommen, 1999; Metcalfe, 1995). From these views a wider and more systemic notion of RTD policy including human resources, standardisation, patenting, procurement and competition rules is advocated (Lundvall and Borrás, 1997).

The gradual development of this new empirical knowledge about S&T policies and new normative rationale have had an impact on policy making via the role played by experts in OECD, national and Commission forums. The communication and dialogue between experts and bureaucrats has been so close and intense that the new frame has developed in a rather interactive way[25]. An emergent RTD or innovation policy epistemic community could be identified. Once the new ideas have been translated into the strategic EU documents and declarations, another question emerges: to what extent has it been viable to put into practice the recommendations about integrating scattered EU actions? In other words, how far has the new innovation policy frame been implemented? What are the chances of transforming, not only the discourse of public action, but also its practice? Asking these questions about the implementation of policy frames is of paramount importance in order to avoid rationalistic assumptions about how ideas influence policy development.

The RTD Framework Programmes involves distributive politics, thus problems may arise, like the resistance of countries and special interests to radical changes in objectives, procedures and funding allocations. For example, national representatives using calculations of the prospective distributive consequences of the new policy developments usually will try to include 'priorities' that correspond to their specific capabilities creating a shopping basket model of policy action. We should recall also the strong criticism from an academic perspective made in an editorial of *Nature* to the EC proposal for the 5th FP.

In terms of the bureaucratic politics of the EC we find also barriers that may emerge. First, barriers related to the consistency of the new RTD policy frame with related policy frames in fields like competition or regional policy. Second, barriers related to institutional and bureaucratic resistance from the administrative units whom supposedly have to re-align their frame of action. The fragmented administrative structure of the Commission, with various different DGs involved in the definition and implementation of RTD policy, and other DGs related to issues like SMEs, education, regional policy and the like, does not per se facilitate the implementation of new guidelines emphasising co-ordination and synergy[26].

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[25] Economists and policy analyst have benefited from this interaction as much as policy-makers, in the sense that the later have forced the former to elaborate more on the normative effects of the new theoretical developments. The policy rationale did not exist as an ex-ante product of the quite abstract reasoning in academic circles, but rather it is the fruit of a social embedded interaction between academics and civil servants. The dialogue between experts and EC officials has been about the political construction of expertise, and about the fluidity in the formation and articulation of ideas that later on become institutionalised in a new policy frame.

[26] In fact today there is not a coherent set of interventions that support RTD policy built up on cognitive models, but an aggregation of different initiatives with various origins and different strategies that leave room for policy experimentation.

The point is that beyond the fact that some of the reforms of the Amsterdam Treaty could facilitate the dynamic of change, there are other institutional elements supporting the continuation of the traditional policy boundaries and the patterns of RTD policy intervention associated to the distributive politics of RTD policy. The manner in which the Framework Programme is then institutionalised could even be an obstacle to changes, because there is a quite successful coalition benefiting from the distributive policy of the FP - countries, firms, academics, etc.-, in the same way that the bureaucratic politics.

European RTD policy has created its own politics with little room for policy innovation. Conditions of policy innovation usually emerge when there is a persistent perception of "failure" of the previous policy. However in areas like RTD policy, in which detecting the effects of the previous policies could take many years, the pressure for change emerging from analytic point of views need to be complemented with the construction of new coalitions that could change the balance of the existing vested interest. Will the changes proposed result in implementation, besides the interest and existing institutional arrangements? Will the evolution of the RTD policy be able to select new modalities of intervention, even though they transform the coalitions supporting it? An example of the difficulties in implementing substantial and radical change in EU RTD policy might be found in the new Fifth Framework Programme (1998-2002). Without denying the novelty of the new framework program design[27], our question turns on the extent to which it has decisively contributed to enforce the new innovation policy frame. It is currently difficult to say how radical a change the Fifth Framework Programme represents and how far it is actually contributing to the new policy frame focusing on innovation. The new organisational flexibility and the emphasis on horizontal public actions are positive clues in this direction. However, its decisive and really 'revolutionary' nature will pretty much depend on its ability to generate synergetic dynamics with the actions defined in education, industrial, and regional policy fields and to contribute to the transformation of the historical boundaries of RTD policy[28].

4. Conclusions

We have been describing the evolution of the European Research and Technological Development policy and studying its dynamics. The traditional explanations insisted on the relevance of national or special interests, like industry or academics, or on the entrepreneurial role of the European Commission in an attempt to gain relevance and power as the European government. However, we have called the attention to the role of

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[27] We can identify some changes. First, there has been a concerted effort to improve objective setting at all levels, with the use of criteria such as: social aspects (especially employment), economic development (improving competitiveness), and 'European added value'. A second novelty is the attempt to further concentrate and select, with a limited number of programmes and 'key actions', and enhancing the flexible implementation of the programs. And third, there is a general approach characterised as "solving problems" that subordinates the promotion of RTD activities.

[28] During the preparation of this book, in January 2000, the new Commissioner, Pierre Busquin, has forwarded a Communication, *Towards a European research area*, that jumps directly into a basic restructuring of the European policy in this field aiming to transform the usual distributive debates around the design of the Framework Programmes into a strategic one.

cognitive elements and ideas as a key factors to understand the dynamic of policy change, especially when we consider the innovation turn in EU policy.

In the nineties the basic structure of European RTD policy actors has become quite stable, due to the high institutionalisation represented by the Framework Programme in the RTD policy domain. However significant changes have been detected in the RTD policy discourse reflecting an adaptive reaction to new elements in the European policy environment. Economic conditions in the mid-1990s - unemployment, how to secure growth in an enlarged and very uneven European economy, etc – were in the background of the policy-makers' search for new responses and a new policy frames. Another feature was the acceptance and introduction of metacultural frames into the policy arena, such as "environmental sustainability", "societal needs", etc. But what have been the forces behind this evolution?

Our suggestion is that the ideas, and the policy frames, which help match problems and solutions, have played a substantive role; but so has the consolidation of a epistemic community around the issues of RTD policy. The *Green Paper on Innovation* accumulated significant elements brought about by recent theorising in the economics of technical change and the social shaping of technology, and incorporated significant knowledge emerging from the evaluation of European RTD and S&T policies. In this sense, the document serves as an expression of a new re-framing process which has involved an interactive learning between the Commission officials, external experts (academics and consultants), and policy makers from other countries.

The changes can be explained, partly as a result of the policy developments: institutional continuity fine-tuning through internal exercises of evaluation and learning within the institutional dynamics of EU RTD policy, and partly as a result of new analytical approaches and theoretical frameworks and the interactive generation of ideas between the experts and officials in the different deliberative forums provided by the OECD, the EU Commission, and the other policy arenas.

The new discourse about innovation is nowadays consolidated within the conventional Commission RTD policy rationale. However, the attempts to implement the new policy frame in the 5th Framework Programme have not been fully successful. Generally speaking, when the rhetorical changes moved towards implementation, some academic interest started to resist the new policy frame. This shows that if the new innovation policy frame succeeded in the second half of the 1990s is because it remained more at discursive level and it has not substantially challenged the material interest benefiting from the funding by the present EU RTD policy.

Further empirical research about the implementation of the innovation agenda is needed in order to explore the reality of such turn, and its impact on the political objectives it pursues, namely, competitiveness and employment. But we could expect that to implement the innovation policy turn in a consistent way a new advocacy coalition of interests would be constructed and, at the same time, further pressures blurring the traditional boundaries of RTD policy would be made at the European level.

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